Lectures and articles

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International Health Exhibition,
LONDON, 1884.

JULY 16TH, 1884.

LECTURE ON "STREET ACCIDENTS AND THEIR AMELIORATION."

By DR. JAMES CANTLIE.

The chair was taken by Surgeon-General SIR WILLIAM GUYER HUNTER.

The CHAIRMAN in introducing the Lecturer said:—We are summoned to hear a lecture on street accidents and what should be done in the event of an accident occurring in the street, to provide for the emergency until such time as the sufferer can be taken to the hospital and properly treated. A person may receive an injury causing hemorrhage and might die from that hemorrhage during the time he is being carried to the hospital, and therefore it is a matter of the greatest importance that the bystanders should know what should be done under the circumstances and should be able to treat the case in such a manner as to avoid immediate death or serious injury. Dr Cantlie's lecture will be a practical illustration of what should be done under such cases and will be illustrated by models and on a living subject. By means of models I will shew the nature of the injuries, and on the living subject the appliances to be used for the relief of a special injury to which the person has been subjected. I do not think I need say any more on this head, but with reference to the parade of the ambulance or bearer company, which will take place in the Exhibition grounds after the lecture, I may say that the gentlemen who will take part are representatives of about 20 students from Charing Cross, St. Thomas's, the London, and one or two other hospitals. They are medical students who are learning the duties which will qualify them, in the event of a foreign war, to take the position of officiers of ambulance, or bearer companies. The medical department cannot always provide a sufficient number to meet all emergencies, and during their pupilage these medical students are studying the nature of the drill and the means of meeting emergencies on the field, and they will therefore be of material assistance to the army medical department in case of a foreign war.

LECTURE.

I will first shew you a few particular applications of bandages before going to the question of broken bones. In the first place, I will shew you the bandages for the head such as you apply in case you have to put a poultice on the cheek or jaw. You know that you very often find when you put on a poultice that, when you go to bed, the cold air gets in between the poultice or the brown paper, or you cannot keep it on, it slips off. The usual way is to tie it to the top of the head, and after you have been in bed a few minutes, it falls off. The way to correct that is simply to cross it at the top of the head and tie it beneath the chin. Then, again, a bandage for the top of the head is generally applied so as to cover the whole head, which makes it very hot, and probably the patient wakes up with a headache in the morning. To prevent that you should use a fourtail bandage which will cover the top of the head—usually two ends are tied behind and the other two ends under the chin—but the same kind of thing is also useful for a bandage to the forehead or the back, and having the tails slightly longer it is also useful for the chin.

With regard to slings anyone who has been through an ambulance course knows how to put on a sling, but it is not quite so easy to put a bandage on the chest such as is

required if you want to put a poultice or a dressing on that part. That is done with a triangular bandage. In older days we used to see large square pocket handkerchiefs, which folded diagonally made such a bandage; but those old handkerchiefs are now discarded, and the modern small pocket-handkerchiefs are of no use for such purposes, and we have therefore to introduce a small triangular bandage. This is put across the chest, but in tying it, it will not do to tie it in a knot at the middle of the back, which would prevent the patient going to sleep, or the other knot just at the edge of the shoulder where it would catch on the pillow, and also be uncomfortable. The way is to tie the one knot just at the side and bring the other part up over the top of the shoulder, so as not to interfere with the patient sleeping either on his side or on his back.

We will now come to broken bones, which are very common in street accidents, when a person or child has been run over. Now when people see an accident, say a child run over in the street, the first impulse is to go and catch him up, but the consequence of this is that, if the leg is broken, the lower end of the leg hangs over your arm and the broken end of the bone comes right through the skin. To prevent that you should never attempt to carry a person to a safe place, but attend to them where they fall, not carry them to the hospital or even to the pavement, or else you very likely produce a much more serious accident. In these cases it is often not the cabman that does the damage, but the ignorant person who picks up the sufferer and carries him. [This was illustrated by a model.] You can easily recognise when a bone is broken, because the limb becomes shapeless and assumes an unnatural position. When a person is lying on his back with the two feet together, the two feet are in the same position; and if one foot is lying on its outside, in a position which it would not take unless some accident had happened, common sense will tell you that the bone is broken. [This was illustrated by a skeleton showing the position of the foot in the case when the thigh bone was broken.] If a cart wheel has passed over the thigh and broken the bone, the limb shortens and one foot lies on one side, and one leg appears shorter than the other. The first thing to do is to get the broken limb in the proper position, and to do so, you must stand at the foot and pull it down until you get it in the same position as the sound limb, and then tie the two limbs together. I will show you first how to treat a case of a broken thigh like that. In such a case there may be further injuries occur besides the fracture, because there is a large bloodvessel in the thigh, and the broken end of the thigh bone, if it is shaken, may go through it, and if that occurs the limb would have to come off. You have to take care not only that the bone shall not come through, but that it shall not pierce the bloodvessels. You have, therefore, when you have got the limb in the proper position, to keep it there; you must not leave go of it while you go and look for a splint, or for some one to assist you, but you must get some one to hold the two feet whilst you go and get the splint. That is easily done. You have only to go across to the first house and get a broom-handle—but I must specially impress upon you that when you have once straightened the limb, you should never leave go of it until it is fastened. If it is in the middle of a crossing, at the Bank, or at Charing Cross, never leave go until it is fixed. You need never be afraid of being run over. No human being was ever run over twice at one point, nor was any one ever run over kneeling down in the street, it is only when you are walking or running that you are run over; therefore do not be afraid to attend to an accident in the most crowded street wherever it may be. Supposing it is not near any houses, that it is in a country-lane, what can you get then? You can get an umbrella—that is hardly long enough, but that will serve the purpose—and if you have not an umbrella or a stick, and cannot leave the person to search for a stick or a broom-handle, what are you to do then? There is a splint which has been there

for the last 3000 years, though it has only just been discovered, and that splint is the other leg lying alongside of the broken one. Ever since the creation of man it has been there, but it is only within the last few years that it has been found out. If you cannot get anything else, all you have to do is to tie the two limbs firmly together; but I will first show you how to do it with the broom-handle. You put the splint alongside the outside of the limb, get some one to hold the two feet together, so that there is no chance of the limb slipping back, then without lifting the limb pass the handkerchief just behind the heel, where there is a hollow, and tie the two feet firmly together. Then there is another hollow behind the knee where you can tie it in the same way, and again under the hip. Then if the patient lying with his head on anything you cannot get your hand under his back, but if you let the head go back a hollow immediately rises in the back, and you can pass another pocket handkerchief round there and so secure the splint. Then he is in a condition to be moved about. Now, supposing you had no broom-handle, you proceed just in the same way, and it secures the limb, though it is better to have some kind of splint as it keeps it more stiff.

Next I will shew you how to manage a broken leg. The police are now being trained, thanks to the St. John's Ambulance Association, and of course among poor there is no more useful class of men to be trained for this purpose than the police. They always have useful appliances with them, which can be utilized as splints and bandages. A policeman's truncheon serves as a splint for a broken leg, and the badge of office which they wear round the wrist, makes a very good bandage. All that two policemen have to do in case of a broken leg is to get the two truncheons—one holds the legs steady, whilst the other puts the truncheons one on each side of the leg, passes the buckle strap round in the way I shewed you just now, behind the hollow of the ankle, and buckles it tightly. Then to make it more secure the policeman's belt is very useful, because it can be put round the ankles, crossed, brought over the feet, and buckled tightly beneath the feet which makes the whole thing secure. An umbrella makes a better splint than a stick, because it has a number of lateral supports. You put the umbrella outside the limb and the ribs support it and form a complete casing, and then you tie the two limbs firmly together.

Now I will take the case of a broken collar-bone. First you want a large pad under the armpit to prevent the two ends of the bone over-riding each other, then a sling to support the arm, and then a bandage around the body, and then the patient may be safely moved.

Now in the case of a broken arm you always want to keep the arm bent. If an accident happens to the leg you want to keep it straight, because if once the lower extremity gets set in a bent position your only means of progression would be by a sling under the knee, but if you get the lower limb straight after an accident, you would then with a swing of the leg be able to get about and have a useful limb But supposing it is the upper extremity, and that recovers in a straight position, you cannot get your hand near your mouth, and it is utterly useless to you to do anything with except to carry a pail, or anything like that. You cannot feed yourself, you cannot write, you cannot earn your livelihood, nor eat it when you have got it, therefore the upper extremity must be bent, not straight. Then you must also take care what position you put the hand in. When it is getting well, it should be moved by some one every day to prevent it getting stiff; but very often the patient says, "Oh, wait till to-morrow, till the inflammation goes down," and so it gets put off. There is no inflammation, but he says so, and so it is not moved and may get stiff, and therefore it is impoetant that it should be put in the best position in the first place. Then, to fix the arm, you take two pieces of stick and cross them at the two ends and tie them with a pocket handkerchief—that makes an angular splint which will prevent the arm getting straight—you tie one to the arm,

and the other to the forearm, and then the person can walk down the street to the first Doctor's house.

The next thing I have to tell you about is hemorrhage, or bleeding. There are large veins at the bend of the elbow; the veins are blue and carry the blood back to the heart, and there is a large vein just at the bend of the elbow where people used to be bled from, and it is a common place for committing suicide from, especially in the East. If a cut is made across that place not very deep, it cuts the veins, but if it cuts deeper, it cuts the arteries. If the vein is cut at the bend of the elbow, the blood from the veins which is going back to the heart is of a dark blue, or purple colour. [This was illustrated by a model.] To stop that bleeding I have only to put my fingers on it. I then take a bandage and tie it up tightly, and then put a sling on. If you have not a pad to put on the vein, you can roll up the coat sleeve and that answers the purpose, and then tie up the forearm with the hand on the shoulder.

I will next show a case of bleeding from the thigh. It is not at all uncommon for the bloodvessels in the thigh to get wounded. A shoemaker, for instance, dropping a knife between his thighs and attempting to catch it, one end of the knife may be sent into the artery, and if you cut an artery then the arterial blood which is coming straight from the heart pours out of a bright red colour. I can stop that in the same way by putting my finger and thumb upon the vessel. Then I put a pad upon it and tie a handkerchief round the hurt tightly and so stop the bleeding. You must recollect that a bloodvessel always lies in a protected part, for instance, at the hip joint if the blood vessel were outside, every time you sat down, it would press on the bloodvessel and stop the circulation, therefore the bloodvessels are inside. Again, at the knee, it could not be outside, or when you knelt down it would be stopped, and therefore it must be behind the knee. In the same way in the other limbs, the bloodvessels are in the inside of the elbow, and on the inside of the arm they are always in the protected parts.

I have a cut here in the lower part of the the thigh and I want to stop that. I cannot walk a mile with my thumb on the vessel to carry the man to the doctor, so I put a pad on it and take a handkerchief and tie it tight round the limb; then I take a stick or a poker or an umbrella, or anything, and I put it through the knot and twist it round, and by that means I can increase the pressure. That is what is called a tournequet. Even if you forget where the bloodvessels are it does not matter, only put something round the limb, and twist it tightly, and you will stop any bleeding below. If you ask how hard you are to twist, simply twist till the blood stops, and then you have done enough. With another handkerchief you can tie the stick in its place to prevent it untwisting, and get the person carried any distance; it keeps him quiet, prevents the stick shifting, and keeps the compress on the bloodvessel. In the same way you can stop a bloodvessel at the back of the knee. The bloodvessel at the top of the thigh is the size of your forefinger, lower down it is the size of your little finger, down the leg it will be the size of a goose-quill, at the foot the size of a crow-quill, they get smaller as they go lower down. If there is a wound to the artery in the upper arm, I can stop that by putting my finger on it, then put a pad on it, tie it up tight, and there you can make a tournequet by means of a key. You can attach the end of the key below the edge of the bandage, put a sling on, and take the patient to the doctor. These are mostly the means for stopping bleeding from the arm, the leg, or the thigh. There is only one way of stopping bleeding from the head. If you have a cut on the lip you can take it between your finger and thumb, but sometimes there are wounds in the upper part of the neck. You know there are large bloodvessels there, and sometimes sharp things come across them, When that does happen what you have to do is to try and stop the blood. One young lady who thought she knew all about it, put a pad upon it, then put a handkerchief round the neck with a stick and twisted it,

She had not been through a St. John's Ambulance course however. She stopped the bleeding very effectually, but she did something more. You can only in such cases compress the bloodvessel with your thumb, which you always have with you. Alongside of the windpipe there are two big vessels which you can feel very easily, and if you hold your chin up and look in the glass you can see them; if you put your finger on there and press hard you feel an uncomfortable sensation in the head, and if you press hard enough you will find you have stopped all circulation of blood on that side. That, therefore, is the only way of stopping severe bleeding in that position.

I will now show you one or two methods of carrying and lifting. Supposing a man has his left limb injured, say a sprained ankle, he is just as helpless as a man with a gunshot wound through his thigh, he has to be put into the ambulance waggon, or carried in some way if it is in battle; in civil life there are as many difficulties as on the field of battle. If he has sprained his ankle on the left side you may not be able to carry him, but you can help him along very well by getting on one side, letting him put his arm on your shoulder, and in that way he can go along very well on the sound leg.

Dr. Cantlie then illustrated, with the aid of his assistants, the various modes of lifting, known as the fireman's lift, three-handed lift, and the four-handed lift, and the audience then adjourned to the grounds to witness the parade of the St. John's Ambulance Corps.

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I have a cut here in the lower part of the the thigh and I want to stop that. I cannot walk a mile with my thumb on the vessel to carry the man to the doctor, so I put a pad on it and take a handkerchief and tie it tight round the limb; then I take a stick or a poker or an umbrella, or anything, and I put it through the knot and twist it round, and by that means I can increase the pressure. That is what is called a tournequet. Even if you forget where the bloodvessels are it does not matter, only put something round the limb, and twist it tightly, and you will stop any bleeding below. If you ask how hard you are to twist, simply twist till the blood stops, and then you have done enough. With another handkerchief you can tie the stick in its place to prevent it untwisting, and get the person carried any distance; it keeps him quiet, prevents the stick shifting, and keeps the compress on the bloodvessel. In the same way you can stop a bloodvessel at the back of the knee. The bloodvessel at the top of the thigh is the size of your forefinger, lower down it is the size of your little finger, down the leg it will be the size of a goose-quill, at the foot the size of a crow-quill, they get smaller as they go lower down. If there is a wound to the artery in the upper arm, I can stop that by putting my finger on it, then put a pad on it, tie it up tight, and there you can make a tournequet by means of a key. You can attach the end of the key below the edge of the bandage, put a sling on, and take the patient to the doctor. These are mostly the means for stopping bleeding from the arm, the leg, or the thigh. There is only one way of stopping bleeding from the head. If you have a cut on the lip you can take it between your finger and thumb, but sometimes there are wounds in the upper part of the neck. You know there are large bloodvessels there, and sometimes sharp things come across them, When that does happen what you have to do is to try and stop the blood. One young lady who thought she knew all about it, put a pad upon it, then put a handkerchief round the neck with a stick and twisted it.

She had not been through a St. John's Ambulance course however. She stopped the bleeding very effectually, but she did something more. You can only in such cases compress the bloodvessel with your thumb, which you always have with you. Alongside of the windpipe there are two big vessels which you can feel very easily, and if you hold your chin up and look in the glass you can see them; if you put your finger on there and press hard you feel an uncomfortable sensation in the head, and if you press hard enough you will find you have stopped all circulation of blood on that side. That, therefore, is the only way of stopping severe bleeding in that position.

I will now show you one or two methods of carrying and lifting. Supposing a man has his left limb injured, say a sprained ankle, he is just as helpless as a man with a gunshot wound through his thigh, he has to be put into the ambulance waggon, or carried in some way if it is in battle; in civil life there are as many difficulties as on the field of battle. If he has sprained his ankle on the left side you may not be able to carry him, but you can help him along very well by getting on one side, letting him put his arm on your shoulder, and in that way he can go along very well on the sound leg.

Dr. Cantlie then illustrated, with the aid of his assistants, the various modes of lifting, known as the fireman's lift, three-handed lift, and the four-handed lift, and the audience then adjourned to the grounds to witness the parade of the St. John's Ambulance Corps.

International Health Exhibition,
LONDON, 1884.

JULY 16TH, 1884.

LECTURE ON "STREET ACCIDENTS AND THEIR AMELIORATION."

By MR. JAMES CANTLIE.

The chair was taken by Surgeon-General SIR WILLIAM GUYER HUNTER.

The CHAIRMAN in introducing the Lecturer said:—We are summoned to hear a lecture on street accidents and what should be done in the event of an accident occurring in the street, to provide for the emergency until such time as the sufferer can be taken to the hospital and properly treated. A person may receive an injury causing hæmorrhage and might die from that hæmorrhage during the time he is being carried to the hospital, and therefore it is a matter of the greatest importance that the bystanders should know what should be done under the circumstances and should be able to treat the case in such a manner as to avoid immediate death or serious injury. Mr Cantlie's lecture will be a practical illustration of what should be done under such cases and will be illustrated by models and on a living subject. By means of models I will show the nature of the injuries, and on the living subject the appliances to be used for the relief of a special injury to which the person has been subjected. I do not think I need say any more on this head, but with reference to the parade of the ambulance or bearer company, which will take place in the Exhibition grounds after the lecture, I may [illegible] that the gentlemen who will take part are principally students from Charing Cross, St. [illegible], the London, and one or two other hospitals. They are medical students who are learning the duties which will qualify them, in the event of a foreign war, to take the position of officiers of ambulance, or bearer companies. The medical department cannot always provide a sufficient number to meet all emergencies, and during their pupilage these medical students are studying the nature of the drill and the means of meeting emergencies on the field, and they will therefore be of material assistance to the army medical department in case of a foreign war.

LECTURE.

I will first shew you a few particular applications of bandages before going to the question of broken bones. In the first place, I will shew you the bandages for the head such as you apply in case you have to put a poultice on the cheek or jaw. You know that you very often find when you put on a poultice that, when you go to bed, the cold air gets in between the poultice or the brown paper, or you cannot keep it on, it slips off. The usual way is to tie it to the top of the head, and after you have been in bed a few minutes, it falls off. The way to correct that is simply to cross it at the top of the head and tie it beneath the chin. Then, again, a bandage for the top of the head is generally applied so as to cover the whole head, which makes it very hot, and probably the patient wakes up with a headache in the morning. To prevent that you should use a fourtail bandage which will cover the top of the head—usually two ends are tied behind and the other two ends under the chin—but the same kind of thing is also useful for a bandage to the forehead or the back, and having the tails slightly longer it is also useful for the chin. (Bandage applied to model)

With regard to slings anyone who has been through the ambulance course knows how to put on a sling, but it is not quite so easy to put a bandage on the chest such as is

required if you want to put a poultice or a dressing on that part. That is done with a triangular bandage. In former days we used to see large square pocket handkerchiefs, which folded diagonally made such a bandage; but those old handkerchiefs are now discarded, and the modern small pocket-handkerchiefs are of no use for such purposes, and we have therefore to introduce a small triangular bandage. This is put across the chest, but in tying it, it will not do to tie it in a knot at the middle of the back, which would prevent the patient going to sleep, the other knot just at the edge of the shoulder where it would catch on the pillow, and also be uncomfortable. The way is to tie the one knot just at the side and bring the other part over the top of the shoulder, so as not to interfere with the patient sleeping either on his side or on his back. (Bandage applied to model)

We will now come to broken bones, which are very common in street accidents, when a person or child has been run over. Now when people see an accident, say a child run over in the street, the first impulse is to go and catch him up, but the consequence of this is that, if the leg is broken, the lower end of the leg hangs over your arm and the broken end of the bone comes right through the skin. To prevent that you should never attempt to carry a person to a "safe" place, but attend to them where they fall, not carry them to the hospital or even to the pavement, or else you very likely produce a much more serious accident. In these cases it is often not the cabman that does the damage, but the ignorant person who picks up the sufferer and carries him. [This was illustrated by a model.] You can easily recognise when a bone is broken, because the limb becomes shapeless and assumes an unnatural position. When a person is lying on his back with the two feet together, the two feet are in the same position; and if one foot is lying on its outside, in a position which it would not take unless some accident had happened, common sense will tell you that the bone is broken. [This was illustrated by a skeleton showing the position of the lower limbs when the thigh is broken.] If a cart wheel has passed over the thigh and broken the bone, the limb shortens and one foot lies on one side, and one leg appears shorter than the other. The first thing to do is to get the broken limb in the proper position, and to do so, you must stand at the foot and pull it down until you get it in the same position as the sound limb, and then tie the two limbs together. I will show you first how to treat a case of a broken thigh. In such a case there may be further injuries occur besides the fracture, because there is a large bloodvessel in the thigh, and the broken end of the thigh bone, if it is shaken, may go through it, and if that occurs the limb would have to come off. You have to take care not only that the bone shall not come through, but that it shall not pierce the bloodvessels. You have, therefore, when you have got the limb in the proper position, to keep it there; you must not leave go of it while you go and look for a splint, or for some one to assist you, but you must get some one to hold the two feet whilst you go and get the splint. That is easily done. You have only to go across to the first house and get a broom-handle—but I must specially impress upon you that when you have once straightened the limb, you should never leave go of it until it is fastened. If it is in the middle of a crossing, at the Bank, or at Charing Cross, never leave go until it is fixed. You need never be afraid of being run over. No human being was ever run over twice at one point, nor was any one ever run over kneeling down in the street, it is only when you are walking or running that you are run over; therefore do not be afraid to attend to an accident in the most crowded street wherever it may be. Supposing it is not near any houses, that it is in a country-lane, what can you get then? You can get an umbrella—that is hardly long enough, but that will serve the purpose—and if you have not an umbrella or a stick, and cannot leave the person to search for a stick or a broom-handle, what are you to do then? There is a splint which has been there

for the last 3000 years, though it has only just been discovered, and that splint is the other leg lying alongside of the broken one. Ever since the creation of man it has been there, but it is only within the last few years that it has been found out. If you cannot get anything else, all you have to do is to tie the two limbs firmly together; but I will first show you how to do it with the broom-handle. You put the splint alongside the outside of the limb, get some one to hold the two feet together, so that there is no chance of the limb slipping back, then without lifting the limb pass the handkerchief just behind the heel, where there is a hollow, and tie the two feet firmly together. Then there is another hollow behind the knee where you can tie it in the same way, and again under the hip. Then if the patient lying with his head on anything you cannot get your hand under his back, but if you let the head go back a hollow immediately rises in the back, and you can pass another pocket handkerchief round there and so secure the splint. Then he is in a condition to be moved about. Now, supposing you had no broom-handle, you proceed just in the same way, and it secures the limb, though it is better to have some kind of splint as it keeps it more stiff.

Next I will shew you how to manage a broken leg. The police are now being trained, thanks to the St. John's Ambulance Association, and of course among them there is no more useful class of men to be trained for this purpose than the police. They always have useful appliances with them, which can be utilized as splints and bandages. A policeman's truncheon serves as a splint for a broken leg, and the badge of office which they wear round the wrist, makes a very good bandage. All that two policemen have to do in case of a broken leg is to get the two truncheons—one holds the legs steady, whilst the other puts the truncheons one on each side of the leg, passes the buckle strap round in the way I shewed you just now, behind the hollow of the ankle, and buckles it tightly. Then to make it more secure the policeman's belt is very useful, because it can be put round the ankles, crossed, brought over the feet, and buckled tightly beneath the feet which makes the whole thing secure. An umbrella makes a better splint than a stick, because it has a number of lateral supports. You put the umbrella outside the limb and the ribs support it and form a complete casing, and then you tie the two limbs firmly together.

Now I will take the case of a broken collar-bone. First you want a large pad under the armpit to prevent the two ends of the bone over-riding each other, then a sling to support the arm, and then a bandage around the body, and then the patient may be safely moved.

Now in the case of a broken arm you always want to keep the arm bent. If an accident happens to the leg you want to keep it straight, because if once the lower extremity gets set in a bent position your only means of progression would be by a sling under the knee, but if you get the lower limb straight after an accident, you would then with a swing of the leg be able to get about and have a useful limb But supposing it is the upper extremity, and that recovers in a straight position, you cannot get your hand near your mouth, and it is utterly useless to you to do anything with except to carry a pail, or anything like that. You cannot feed yourself, you cannot write, you cannot earn your livelihood, nor eat it when you have got it, therefore the upper extremity must be bent, not straight. Then you must also take care what position you put the hand in. When it is getting well, it should be moved by some one every day to prevent it getting stiff; but very often the patient says, "Oh, wait till to-morrow, till the inflammation goes down," and so it gets put off. There is no inflammation, but he says so, and so it is not moved and may get stiff, and therefore it is important that it should be put in the best position in the first place. Then, to fix the arm, you take two pieces of stick and cross them at the two ends and tie them with a pocket handkerchief—that makes an angular splint which will prevent the arm getting straight—you tie one to the arm,

and the other to the forearm, and then the person can walk down the street to the first Doctor's house.

The next thing I have to tell you about is hemorrhage, or bleeding. There are large veins at the bend of the elbow; the veins are blue and carry the blood back to the heart, and there is a large vein just at the bend of the elbow where people used to be bled from, and it is a common place for committing suicide from, especially in the East. If a cut is made across that place not very deep, it cuts the veins, but if it cuts deeper, it cuts the arteries. If the vein is cut at the bend of the elbow, the blood from the veins which is going back to the heart is of a dark blue, or purple colour. [This was illustrated by a model.] To stop that bleeding I have only to put my fingers on it. I then take a bandage and tie it up tightly, and then put a sling on. If you have not a pad to put on the vein, you can roll up the coat sleeve and that answers the purpose, and then tie up the forearm with the hand on the shoulder.

I will next show a case of bleeding from the thigh. It is not at all uncommon for the bloodvessels in the thigh to get wounded. A shoemaker, for instance, dropping a knife between his thighs and attempting to catch it, one end of the knife may be sent into the artery, and if you cut an artery then the arterial blood which is coming straight from the heart pours out of a bright red colour. I can stop that in the same way by putting my finger and thumb upon the vessel. Then I put a pad upon it and tie a handkerchief round the hurt tightly and so stop the bleeding. You must recollect that a bloodvessel always lies in a protected part, for instance, at the hip joint if the blood vessel were outside, every time you sat down, it would press on the bloodvessel and stop the circulation, therefore the bloodvessels are inside. Again, at the knee, it could not be outside, or when you knelt down it would be stopped, and therefore it must be behind the knee. In the same way in the other limbs, the bloodvessels are in the inside of the elbow, and on the inside of the arm they are always in the protected parts.

I have a cut here in the lower part of the the thigh and I want to stop that. I cannot walk a mile with my thumb on the vessel to carry the man to the doctor, so I put a pad on it and take a handkerchief and tie it tight round the limb; then I take a stick or a poker or an umbrella, or anything, and I put it through the knot and twist it round, and by that means I can increase the pressure. That is what is called a tournequet. Even if you forget where the bloodvessels are it does not matter, only put something round the limb, and twist it tightly, and you will stop any bleeding below. If you ask how hard you are to twist, simply twist till the blood stops, and then you have done enough. With another handkerchief you can tie the stick in its place to prevent it untwisting, and get the person carried any distance; it keeps him quiet, prevents the stick shifting, and keeps the compress on the bloodvessel. In the same way you can stop a bloodvessel at the back of the knee. The bloodvessel at the top of the thigh is the size of your forefinger, lower down it is the size of your little finger, down the leg it will be the size of a goose-quill, at the foot the size of a crow-quill, they get smaller as they go lower down. If there is a wound to the artery in the upper arm, I can stop that by putting my finger on it, then put a pad on it, tie it up tight, and there you can make a tournequet by means of a key. You can attach the end of the key below the edge of the bandage, put a sling on, and take the patient to the doctor. These are mostly the means for stopping bleeding from the arm, the leg, or the thigh. There is only one way of stopping bleeding from the head. If you have a cut on the lip you can take it between your finger and thumb, but sometimes there are wounds in the upper part of the neck. You know there are large bloodvessels there, and sometimes sharp things come across them, When that does happen what you have to do is to try and stop the blood. One young lady who thought she knew all about it, put a pad upon it, then put a handkerchief round the neck with a stick and twisted it,

She had not been through a St. John's Ambulance course however. She stopped the bleeding very effectually, but she did something more. You can only in such cases compress the bloodvessel with your thumb, which you always have with you. Alongside of the windpipe there are two big vessels which you can feel very easily, and if you hold your chin up and look in the glass you can see them; if you put your finger on there and press hard you feel an uncomfortable sensation in the head, and if you press hard enough you will find you have stopped all circulation of blood on that side. That, therefore, is the only way of stopping severe bleeding in that position.

I will now show you one or two methods of carrying and lifting. Supposing a man has his left limb injured, say a sprained ankle, he is just as helpless as a man with a gunshot wound through his thigh, he has to be put into the ambulance waggon, or carried in some way if it is in battle; in civil life there are as many difficulties as on the field of battle. If he has sprained his ankle on the left side you may not be able to carry him, but you can help him along very well by getting on one side, letting him put his arm on your shoulder, and in that way he can go along very well on the sound leg.

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HONG-KONG

By Dr. JAMES CANTLIE

The Crown colony of Hong-kong consists of the island of Hong-kong itself; of several small adjacent islands; and of the peninsula of Kowloon, about three square miles on the mainland of China, immediately opposite the main island. All except the last-named were ceded to Britain in the year 1841; but it was not until the year 1860 that Kowloon became part of the colony. The island, which gives its name to the colony, is in length eleven miles from east to west, and varies in breadth from two to five miles. It occupies an area in all of twenty-nine square miles.

Hong-kong consists of a chain of granite peaks rising abruptly from the sea to a height of over 1500 feet in several instances, and attaining an altitude of 1820 feet at the highest point—the "Peak." The name "Hong-kong" in Chinese means "Fragrant Waters," a name bestowed upon it presumably on account of the excellent quality of the water and the abundance of the mountain streams. The granite of which it is composed forms part of the great granite stratum which extends throughout the province of Kwantung, of which Hong-kong is geographically a part. The granite is grey in colour, and presents the peculiar feature of undergoing gradual decay, causing it to crumble down and form a gravel of a reddish colour, which gives to the landscape, especially during the wet season, a bright red colour to the parts bare of vegetation. The vegetation natural to the soil is, however, of the poorest description; consisting of a coarse grass, with dwarfish shrubs of but little pretension. Only during the early spring can there be said to be any attempt at profusion of verdure; it is during the spring that the azalea, which seems indigenous to the island, flowers. At that season the hill slopes are covered with a fairly profuse blush of pink azaleas, affording for the space of some six weeks a pleasing, but all too short, evidence of tropical verdure. But although nature has done little to beautify the island, the Colonial Government, since the island has been acquired, has devoted laudable pains to make up for the defects in natural afforestation, by planting trees in profusion, so that now there is an arboreal clothing of no mean extent. The height attained by the imported trees is not, nor does it promise to be, other than disappointing; at the same time, although not robust, the plantations serve to beautify the island to a very marked extent.

The acquisition of Hong-kong was an act of political and commercial necessity, if the British meant to retain a hold upon the trade of China. The Chinese were, when they first began to trade with Western nations, even more exclusive than they now are, and it was only at the point of the bayonet, so to speak, that they were compelled to allow trade to be opened with them. Ever since the year 1613 had the British been attempting to acquire the right to traffic with the inhabitants of the Celestial Empire, and from that date onwards to the cession of Hong-kong there were constant bickerings, and occasionally open warfare, between the two peoples. But the British were not the first of the European nations to reach the far-distant land of Cathay. The Portuguese had not only found their way thither, but had acquired a foothold in China in 1557, and established themselves in Macau. Macau is a small peninsula jutting out from the mainland of China at the mouth of the Canton River, and situated some thirty miles by sea from Hong-kong. When the British began to trade with China they were anything but encouraged by the Portuguese, who looked upon them as formidable and powerful interlopers in what they considered to be their exclusive prerogative. It is the old East India Company that we have to thank for opening up the country. It was the merchants of this famous Company who first sent their ships to Chinese waters to barter goods with the natives; and after a few voyages thither the results were found to be so encouraging that they resolved in

the year 1627 to open up trade with Canton by way of Macau. As strenuous opposition was offered by the Portuguese to this arrangement, the commander of a British ship, the *London*, determined to force the way to Canton himself. This he boldly did by sailing up the Canton River, bombarding the Bogue Forts on the way, and astonished the Cantonese by demanding an interview with the Viceroy. Thus was intercourse with Canton begun, but it took many weary struggles and the waste of much powder and diplomatic wrangles to teach the Chinese that the British were not to be thwarted in their desire.

It is impossible in the short time at my disposal to recount a tithe of the fights, the international ruptures, the dissensions, and the intrigues by which the trade was interrupted during a period of well-nigh two hundred years. It must be remembered that our relations with China began in the reign of James I.; and Oliver Cromwell, in the year 1654, concluded a treaty with King John IV. of Portugal, whereby the two countries had free access to all ports of the East Indies. About the time the British began to trade with China the ruling dynasty of the Empire was changed from the Ming to the present Tatsing or Manchu. These interlopers, small crofters from the Ultima Thule of humanity, showed a rooted contempt for all persons engaged in trade. They would have no dealings with the "foreign barbarians," as the Portuguese and the British were styled, and so utterly did they despise them that they did not think it worth while to sweep them from their path. The Manchus permitted foreign traders to reside outside the city gates of Canton, but gave them to understand that they could not claim equality with even the lowest of the Chinese coolies. They were not allowed to enter the city nor to travel inland, and were permitted to engage servants only from the outcast section of the boat population. So long as foreigners were content to trade on these humiliating conditions, the Chinese accepted their presence; but it was not possible, even in the hopes of making money, for British subjects to stand the insults heaped upon them by a pagan people, and when national pride began to show itself, the Chinese could not and would not tolerate it, and so troubles ensued. At long intervals British men-of-war visited the Canton River, gave the Mandarins and the Viceroy a taste of their quality; but all to no good. The moment the ships departed the Cantonese authorities doled out more insults, more restrictions, and fresh "squeezes." The Chinese insisted upon the superiority of their laws, and on several occasions British seamen, after being handed over to the Chinese, were strangled. It was not, in fact, until 1822 that the Commander of H.M.S. *Topaze* took a stand against this form of legislation, and informed the Celestial authorities that the subjects of his Britannic Majesty could not be tried by native courts. Lord Napier was sent by the British Government in the year 1834 with instructions, of anything but a definite character, to negotiate with the Chinese; but he was outwitted, and after long and harassing interviews and correspondence, was conveyed out of Chinese waters and forced to seek refuge in Macau. The cause of many, if not all these differences of opinion between China and Great Britain was to be found in the fact that there were two British factions at work. The East India Company's servants cared not for the prestige of their country so long as they could gather in the profits derived from the traffic in tea and silk; and they were willing, or at least instructed their ship captains and their agents, to give way at every point to Chinese requirements however humiliating. The Chinamen would not understand the difference between merchants conducting irresponsible trade and the representatives of the British Government. They persisted in treating naval commanders and their vessels as merely merchantmen, and as the Emperor of China was the potentate of the entire universe, it was impossible for them to stand any attempt of these low-class traders to assume that their "Headman," in other words their Sovereign, could be in any way recognised. Lord Napier was told that the Viceroy could hold no communication with "outside barbarians." Napier's mission, however, if it did nothing else, showed the necessity for some place of safety for British subjects in the neighbourhood of the Chinese coast; nay more, it actually caused Napier to recommend that the island of Hong-kong was a place suitable for British wants. The further history of the relations of Britain and China is within the knowledge of most, and within the memory of many—how the British merchants in the late "thirties" were driven from Canton; how they, with their families and belongings, sought refuge in Macau; how the Portuguese, in consequence of threats from China, refused to shelter them; and how they had to take to their ships to preserve their lives from the fury of the Chinese authorities. They cast anchor in the roadstead of Hong-kong, which was then but a bare, inhospitable

; on the opposite shore, on w
Chinese placed batteries, and th
ships. Starvation stared the British
the face, and Chinese boats which attempted
victual them were fired upon by the shore batteries.
The British Government at last seemed to think that
something must be done to redeem the insults to
which their countrymen were being subjected, and
accordingly in 1840 sent out an expedition to enforce
its authority. Thus was the war of 1840 brought
about. It is frequently styled the Opium War, but that
is a mere misnomer. The war was the result of 200
years' of insult, injury, and wrong heaped upon British
subjects by a pagan people. It was not, in fact, until
starvation and annihilation stared the British commu-
nity in the face that the Government came to their aid.

On the 25th January 1841 the British flag was hoisted upon the island of Hong-kong, and a proclamation to the effect that protection was offered to the citizens and ships of foreign powers that may resort to her Majesty's possession; further, that merchants and traders were welcome to trade free of any charges on imports and exports.

When seized, the island was inhabited by only a few fishermen; there were no roads; the bare granite rocks were wholly unproductive; and the possession, except as a naval base and place of shelter for shipping, repelled rather than attracted. The liberal lines, however, upon which the colony was founded and maintained soon began to produce good effects, and in a few months thousands of Chinese took up their residence in what had been baptized the "City of Victoria." The initial outburst of prosperity, however, waned after a few months, chiefly owing to the reluctance of the British merchants to leave Canton. By the year 1848, however, some 24,000 of a population testified to the possibilities of the place, and by the year 1850 as many as 72,000 persons sought the protection afforded by the British flag.

Such is a short account of the foundation and commencement of the trading port of Hong-kong, and I will now state the present condition of this important possession.

Trade

The shipping industry of Hong-kong is at once extraordinary and enormous—extraordinary, inasmuch as what was fifty years ago a bare granite rock should now be a busy harbour frequented by ships of all nationalities; enormous, for at the present moment its tonnage register is about 15,000,000 tons. To understand aright what that number means, I will try to illustrate by comparison. The port of Glasgow has a total tonnage of 6,000,000 tons annually. Now, that is equal to the entire tonnage of France. Double the number, and we have the entire tonnage of the United States, America, namely, 12,000,000 tons. The port of London shows a registered tonnage of almost 13,000,000 tons, but the latest return from the Harbour Office of Hong-kong gives a total of well-nigh 2,000,000 tons more.

Now, whilst fully appreciating the enormity of trade which belongs to Hong-kong, we must not forget that the port is more or less of a junction—a port of call mostly. It is not, like London, a place at which all the ships entirely load and unload. The numerous steamers which enter and leave the anchorage stay, it may be, a few hours or a few days unloading part of their cargo, and perhaps receiving a small addition thereto. The port is a distributing centre, and serves as a terminus in but few instances.

But even with this understanding, the importance of the possession as a shipping port is in no way diminished. Hong-kong affords protection to the commerce of all nationalities; and from it as a centre, and towards it as a rallying point, most of the great commercial undertakings are focused and spread.

As a protected base, it renders commerce and property safe and possible in the numerous "concession" ports dotted all along the coast of China. Without it the Chinese would fall back on their old plan of harrying British traders, and threatening them with expulsion when it suited their purpose. The presence, however, of a strong fleet, with Hong-kong as a coaling base, and an ample garrison, serve to maintain the prestige of the British flag throughout the Far East generally.

The harbour is a natural one—a sheltered roadstead, in fact; and its selection reflects the greatest credit upon the wise and sagacious men who first chose it as a suitable base. In the narrowest part the harbour is just upon a mile wide, but it opens out laterally into wide bays with ample accommodation. The occupied part is some three miles in length; but, should necessity demand, there is at least double that length available. Towards the eastward the men-of-war anchor; to the north-west the sailing-ships congregate; some

forty to fifty or more ocean-going steamers occupy the main bulk of the harbour; hundreds of Chinese sea-going junks lie drawn up side by side off the shore; and sampans (small Chinese row-boats) ply hither and thither in numbers—a busy scene truly, and picturesque withal when viewed from the higher ground, and more especially from the "Peak." The mail steamers of the P. and O. Company and those of the German and French services call here. The Canadian and American Transpacific boats have their terminus at Hong-kong. Boats in the Australian trade call here; the Scottish Oriental line of steamers trading to Bankok have their headquarters at Hong-kong. Besides these, we find the Glen Line, the Blue Funnel (Butterfield & Swire's) Line, the Shire Line, a line of boats to Calcutta, to the Philippines, and a large number of coasting steamers belonging more especially to the China trade, casting anchor in Hong-kong. From these bald statements it will be gathered that although Hong-kong is in reality Britain's farthest outpost, it is one of the most important in the long list of Crown colonies to be found dotting the ocean.

Docks and Wharfs

The wharf accommodation seems meagre when the enormity of the shipping trade is considered. Only at Kowloon is there a wharf of any pretension, and here some six ships only can be drawn up. This is accounted for by the character of transhipment which is in vogue. The native boats and junks receive their cargoes direct from the ocean steamers as they lie in mid-stream, thus saving double handling and housing dues. Goods, however, in quantity find their way ashore, and are stored in huge solidly built sheds termed "go-downs." Some one has styled Hong-kong a huge protected "go-down"—that is, an emporium or storehouse for goods.

Docks

When the ships visiting the island were sailing-ships merely, there was no great difficulty in docking ships; but with the accession of mail steamers and ironclad line-of-battle ships considerable engineering and pecuniary difficulties had to be surmounted to meet the changed conditions. In the old pre-Hong-kong days the British were allowed to careen their ships at the port of Whampoa—a small bay on the Canton River, a few miles below the city of "Rame," as Canton is frequently styled. In time a patent slip was erected there, but with the acquisition of territorial rights in Hong-kong the Whampoa slip fell into disuse. The name, however, is still retained in the designation of the present docking company, the Hong-kong and Whampoa Dock Co., Limited. On the island of Hong-kong itself the first dock was founded, on the south side, and the place was baptized "Aberdeen," by Lamont, the founder of the dock, who hailed from that well-known city in Scotland. After the peninsula of Kowloon was acquired in 1860 two more docks were inaugurated, but now the docking and shipbuilding industry is mainly combined in the above-named Hong-kong and Whampoa Dock Co., Limited. The docks can accommodate the largest mail steamers and the most formidable men-of-war. At the present moment the Admiralty contemplate erecting a naval dock suited to meet the requirements of the British fleet in Chinese waters. As there is no other dock in the Far East capable of docking the largest ships, the Company have pretty well a monopoly of the business; and whilst turning out first-class work, they can afford to charge prices which send the shares of the company up to 229 per cent. premium.

Banks

With so large a shipping traffic it might be expected that banking would be conducted on a large scale. Various banks have established branches at this busy centre, and some have their head offices here. The old Oriental Bank was, of course, in years gone by, the chief focus for all transactions in business; but with its departure arose an institution, locally owned, which far and away eclipsed the Oriental Bank itself. The Hong-kong and Shanghai Banking Corporation usurps the chief monetary transactions in the Far East. It is the fourth largest bank in the world, and the largest of the silver banks. The capital is $10,000,000, the reserve fund amounts to $8,000,000, and the shares at the present moment stand at 182 per cent. premium. The bank building is palatial in its magnificence, and an ornament to the city of Victoria. The presiding genius—for he is no ordinary manager—is Mr. T. Jackson, to whom not only the bank, but the European community in the Far East generally, owes a debt of gratitude. The bank is conducted on the most liberal scale. No matter what be the nationality, equal facilities are afforded, and the board of directors are chosen from all sections of the community. There are always three to five German merchants on the board, out of a total of nine—a concession to free-trade principles, which is the astonishment of all non-British peoples. Besides the great bank, there are others. The well-known Chartered Bank of India has a large and flourishing establishment here; the Mercantile Bank of India, the Bank of China and

Japan, Limited, the National Bank of China, Limited, do business on a large scale, and facilitate exchange transactions in all parts of the world. When one visits these banks one is astonished to find the number of Chinese employed, not merely as clerks, but as trusted accountants and cashiers. All the Chinese in the bank, and, in fact, in all big mercantile houses, are engaged and controlled by a headman, termed a "Compradore." The Compradore has a most responsible position. He has a large quantity of cash passing through his hands, and upon his honesty much depends. Of course, amongst Chinamen, as amongst all nationalities, scoundrels are to be found; but the honesty in trade of the Chinaman is, or perhaps was (for all the irritation they have been submitted to lately has told its tale, and will tell, no doubt, still more pronouncedly), proverbial. The Compradore is often guaranteed to the bank or firm for a large sum by those of his countrymen who have a stake in the colony—sometimes for as much as half a million dollars; so that his honesty is "guarded," as it were. But the Chinaman as a trader has no superior. In the old days, when there were no banks, no guaranteed Compradores, no writing even to insure legality in dealing, the Englishman and the Chinaman learnt to trust and respect each other. The Chinaman stuck to his bargain—did he promise to deliver twelve months hence so much tea or silk, the goods were forthcoming, even if the market was against him. In this way the Chinaman became a factor in trade, as distinct from mere trafficking. He has a code of commercial integrity which he himself describes as "face." A Chinaman to "lose face" means as much as loss of "caste" to the Hindu, and but few care to incur the odium of the disgrace entailed. This is how the Chinese have secured a position in the world of trade, and it is a trait of character betokening a praiseworthy integrity.

Merchants

Many merchant firms of world-wide celebrity have business houses, or "hongs," as they are termed in Hong-kong. They are all connected with shipping firms, and under the ægis of the British flag. All nationalities find scope afforded them. Germans occupy a prominent position in the trade of the island, and the German "hongs" are multiplying fast. They have driven the French as traders out of China, and they have been chiefly responsible for lowering the flag of the United States of America throughout the Chinese littoral.

Parsi, Hindus, and, of course, Chinese firms are plentiful, and many of them prosperous. The French have practically no hold in this region of China; the trade does not follow their flag even in their own provinces of Indo-China, for at Saigon, the capital of the French possessions, British and German flags proclaim the nationality of the steamers in that harbour. For all the competition, however, the prevailing flag in Chinese waters is the British; the Germans come next, but even they are a poor second, and no other nationality has more than a fractional interest in the carrying trade of China.

The merchant of to-day differs, however, somewhat from his prototype in China. The telegraph is so handy nowadays that the firms in the Far East are largely dependent upon "instructions from home" as to how they are to conduct their business. Responsibility is largely taken off the shoulders of the China merchant. He has no longer to act on his own responsibility, but to obey instructions; a line of procedure which is neither to the advantage of trade, nor does it help to make real merchants. The heads of firms in China representing British business houses are more of the nature of commission agents. This is a great drawback to the push and energy necessary in fostering trade; initiation is swamped, with the result that foreign competition is allowed a free hand. Given the old regime, with a responsible man on the spot, the British merchant can more than hold his own in the Far East; but with the head of the firm at home, trying to direct trade under the conditions as he once knew them in China, the fight is hopeless. Luckily for Hong-kong, one or two of the younger firms are managed by capable men who have their headquarters in China, and who can direct matters to suit the moment. It is the same with military, and especially naval matters. In pre-telegraph and cable days the commander on the China station dealt with difficulties as they arose, and settled matters according to the best of his ability. This course developed all that was best in the captains, made them self-reliant and resourceful. The dispute was not infrequently settled first, and the Government at home informed afterwards. Not so at the present time. Nothing is done except orders from home are received, and the British Admiral merely "carries out instructions." The British Empire was not made by Governments; the men on the spot acted as they thought occasion required. Rhodesia would never have been acquired had the opinion of Parliament been first asked, and the Chinese would never have been allowed to have given us the slaps in the face they have if the

insults had been left to the naval authorities on the spot. The British manufacturer is, again, so conservative, so obdurate, that he will not cut his cloth according to his customer, but will endeavour to dictate to the natives what they ought to buy. In other words, he will not alter his looms to suit his customers, but will send out for sale goods, in such a form and of such a quality, that it is impossible to get a market for. Take an example: in Korea all merchandise is carried on men's backs, on peculiarly arranged "saddles": of course a man is capable of bearing a burden of only a certain weight and form, and before British-made goods can be transported to the interior it is necessary to unpack the goods, cut them up, and adapt them to the means of carriage. The British merchant declines to acquiesce in the matter, and plainly tells the Koreans that if they do not take them as they find them they can go without. Not so the German, not so the Japanese; with an acuteness which is highly commendable, they prepare their goods in a "packable" form, and naturally obtain the custom. Practically they have got a hold on the commerce of this and many other countries by the obstinacy of the British merchant, and especially the manufacturer. As in Korea, so in many countries, even in the British colonies themselves, Germans and Japanese are ousting the British, and one cannot help thinking that the incursion is well deserved. The Germans believe that the days of the commercial traveller are not numbered, the British seem to think they are. Consequently the German finds, as he travels with his sample-book beneath his arm, that people will deal with him rather than with their own countrymen, who have appeared to have given up commercial travelling, and rely on the telegraph as a means of communication between manufacturer and merchant. The bitterness of the lesson has not yet come home to people in the British isles, but it will and must come, and the starving millions of Lancashire will rue the day they neglected the evident lessons set them to learn. The goods sent possess neither the shape nor colour wanted by people who know their own minds and whose customs and habits are not to be altered because a Lancashire proprietor has put up a mill which will produce articles they do not want.

Manufactories

With the exception of sugar-refining there is no great industry in Hong-kong. There are two large sugar works in the colony; one, belonging to Messrs. Butterfield & Swire, the well-known Liverpool merchants and shipping agents, is of enormous proportions. The colony does not, however, benefit much by this concern financially, as it is owned by this firm, and the proceeds only fill the pockets of the home-dwelling proprietors. The other, however, is owned locally, and managed by the well-known firm of Messrs. Jardine, Matheson & Co. A small rope factory and a brick and cement factory constitute the bulk of European owned undertakings. There have been others which have failed. A glass works of considerable pretensions succumbed; a paper work of the most modern type, with machinery of the latest developments, and owned and worked by Chinese under skilled workmen from Britain, ran only for a year or two before it collapsed financially; a steam laundry, to better the work of the native laundries, also spelt ruin to a number of subscribers. With all its go and wealth, therefore, it is seen that Hong-kong produces little or nothing, and that attempts to introduce European manufactories and methods do not seem to meet with the approval of the Chinese.

Government

The Crown colonies of the Empire are governed and managed on much the same lines, so it is not necessary to dwell upon the system of the government in connection with this particular colony. An Executive Council presided over by the Governor as President constitutes the machinery of the Government. The Legislative Council consists of the Governor as Chairman, the Chief Justice, the Colonial Secretary, the Attorney-General, three other officials, and four unofficial members. Of the last-mentioned, one is elected by the Justices of the Peace, and another by the Chamber of Commerce. The remaining two are nominated by the Governor. It will be seen that the official element outnumbers the unofficial, and the sop to the public that they are represented on the Legislative Council is a pure fiasco. When one elects to reside in a Crown colony one must be content to resign all rights of citizenship and be content to be ruled by a system of bureaucracy, which may be admirable, but it is one against which the British elector is inclined to revolt. The spectacle of all the officials voting one way, and all the unofficials the other, with the official majority assured by their number on the Council, is one calculated to provoke derision, and to a

people with less forbearance than the British, not unlikely to cause disturbance. What is demanded in honour to the self-respect of the community is that whilst Imperial matters are dealt with by the nominees of the Crown, municipal matters should be left to the control and direction of those who subscribe the money for municipal work. The residents in Crown colonies are recruited, with but few exceptions, from the middle classes, and are surely as well qualified to manage the municipal affairs of their place of adoption as are the representatives of the working classes at home.

Sanitation

So as to perpetuate the burlesque of pretending to govern by popular methods, we find in Hong-kong a Sanitary Board. The concession to the Board of a majority of unofficials was rendered completely futile by withholding all executive power from the Board. It is merely a deliberative body with power to recommend to the Council. So intolerable and repugnant has the position of the unofficial members become, that at the present moment the majority have tendered their resignation. This step is one which every right-minded person who retains a scrap of the sense of dignity due to his privileges as a British subject was compelled to take. The elector, trained in Britain to believe that he is entitled to a "say" in the affairs of the Crown colony in which he takes up his residence, will be woefully disappointed. He must politically throw himself back to ante-Magna-Charta days; he must be content to lay aside all the freedom his forefathers fought for, and submit to a regime of autocratic rule paralleled only with political life in Russia. Nay, more than this, he must expect to find himself made a burlesque of, inasmuch as he is given a vote which has no influence, and a voice in public matters which has all the machinery of Government against it and fit to render it abortive. A wise autocracy is perhaps the ideal form of government, but it is one British subjects have been trained to look at askance, and it is a little difficult to recur to a system which for well-nigh a thousand years has found no favour in Great Britain.

Police

The police force consists of well-nigh 800 men, about 300 of whom are water police, whose duty it is to patrol the harbour. The force on shore is made up of about 100 Europeans, 100 Indians (Sikhs so called), and 300 Chinese. At the present moment there is considerable scandal in connection with the acceptance of bribes by the European police, and men of great local experience are being got rid of because they took "tips"; surely a well-understood purloin of the police in all countries. The "Sikh" policemen are voluntary recruits from different parts of India; but the majority do not belong to this warlike tribe, but to caste of a lower order. They are endowed with a keen sense of usury, and this may be said to be their only drawback as efficient police. The Chinese members, if not quite reliable as regards their moral tone as police, are invaluable aids in the detection of crime. A leading member of the detective is Inspector Quincey, Chinese Gordon's old "boy." Unfortunately he has also fallen under the ban of the purists, and he has been dismissed the force. Surely his connection with his great master, and the dangers and perils he endured in his behalf, might have saved him from this indignity. One can only be too thankful that Gordon did not live to see this further "neglect" heaped upon those he already endured at the hands of his "grateful" country.

The police barracks, with the adjacent jail, occupy a central position in the town. In the same compound the police magistrates hold their courts. There is a divided opinion as to the expediency of loading the expenditure of the colony with Chinese prisoners of all sorts. The jail does not present to the Chinaman the "bogie" it is to most Europeans. The coolie, condemned to incessant labour, and on a starvation diet, finds within the precincts of the jail rest and food, and does not resent his incarceration as a rule. Recently the jail has been largely increased, partly in view of the increasing population, but also in consonance with the modern tendency to reduce to a minimum the hardships attendant upon prison life.

Crime

Hong-kong is so placed that it is liable to be flooded with an influx of Chinese law-breakers. Lying, as it does, but a mile off the mainland of China, it affords a refuge for criminals of all sorts who seek a hiding on a foreign shore. This fact renders a large police force necessary, and leads to constant international complications with the Chinese Government. Any offender escaping from Chinese "justice," when he is demanded for purposes of punishment, has the privilege of being first tried by the British courts, and in not a few instances benefits thereby. Political offenders are for the most part protected from the

arbitrary dealings of the Chinese; but in a recent case, that of Dr. Sun Yat Sen, whose sensational capture and release from the Chinese Legation in London, it would seem that the privileges which we all pride ourselves belongs to those who seek the protection of our flag, are traduced. Sun Yat Sen has been exiled from Hong-kong, and if he attempts to show himself in the colony, he is liable to be taken and handed over to the tender mercies of the Chinese. So contrary to our ideas of fairplay, not to put it more strongly, is this high-handed piece of Crown colony diplomacy that the question is at no distant date to receive attention in the House of Commons.

Law

The supreme court of Hong-kong is presided over by a chief justice and a puisne judge. Trial by jury is in force, and the business of the courts is very large, entailing a large staff of workers.

Population

The present population of the colony is about 230,000. The city of Victoria contains some 180,000 of the total. Scattered around the island and in Kowloon, villages and hamlets, in some cases with a population of over 5000, are to be met with. The traffic of passengers to and from the colony is enormous, as many as 10,000 persons per week coming and going. The British population is put down as between 2000 and 3000, the Portuguese community at some 4000, and with the exception of a few Europeans of other nationalities and a few scores of our fellow-subjects from India, the main body consists of Chinese.

Public Buildings and Institutions

For the most part all business houses are in the neighbourhood of the "Praya," the name given to the sea front or quay. The Praya itself is evidence of the enterprise and ability which characterise British energy. What was once a deserted shore has been converted into a busy quay, with piers and landing stages extending to a length of well-nigh three miles. Nor has a frontage merely been erected; a large part of the land has been reclaimed from the sea at great cost and labour. Nor has this work ceased, for at the present moment further extensions in the plan of reclamation are being conducted, giving a frontage and building area of largely increased proportions. The City Hall is one of which any city might be proud. Here are excellent ballrooms, a commodious public library, a public museum, the rooms of the Chamber of Commerce, and a well-appointed theatre. Adjacent to the City Hall is the noble building occupied by the Hong-kong and Shanghai Bank. The main thoroughfare, extending from one end of the city to the other, is the Queen's Road, some three miles in length, along which the chief traffic is met with. The clock-tower is held to mark the centre of the city, although it is by no means an imposing erection. Adjacent to the tower we have the Hong-kong Hotel, a large and well-appointed hostelry owned by a local company. The Post-Office is opposite, but with accommodation altogether insufficient for the wants of the colony; near by is, or was, the Hong-kong Club, an institution which plays an important part in the social life of the colony. The old club, however, has proved wholly inadequate, and a larger building is just about to be opened on the newly reclaimed piece of land facing the harbour.

Besides these we have the Queen's College, a striking edifice with numerous schoolrooms and a fine assembly hall and play-ground. The Victoria English College. The Civil Hospital, with accommodation for some 150 patients, stands on an open piece of ground just above "China Town." Along the Queen's Road are to be found the offices of the principal merchants, the Europeans mostly to the east of the clock-tower, the Chinese places of business chiefly to the westward. The German Club, close by the old Hong-kong Club, testifies to the numbers of merchants of that nationality who find it advantageous to seek their livelihood under the British flag. Government House is a handsome building, the situation imposing, and the grounds, opening as they do on to the Public Gardens, very beautiful. Headquarter House, the residence of the general commanding the garrison, is quaintly pretty.

The appearance of the city of Victoria from the sea is at once imposing and beautiful. The land rises so abruptly from the sea-shore that the houses stand in tiers one above another until a height of between 400 and 500 feet is attained. The three principal roads run parallel to each other, and are named respectively the Queen's, the Bonham, and the Robinson Roads as one proceeds inland. The houses, in the upper reaches of the town more especially, are of considerable proportions and look imposing. Westward the residences become more scattered, stand in their own grounds, and have a goodly show of foliage around them. The

houses have for the most part a granite foundation, and they are raised from the ground some six feet before the first floor is reached; thus differing from the bungalow system in vogue in India. Wide verandahs give an appearance of extent to the houses, which induced one Governor—Sir William des Vœux—to exclaim when he first saw them, "Why, the people here live in palaces!"

The medical staff, the hospitals and nursing staff are in every way a credit to the colony. The immensity of the shipping community necessitates ample hospital accommodation, and this is well provided for by the Civil Hospital; the wards are large and adequately provided, and everything that science can provide or money procure is at hand. There are six medical officers in the pay of the Government, and a nursing staff recruited from the best training schools in Britain. In connection with the medical establishment is a large general hospital, a lock hospital, an epidemic hospital, a lunatic asylum, and a floating hospital in the harbour in use for isolation or for the accommodation of patients during epidemics. Recently a vaccine institute has been added to the armamentarium; a much-needed addition, when one knows the difficulty of obtaining effective lymph in this isolated station, and the virulence of the epidemics of smallpox which visit the Chinese.

The colony also boasts of a Government veterinary surgeon, under whose care the live stock of the island is watched and the diseases of the animals combated.

A well-appointed observatory with an efficient staff are housed in a commodious building in Kowloon. In addition to scientific investigation and recording, the staff of the observatory issue storm warnings of great value to shipping in these typhoon-swept seas.

The Botanical Gardens are at once an ornament and of high scientific value. The director of the gardens has done good work, not only by importing and growing rare plants and trees, but has completely altered the aspect of the island and converted it from a bare rock into a miniature forest.

As places of public worship, there are the Cathedral of the English Church, a fine building prettily situated; the Union Church, belonging to the Presbyterian worshippers; the imposing Roman Catholic Cathedral of the Portuguese; a smaller chapel for the English Roman Catholic worshippers. Besides these denominations there is a thriving Wesleyan congregation. If the Chinese temples can be called places of worship, we find but few, and these have no great pretension in either their exterior or interior decoration. The Missionary Bishop (English Church) of South China has his headquarters in Hong-kong, and resides in a commodious and imposing building—St. Paul's College. Various missionary societies have their headquarters in the colony. The London Missionary Society, with its branches throughout the length and breadth of China, directs its working from here; the German Mission, the French Jesuits, and the Spanish Procuration have found shelter under the British flag. Two convents, one Italian, another French, do an immense amount of work in bringing up Chinese children in the Catholic faith. Their endeavour is to obtain the children of the very poorest, or of Eurasians who have been neglected by their parents, and to clothe and feed and educate them, in the hopes that, when they attain maturity, they may adhere to their Christian training, and so help to reclaim China from its pagan ways. At the Peak an English Episcopal Church is attended by Peak residents.

The Peak

When the Chinese began to swarm into the colony, the Europeans were gradually driven to the higher levels of the city; but as years passed, the encroachment of these undesirable neighbours became so acute, that other places of the colony were sought after as suitable residences for Europeans. At first dwellings were erected on the lower levels some mile or two out of the city; but as these proved "feverish," refuge was sought on the higher altitudes. The example set by one or two of the wiser men began to bear fruit, and now the main bulk of the foreign community dwell on the Peak. Some ten years ago a wire-rope tramway was opened, running from the lower levels to a height of 1200 feet. Around the top terminus, and at a distance of seven miles from the terminus, houses sprang up, and now a large area of what was once bare hill-tops is covered with well-built and commodious houses. There is, moreover, a further advantage in dwelling at the Peak. The aspect is southern, and as the prevailing wind during the hot summer months is south-west, a good breeze from off the sea is enjoyed. The temperature at the Peak is eight degrees lower than that of the city; so that even during the hottest months a blanket at night is welcome. The chief drawback to the hill retreat is that during the rainy season fogs are apt to prevail, and everything is drenched with damp.

The Governor has an official residence at the Peak, and there are two large and well-appointed hotels, bungalows for the Government servants in summer, and a private hospital conducted by a firm of medical men in the colony. The Peak is a sanitorium of the greatest value to the colony, and one of the health resorts of South China. Away to the eastward is another group of houses situated in what is known as Magazine Gap. Here the military have built a sanitorium for the troops, but the place has of late years not proved so healthy as was anticipated by its promoters. Kowloon is being rapidly covered by dwelling-houses; mostly by those who object to "cloud lands," as the Peak is frequently nicknamed.

Education

The Chinese are fully alive to the benefits of a good education, and the Government of the colony has done wisely in promoting the cause of education. There are about 100 schools under Government supervision, attended by some 7000 pupils, and about the same number of private schools, attended by between 3000 and 4000 children. The main educational centre for boys is Queen's College, entirely a Government institution, at which about 1000 pupils congregate. Recently, by the liberality of a wealthy resident, the Hon. E. R. Belilios, C.M.G., a well-appointed school, the Victoria English School for Girls, has been opened. The Diocesan Home, a Church of England school, does excellent work. The objects of these institutions are to provide an elementary middle-class education. In all the Government schools the education is entirely secular. The system followed is well adapted to the wants of the Chinese inhabitants; it is a powerful element in popularising British rule and inducing the more respectable of the Chinese to settle in the colony. The cost to the Government of the educational system is about £8000 annually.

Revenue

Hong-kong being a barren and unproductive island, it has as capital only the land, to be used for building sites. These are disposed of by public auction in terms, for the most part, of long (999 years') leases. The land in places is very valuable, and as the place grows, so the difficulty of obtaining sites increases. As far back as 1884 land was selling at ten shillings a foot, and to-day the price is very much higher. The Government has considerable difficulty, [illegible] demand for public works daily increa[illegible] here to look for their revenue. Hong-kong [illegible] port, and although the ever-increasing trade adds to the wealth of the community, it does not commensurately improve the revenue of the colony. The increase in population means increased public works, new roads, more water, extension of drainage, more police, street lamps, scavenging, &c., &c., and the Government has to arrange for an increased revenue in such a manner as not to scare the Chinese out of the colony. Recently a small public loan has been incurred, and the affairs of the colony require guidance by a skilled hand. In ten years the revenue increased from $186,818 in the year 1875 to $1,274,973 in 1885. The expenditure between the same periods rose from $181,337 to $1,152,382. Since that time both have increased, until now the revenue amounts to [illegible], and the expenditure to [illegible]. The currency in use in Hong-kong is the Mexican dollar. Subsidiary coins are in circulation, partly produced at the Canton mint, a Chinese undertaking. The colony some twenty years ago started a mint of its own, but, for reasons best understood by financiers, the affair ceased its production. Quite recently a British dollar is again in circulation, produced by an Indian mint. The money is on the silver basis; it is constantly fluctuating, or, perhaps I should say, falling, causing thereby confusion in trade, hampering all commercial transactions, and inflicting personal loss to every one resident in the Far East. A large item—£40,000—is paid by the colony as a contribution towards the Imperial Exchequer annually, nominally for payment of the military garrison. With the fall in silver the payment is a considerable burden, taxing the resources of the colony at the present moment to over $400,000, well-nigh one-fifth of its income.

Climate

When first occupied the climate of Hong-kong proved so deadly to our troops that the place became a byword. "Go to Hong-kong" had reference no doubt to the extreme distance at which the place was situated, it requiring in sailing-ship days a voyage of six to eight months to reach it from England, but more on account of the evil report the island gained for itself as regards its "feverishness." For a long time this bad name seemed deserved; but as occupation continued and the city grew, the health of the island

bettered. During the winter months, from October to February, the climate is delightful; little rain falls; a brilliant sun, with a comfortable temperature, rules; and a light wind, the north-west monsoon, prevails. During March, however, clouds begin to gather, the temperature rises, and onwards through the summer months damp, heat, mists, thunder-storms, and deluges of rain render the island anything but an attractive place for live in. The city, being situated on the north side of the island, is cut off from the south-west monsoon, which prevails in summer, adding thereby to the discomfort. During the autumn, typhoons visit the island, and at times do great damage, not only to shipping, but also to property on shore. During the winter months the temperature varies between 37° and 87°. So cold is it at the Peak that, during some winters, ice may be even found on the pools. In January 1894 the whole Peak, down to within 450 feet above sea-level, was ice-bound for three days. This was a phenomenal occurrence, and never witnessed before. In summer the temperature ranges about 90°, at times higher, and with a minimum register of 75°. The character of any place cannot be judged by the thermometer alone; for here, as in many other tropical countries, it is the dampness combined with the heat which causes the discomfort, as for several months the climate is that of a vapour bath.

The diseases of this part of the world resemble those of tropical countries generally, nor are they more deadly than elsewhere. Malaria, with its many complications, forms the chief danger, and amongst the Chinese, smallpox prevails with terrible fatality. It is no doubt present in the memory of every one that, from 1894 to 1896, plague raged in Southern China, and caused Hong-kong to be well-nigh deserted by the Chinese.

The Military and Naval Defences

It is not possible for any one not an expert in these matters to give a statement of any value as regards the adequacy of the defences of Hong-kong. A mere statement must therefore suffice. Guarding the eastern entrance of the harbour, at the strait, the Lyee-moon Pass, between the island and the mainland of China opposite, there is a fort of considerable pretensions. The channel is here very narrow, and an enemy's ship would have but little chance of [illegible]. Guarding the western entrance of the harbour [illegible] battery on the island of Hong-kong itself, and [illegible] this a fortified island, Stone[illegible] command the entrance. [illegible] the channel after H.M.S. Sulphur, which [illegible] on the [illegible] shore, constitutes the [illegible] The Sulphur [illegible] to the harbour from the west, and lies between the main island and the small island knoll known as Green Island, characterised by its verdure and by having a lighthouse on its westerly slope. Another lighthouse, some thirty miles off, known as the Gap Rock Lighthouse, serves also to illumine the path to Hong-kong. Those who affect any knowledge of the subject maintain that Hong-kong is without adequate defences to the south, and it would certainly seem as though there was no attempt made to protect the southerly shore.

The garrison of the island is about 3000 men, representing all branches of the service except cavalry, which, of course, are out of place in a fortified rock. One British regiment is housed on the island, and on the opposite peninsula of Kowloon the Hong-kong regiment has its quarters. The latter is not a battalion of Chinese troops, as the name might imply, but an Anglo-Indian regiment composed of men from the north-west frontier of India, with the usual complement of British officers. A volunteer artillery corps of considerable promise contributes to the defensive force of the colony.

As in all British possessions, the first line of defence is the fleet. The squadron in Chinese waters is second in size only to the Mediterranean, and it is daily being increased and strengthened. At the present moment there are on the station 3 battleships of the first class, 4 cruisers of the first class, 3 armoured cruisers of the first class, 4 cruisers of the second class, 1 cruiser of the third class, 23 vessels of smaller calibre, besides some half-dozen torpedo-boats. This constitutes a formidable fleet, and one that may be considered adequate even in the troublesome times of "grab" which seem to prevail in this part of the world.

In closing this imperfect account of Hong-kong, it will be seen to what dimensions our trade and stake in China has grown, and to how great consequence the small island the subject of my theme has attained in the short space of fifty years. In my opinion, however, the full importance of this possession is only about to be realised. The Pacific is the future battle-ground of the world, and the four countries interested in the struggle are the Russians, the Japanese, the United States of America, and ourselves. Australia is bound

in the near future to play an important part in the trade of the Pacific, and to the United States an "open" Pacific is of vital consequence. The Atlantic supremacy was fought out a hundred years ago, but the question as to whether the Anglo-Saxon is to predominate in the Pacific as well is hidden in the womb of the future. As a *point-d'appui* in the Pacific, Hong-kong is of the highest importance, and its military and naval efficiency will in the future play an important part in the development of the history of this part of the world.

Life in Hong-kong is by no means the exile to Europeans that its distance from Europe and civilisation generally might imply. The British, with that aptitude in adapting themselves to surroundings which characterises them in every part of the world, manage to have what our American cousins would call a "good time." Nor are out-of-door sports forgotten: cricket, football, rowing, polo, racquets, lawn-tennis, and all forms of manly sports find numerous and ardent supporters. Nor are the ladies forgotten. A ladies' tennis ground—some seven excellent courts—has been scooped out of the steep hill-side, and the afternoon meetings here are quite a feature in the social life of the colony. In February the annual horse-racing meeting is held. The race-course occupies the only tract of level ground in the island. It is admirably adapted to the purpose, and the beauty of its surroundings enhances the enjoyment of the meeting. Close by the race-course is the "Happy Valley," in other words, the grave-yard. Here, in one of the most beautiful cemeteries of the world, lie the men and women who, by their courage and example, have served to maintain Britain's farthest outpost, and to show to the pagan people of the Pacific the meaning of Western civilisation, the advantages of education, integrity, and enterprise, and to uphold the flag and prestige of the British Isles.

The Future

The future of this part of the world is perhaps the most important problem which diplomatists have to deal with. The British seem to act as though any acquisition of territory was not to be considered. Since the Japanese defeated China on land and sea, the power of China has been shown to be a quantity not worthy reckoning with. China is unable to defend herself, and her extensive empire lies open to the invader. In the North, Russia will assert herself in no stinted measure, and when the Siberian railway is completed the balance of power in the Pacific will be completely upset. The nations of Europe do not yet seem to have grasped what Russia is doing. Within the next two years it will be seen that an ice-free port will have been seized, but whether in Corea or in Manchuria, on the Gulf of Pechili, remains to be seen. If the Russians desire their railway to attract passengers and traffic, it is no use having a terminus at Vladivostock; no one in their tour round the world would think of going so far afield to reach the railway. But were the terminus in the peninsula of Corea, or say Port Arthur or its neighbourhood, the crossing from Japan would only be a question of hours instead of days. All experts declare that Britain requires a coaling station in the North. Hong-kong is too far away to serve as an efficient base for the fleet operating in the North China Sea. But with all its prestige and power, Hong-kong requires more room to expand. The island, moreover, is open to attack from the mainland of China, and any Power co-operating with China (or compelling China) could successfully bombard Hong-kong and Kowloon from the hills on the mainland overlooking the harbour. It is essential to the defence of the colony that the tract of high land on the mainland of China opposite Hong-kong should be occupied by Britain. This is a subject about which I believe there are no two opinions; but nothing has been done, nor will it likely be done; and the appearance of an enemy on the heights behind Kowloon may one day inform those responsible for our defence that they have lost the important island which in the meantime serves to maintain our prestige and commerce in the Eastern shores of the Pacific.

and feet the bones may atrophy, necrose, and exfoliate, so that mere stumps are left at the wrist or ankle. In this condition the patient is a piteous object, and the forlorn aspect is added to by the expressionless face, by the drooping eyelids and lower lip, the epiphora consequent upon the everted puncta, and it may be the loss of an eye, ~~due to~~ ulceration and giving way of the cornea owing to exposure of the eyeball. Towards the end smell and taste may be lost, gastric catarrh and diarrhœa are common, albuminuria may supervene, or pulmonary tuberculosis may carry off the patient.

II. Lepra tuberosa.—The exact period at which tubercular or nodular leprosy commences in any single individual is well-nigh impossible to ascertain. A few scattered nodules may exist for years, and the patient may either conceal them or be unaware of their significance. After a time, however, a fresh crop of nodules appear, and the process is repeated at longer or shorter intervals. Accompanying each eruption the patient is attacked by rigors and fever, which may reach 103° or 105° F., and last a day or two. With each fresh eruption the old nodules soften and may completely disappear.

This disappearance of old nodules with the formation of new, accompanied in every case by fever, suggests that during the process the bacilli leprœ are absorbed and re-deposited, giving rise to auto-infection. There are several arguments in favour of this assumption as to the manner of the spread of the leper bacillus or its products in the body. Leprous nodules vary in size from a grain of rice to a chestnut, or even half a fair-sized orange. They feel hard and inelastic, and attain a yellowish tint when of some standing. They are usually met with in the exposed parts of the body, viz. the face, back of hands and wrist, and the fronts of the legs, but afterwards they may appear anywhere except in the glans penis, the palms of the hands, the soles of the feet, and the scalp. The eyebrows, forehead and cheeks, early present signs of infiltration, but every part of the face may be so thickened and reddened that a "leonine" aspect ensues. The ears become thickened and discoloured; the eyelids become nodular; the eyes suffer from keratitis or iridocyclitis, resulting in loss of sight. The mucous membrane of the nose is infiltrated and leads to destruction of that part of the nose supported by cartilage. The mucous membrane of the cheek, tongue, gums, pharynx, and larynx becomes infiltrated and nodular, leading to ulceration and possibly partial paresis of the laryngeal muscles.

The lymphatic glands in anatomical relation with the affected parts in both nodular and maculo-anæsthetic leprosy are always somewhat enlarged, although they never suppurate. The nerves in nodular leprosy, as in the maculo-anæsthetic, are subject to infiltration and neuritis, with consequent neuralgia, but this lesion develops later in the former than in the latter disease. The testicle, liver, and spleen, are always the seat of leprous infiltration in the nodular variety; the testicular tissue becoming wholly atrophied, and supplanted by fibrous ~~tissue~~. As the disease advances nodules come and go, but the actual number increases with each attack of fever. These eruptions and attacks of fever may supervene every few years, then every year, or several attacks may occur yearly. The nodules may, however, become stationary and ultimately burst, ulcerate, and then heal, leaving a scar. In the course of time ulceration leads to lardaceous degeneration, or tuberculosis ensues, and is finally fatal after the entire course of eight to ten years.

The nodules of leprosy, when cut into, appear white and homogeneous, and the tissue beneath the microscope is seen to consist of round, epithelioid, and spindle-shaped cells, and scattered amongst the cellular elements connective tissue and a few blood vessels.

Diagnosis.—The nodular variety of leprosy is usually so pronounced in character that there is but little chance of any mistake arising. Large nodules, however, when few in number, are sometimes mistaken for Keloid growths, or, again, the nodules may be so small that only by microscopic examination and finding the bacillus can a decided opinion be given. The maculo-anæsthetic form of the disease in the commencing stages is more difficult to diagnose, but the early anæsthesia and the lymphatic gland enlargement are usually sufficient to determine its character. Charcot mentions and differentiates between the lesions of syringo-myelia and leprosy. As in the former there are neither maculæ, thickened nerve trunks, nor enlarged glands, there is no occasion for confusion to the careful observer. The leper is subject to many skin affections which may obscure the real disease. Scabies is a common accompaniment, but eczema, lichen, psoriasis, etc., are often met with.

Tertiary syphilis perhaps exhibits lesions which resemble some leprous conditions more closely than any other disease. The means of diagnosis, however, is always at hand, namely, the demonstration of the lepra bacillus.

Prognosis.—Leprosy is essentially a chronic disease, but occasionally, owing to rapid exhaustion of strength, some fatal intercurrent affection supervenes within a year or two. Nodular

leprosy is much more acute than the maculo-anæsthetic variety; the average life-time of the leper afflicted with the former, after the malady declares itself, is eight to ten years. But in the case of the latter a period of fifteen to twenty or even forty years may be granted.

The patient succumbs usually to phthisis, pneumonia, nephritis, or amyloid degeneration of the viscera. So-called spontaneous cure is recorded, but it would seem to be merely a cessation of infection, the nodules disappearing to be succeeded by a scarred anæsthetic patch. "In the maculo-anæsthetic form the cure of the leprosy is almost invariably the result" (Hansen and Looft.) On excellent authority it would seem that leprosy may disappear and leave a healthy man, but the rule is that a maimed and mutilated being is left to continue a miserable existence.

Treatment.—There is no specific treatment for leprosy; many drugs have been announced as such, but a temporary reputation is all that any one of them has attained. The destruction of the bacillus, either by medicinal or hygienic treatment, is what has to be aimed it. With this intention Unna introduced pyro-gallol and chrysarobin and Dr. Danielssen the salicylates. The ointment employed by Unna for application to the body consists of:—chrysarobin, 5 per cent; salicylic acid, 2 per cent; ichthyol, 5 per cent; lard to 100. When the ointment is for the face Unna recommends ~~pyro-gallol~~, 6 parts; salicylic acid, 2 parts; ichthyol, 5 parts; lard to 100 parts. The administration of 10 drops of acid, hydrochloric dil., as suggested by the same author, counteracts the deleterious action of the ~~pyro-gallol~~. The writer had very gratifying results in numbers of cases of leprosy treated in this manner. Chaulmoogra oil has attained a considerable reputation; 10 drops and upwards are given in milk twice daily; and externally it is applied with olive oil (1 in 16) as an embrocation, which is allowed to remain on the skin for some hours and then washed off with soap and water. Gurjon oil has been employed in a similar manner.

Dr. Danielssen's treatment is perhaps the most satisfactory. The general health of the patient is first improved by good food, and the administration of cod-liver oil, iron and quinine. When the general condition is fairly good 15 grains of salicylate of soda is administered three or four times a day. The dose may be gradually increased, and its use continued for six or twelve months.

The writer has employed almost every drug recommended for leprosy by the Chinese, but with no marked benefit; and besides these creasote, phosphorus, arsenic, mercury, aristol, naphthol, and salol, etc., with similar unsatisfactory effects.

Koch's tuberculin was first tried by the writer on an extensive scale, as many as fifteen lepers being under treatment at a time. A certain number responded to the treatment, but in a few no effect was produced. In some the effect was most marked, almost all cutaneous signs of leprosy disappearing after the initial fever had subsided. In several cases coolies who suffered from leprosy, and who had been driven off by their fellow-labourers from working alongside of them were, after treatment by tuberculin, received back amongst them as "cured." Unfortunately the beneficial effects were transitory.

Surgically the leper may require to have tracheotomy performed; operations for ectropion, iridectomy, etc.; removal of dead bone when the bones of the hands and feet necrose; and nerve stretching in cases of anæsthesia. When the nerve trunk supplying a paralysed area is stretched and incised longitudinally, the sensation may return and the muscular power reappear for a time.

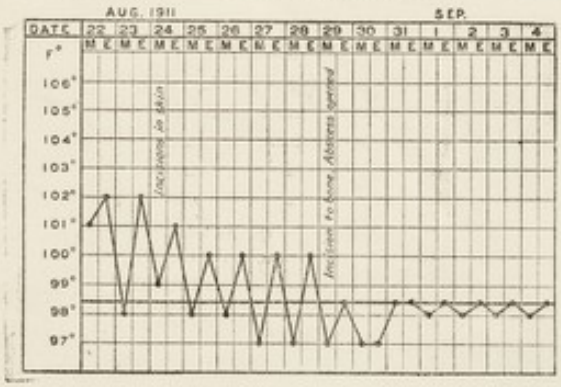
Prophylaxis.—~~The only plan to be adopted in dealing with lepers is~~ complete segregation with separation of the sexes, ~~but this can be rarely carried out completely, especially in large districts.~~

James Cantlie.

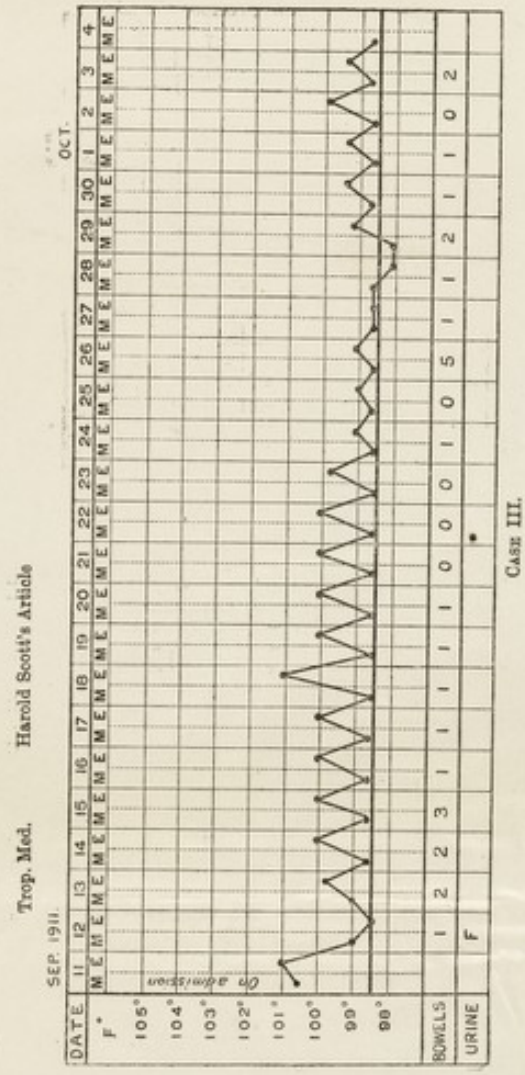
Complete segregation with separation of the sexes is the only known system whereby the spread of leprosy may be held in check.

A curative serum has been prepared employed ~~by~~ ~~Several scientists~~, but so far, with dubious results. Dr Carrasquilla, ~~has~~ after cultivating the bacillus on ~~human~~ blood serum, injects the filtrate of his cultures into horses. The serum obtained from horses thus treated has given in the hands of Dr. Carrasquilla & also of Audié in New Caledonia apparently beneficial results. Gallay of Pondicherry ~~has~~ reports favourably also on this procedure ~~method~~, but he uses the ass as a serum producer in place of the horse.

Trop. Med. Harold Scott's Article



Case I.



Case III.

SEYMOUR

FOOD & DRUGS (NOT to go in DEC 15)

HORLICK'S MALTED MILK.—This well-known preparation has now been before the public for more than thirty years, and the reputation it has acquired among the members of the medical profession is the best testimony to its value. It forms the best substitute for mother's milk, and is prepared with great care, under scientific supervision. The milk is not "sterilized" in the ordinary sense of the term, but is "pasteurized," that is to say, is rendered totally free from germs by being repeatedly heated to a certain temperature, 160° F., for a given time, and then cooled. This takes place at intervals of about an hour, until the milk is sterile. It is then passed on for further treatment, which consists in adding, by a special process, the extracts of wheat and malted barley. The addition of these important nutritious elements prevents coagulation in the stomach, and enormously enhances digestibility. The milk is thus perfectly pure and germ-free. It will keep indefinitely in any climate. It is of uniform composition, is always alkaline, thus resembling mother's milk, and the casein will not coagulate, but forms light flocculent flakes, easily dealt with by the weakest digestive organs. The addition of the extracts of the cereals means a great increase of flesh-forming material. There is no added cane sugar or artificial preservative in any shape, so harmful to infantile life, and so frequently present in many forms of preserved or condensed milk. The milk is obtained only from cows fed on extensive pastures in the Vale of Aylesbury. The herds are kept at the highest state of efficiency, under the most careful supervision. The supply is tested frequently, and at the slightest falling off in quality any animal is discarded. Thus the milk is always pure full-cream milk of the highest grade. The preparation may safely be recommended for infants, invalids, &c., particularly in warm climates where the difficulties of obtaining adequate supplies of fresh milk are great.

ORIGINAL COMMUNICATION.

THE PREVALENCE OF FILARIAL EMBRYOS IN THE BLOOD OF THE LAGOS NATIVES.

By A. Cowan, M.D.Glas., D.T.M. & H.Camb.
Gold Coast, West Africa.

This paper deals with the results of a search for filarial embryos in the blood of 700 natives in Lagos, West Africa.

The investigations were carried out with a view to ascertaining the prevalence of infection, and the effects of the parasites in the circulation.

The persons examined include two classes, those apparently in good health, the prison occupants, and those suffering from disease, the hospital patients.

The examinations were made as a routine procedure in the hospital from November 12, 1910, until April 15, 1911. The prison population was examined between November 15 and December 15, 1910.

The number consists of 444 patients and 256 prisoners.

The blood was taken twice in the twenty-four hours, the actual time being, as near as possible, 11 a.m. and 11 p.m.

Films were examined in the fresh state as well as in thick, dehaemoglobinized, stained preparations.

Ehrlich's haematoxylin applied for five minutes without the aid of heat was found to bring out the details of the embryos satisfactorily, after the usual fixation of the smear in equal parts of absolute alcohol and ether.

All the hospital patients were examined both day and night, except five, whose blood was taken only in the day-time, and one in which an examination was made only during the night. Samples of blood were collected during the night only in 113 prisoners, and the remaining 144 were examined both day and night.

The hospital patients being more numerous than the prisoners, offer more reliable information.

Table I shows the number of patients examined and the number and percentage of infected persons, arranged in monthly columns. Chart 1 shows the percentage of infection graphically.

TABLE I HERE

Chart 1.—Showing Percentage of Infection in Six Months.

The months of February and March give the highest percentages, while November and April, with a small number of examinations, give the smallest percentages.

The period covered by the investigations is the driest part of the year, the rains having practically ceased in November, and the tornado season beginning in April, mosquitoes are correspondingly less numerous during those six months.

The percentage of infected persons is 25.22. Infections by one species of embryo alone account for 21.62 per cent., and mixed infections are 3.60 per cent.

The percentage of cases in which only one species was observed, calculated on the total number of infections is 85.71 per cent., and mixed infections equal 14.28 per cent. Embryos of *F. loa* were found in sixty-three cases, occurring both day and night in thirty-two, and only during the day in thirty. There is one case in which they were not observed during the day, but were seen at night.

There are ten instances of the co-existence of *loa* embryos with those of other species, *perstans* embryos being associated in eight, and *bancrofti* embryos in two cases.

There are thirty-one records of the occurrence of embryos of *F. bancrofti*, the infection being pure in twenty-three and mixed in eight cases. The mixed cases are made up of six in which *perstans* embryos were seen, and two in which *loa* embryos were associated.

Bancrofti embryos were found during the night only in twenty-five cases, both day and night in five, and only during the day in one case.

The embryos of *F. perstans* are noted as having occurred in thirty-four cases, the infection being uncured in twenty. There are fourteen instances of its co-existence with other embryos, the species being *loa* in eight, and *bancrofti* in six.

The *perstans* embryos were found both day and night in fifteen patients, during the day only in eleven, and during the night only in eight.

The various percentages are to be found in Table II, where they are placed alongside of the results obtained from examination of the prisoners.

TABLE II HERE.

Table III shows the diseases from which the patients suffered and the species of embryo found. The list includes thirty-six diagnoses, twenty-six of which are fairly obviously unconnected with the presence of filarial parasites.

The remaining ten diagnoses are abscess, ulcer, fever, hydrocele, sclerotitis, rheumatism, synovitis, malingering cellular swellings, and elephantiasis.

ALLISTONE.

There are ten cases of abscess. The site was generally on the thigh, buttock, or leg. It is possible that the origin of the abscess in some of the cases was an adult filaria which had died in the tissues, a pyogenic infection following. The contents of most of the abscesses were examined, but no signs of filarial tissue were seen.

It is certainly striking that nine out of the ten cases showed embryos of *F. loa* in the blood. They were present as an unmixed infection in seven, associated with *perstans* in one and with *bancrofti* in another. Embryos of *F. perstans* were found alone in the tenth case.

The cases of ulcer number eight. These ulcers may have originated from the same cause as the abscesses, but as the bulk of out-door hospital work consists in attending to patients suffering from ulcer, very few of whom are infected with filaria, such origin is probably unusual. Embryos of *F. loa* alone were seen in three of the cases, *perstans* alone in two, and *bancrofti* alone in one. The remaining two cases showed *bancrofti* and *perstans* embryos together.

The eight cases of fever are interesting. A careful blood examination was made at intervals in each, without detecting parasites other than the filarial embryos. The duration of the febrile state was short in most of the cases, seldom longer than a week, and in no case was the chart suggestive of a malarial infection. Quinine had no apparent effect on the course of the temperature. It is possible that the fever was due to the presence of the filariæ, in the absence of any other obvious cause. An analysis of the cases shows that *loa* embryos were present as an unmixed infection in three, *bancrofti* embryos unmixed in four, and *perstans* alone in one.

Filarial embryos are recorded in five cases of hydrocele, the species being *bancrofti* in three and *perstans* in two.

Four cases of synovitis exhibited filarial embryos in the blood. Two of these cases were attributed to injury and no cause was assigned in the other two. *Bancrofti* embryos occurred alone in two cases and *loa* embryos alone in the other two.

The three cases of adenitis were probably due to the presence of filariæ, the species being *loa* in two and *perstans* in one.

The three cases of "rheumatism," and the three instances of "malingering," are grouped together, the complaint in all of these being of vague pains. No swelling was observed, pain more or less localized, and tenderness which could generally be elicited in any situation, with an absence of fever, being the other conditions found. Embryos of *F. loa* were seen in three of the patients, and *perstans* in one, an unmixed infection. *Loa* and *perstans* were associated in the fifth case, while *bancrofti* and *perstans* embryos co-existed in the sixth.

TABLE III HERE.

Two cases of so-called calabar swelling were examined and *loa* embryos were found alone in both. There was a non-fluctuant swelling in front of the left tibia, and on the left side of the chest in one case, and there was a similar swelling on the dorsum of both hands and of the left foot in the other case. The pain complained of was numbing, there was faint pitting on pressure and slight tenderness existed. The heart appeared to be healthy and the urine to be normal in both cases, and the condition passed off in about a week. Filarial embryos were found in one case of elephantiasis, the species being *perstans*.

A careful inquiry was made in all the cases, which showed embryos of *F. loa*. Each patient was questioned as to the occurrence of swellings or pain and as to the movement of worms across the conjunctiva or elsewhere. The answers were uniformly in the negative.

It is to be noted that the diagnosis in all the cases was made by the medical officer, uninfluenced by the findings of the observer, who frequently did not see the diagnosis until after the discharge of the patient.

The question of sex appears to have an important bearing. Forty-three female patients were examined and only one was found to harbour filariæ. The case was one of trypanosomiasis and the species of filaria was *perstans*.

The influence of age is interesting. The bulk of the cases occurred between the ages of 25 and 45 years. This is well seen in Chart II.

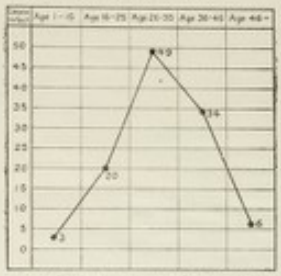


Chart II.—Showing Approximate Percentage of Infected Persons at the Different Age-Periods.

There are grounds for believing that certain districts are more heavily infected than others. This probably depends on the extent and the suitability of the breeding-grounds for particular mosquitoes. Exact data were not obtained, but it was observed in a general way that natives from the Eastern and Central Provinces more frequently showed filarial embryos than the natives of the Western Provinces in Southern Nigeria.

The degree of Eosinophilia was found to vary within fairly wide limits. The lowest observed was 0.66 per cent., and the highest 19.2 per cent., in twenty-seven cases, in which a differential count was made of 500 leucocytes.

Table IV gives the details of these cases. Probably intestinal worms account for the great variations.

TABLE IV.—SHOWING DEGREE OF EOSINOPHILIA IN CERTAIN CASES.

Disease	Eosinophile	Embryos of
	Per cent.	
Beri-beri	5	*F. perstans*
,, ...	1.6	*F. loa* and *F. perstans*
Trypanosomiasis ...	10.66	*F. perstans*
,, ...	3.65	,,
,, ...	6.66	,,
,, ...	12	,,
Ulcer	7.8	,,
Nil	7.4	*F. loa*
,, ...	8.5	,,
,, ...	19.2	,,
,, ...	14.5	,,
,, ...	12.8	,,
,, ...	4.2	*F. bancrofti*
,, ...	7.8	,,
,, ...	13.6	,,
,, ...	7.2	,,
,, ...	13.2	*F. perstans*
,, ...	15.4	,,
,, ...	11	,,
,, ...	13.6	,,
,, ...	12	*F. bancrofti* and *F. perstans*
,, ...	16.4	,, ,,
,, ...	8.4	,, ,,
,, ...	16.6	,, ,,
,, ...	7.6	*F. loa* and *F. perstans*
,, ...	14.4	,, ,,
,, ...	17.2	,, ,,

Four cases out of the 112 infected patients came to *post mortem*. Adult filariæ were only found in one of these. The case was one of advanced cardiac valvular disease. The patient was admitted late at night in a moribund state. He died within a few hours. A blood smear showed enormous numbers of *bancrofti* embryos, and a few *perstans* embryos during life. At the *post-mortem* examination, twenty-one adult *F. loa* were recovered from the tissues in the scrotum.

Embryos may be found in the blood at certain times on certain days, and be absent at the same hour on other days. This was noted in four cases, the species of embryo being *perstans* in three cases and *loa* in the fourth. Embryos of *F. perstans* in one of these cases were seen in a thin blood-smear, but were not again seen, even in thick dehæmoglobinized drops, for a fortnight.

An analysis of the results obtained from the prisoners shows that the percentage of infection was 26.45. Infections by one species alone equalled 20.62 per cent., and mixed infections were 5.83 per cent.

The pure infections, calculated on the number of infected persons, yielded a percentage of 77.94, and the mixed infections gave 22.05 per cent.

Embryos of *F. loa* were found in thirty-four cases. They were unmixed with other species in twenty-five, and associated with *perstans* in seven and with *bancrofti* in two. They were found during the day only in twenty-eight, both day and night in four, and only at night in two cases.

Embryos of *F. bancrofti* occurred in twenty-eight cases, the infection being pure in twenty and mixed in eight. These embryos were seen at night only in twenty-six, and both day and night in two cases. *Perstans* embryos were associated in six instances and *loa* embryos in two.

Embryos of *F. perstans* were observed in twenty-one cases, and in thirteen of these other species of embryos co-existed, so that only eight cases were pure infections.

Loa embryos were associated in seven and *bancrofti* embryos in six cases.

Reports.

THE SOCIETY OF TROPICAL MEDICINE AND HYGIENE.

THE November meeting of the Society of Tropical Medicine and Hygiene was devoted to the subject of beri-beri. Schaumann, Axel Holst, Fraser, and others, especially those who have been working on the lines that overpolished rice is the real cause of beri-beri, read papers, and an animated discussion followed. Schaumann, in concluding his paper, said that finally he would like to draw the Society's attention to the following points:—

That later examinations had shown the much greater similarity than one formerly assumed between experimental polyneuritis of animals and rakke, or beri-beri.

That the similarity did not refer only to the etiology, as far as it was connected with the nutrition, but also to the pathologic anatomical alterations due to both diseases.

That therefore there seemed to exist many more reasons for assuming that both diseases were identical than to presume the contrary, chiefly by taking into consideration that the same cause must not necessarily have the same results in different organisms.

That the extraordinary success obtained by Fletcher, Fraser, Ellis, and particularly by Heiser in the Philippines, solely by a change in the diet, could reasonably only be attributed to the change in the nutrition. There could be no question that the essential factor lay in the giving of the rice-bran adhering to the cured rice.

Further, as many reports showed, the same result could, however, be attained by the addition of other food to polished rice, and therefore it was not an exclusive property. For instances, peas, phaseolus radiatus, and fresh meat might be mentioned. The activator itself and the organic phosphorus compounds rendered fit for use by it were most likely contained in many articles of food, even though in very varying quantities.

That the assumption that beri-beri was a metabolic disease was favoured by the circumstance that there was not a single infectious disease which could be prevented exclusively by a change in diet, and which could be cured by such a change.

He said, however, that it was far from him to completely exclude biological processes in the etiology of beri-beri, although it seemed to him that alimentary influences greatly predominated. It was not improbable that an abnormal flora and other parasites of the intestines might destroy the activator as well as the phosphorus compounds in question. The intestinal parasites might likewise injure the mucous membrane of the intestines, by which resorption could be hindered.

The effect must, then, naturally be the same as with an insufficient supply of the mentioned effective substances, and could therefore easily cause the illusion of an infection.

All the effects taken together seemed to him, however, only to allow of one conclusion—that beri-beri was a disease due to deficient metabolism of phosphorus and its consequences.

Axel Holst, speaking especially of beri-beri as seen on board ships (ship beri-beri), said that, though the disease had relationship to scurvy, yet there existed, on the other hand, some facts speaking against such a contention. It was true, Dr. Frölich and himself had found that the anti-scorbutic constituents, for instance, of fresh cabbage were, to some extent, soluble in acids, but not in petrol-ether, and that they dialysed. These reactions agreed with some of the results found by Fraser and Stanton and Shiga and Kusama, with regard to the anti-neuritic compounds of the polishings of rice. Dr. Frölich's and his own chemical researches were, however, not far advanced, and this was due to the fact that the anti-scorbutic constituents of fresh vegetables suffered from a far greater fragility than the corresponding anti-neuritis substances hitherto studied. This represented a great difference indeed. For instance, if you dried fresh cabbage and kept it in an open vessel in your laboratory-room, it lost, within some months, its anti-scorbutic properties. It was easy to show that this was due to the humidity in the air. On the other hand, however, even if rye-flour was exposed for two years to a moist air, it did not produce neuritis when given to pigeons. This seemed to prove that the anti-neuritic constituent of the rye-flour was not destroyed by humidity. He added, however, that the polishings of rice, being excellent protective remedies against the experimental neuritis of poultry, did not prevent the experimental scurvy of guinea-pigs, but still you might make peas prevent the latter disease, as Dr. First in Christiania had proved. The peas prevented the experimental scurvy when they were moistened and made to sprout. That was, they must be converted to a fresh vegetable. These preventive properties were not destroyed if the peas were boiled for one hour at 100° C. The same applied to grains, such as oats and barley; if guinea-pigs were fed on these nutriments before sprouting, they died from scurvy; if after sprouting, they did not get ill.

Under these circumstances, Holst thought it might be of interest to examine the bone-system from post mortems of beri-beri cases in order to ascertain if there possibly existed some of the peculiar changes of the bone-marrow specific to scurvy. Dr. Frölich and himself had also tried to carry out investigations of this kind, Dr. Vis, of Java, having been good enough to send them several ribs from each of about thirty post mortems of beri-beri cases in Java. No changes of the said nature were found, however.

Under all the circumstances, Dr. Frölich and himself thought it safer to limit themselves to a neuter expression, and to imagine that there must exist, somewhere, a bridge between beri-beri and scurvy, but they could not tell if there existed a real relationship. When, for instance, fresh cabbage prevented both the experimental neuritis and the experimental scurvy, the explanation possibly would be this—that the cabbage contained two different compounds, the former preventing one and the latter the other disease.

Dr. Fraser, who followed, supported the views he and Stanton had already expressed in their work on the etiology of beri-beri (vide the JOURNAL OF TROPICAL MEDICINE AND HYGIENE, November 15, 1911, and following numbers). He disagreed with Schaumann that phosphorus played any part in the production of the disease. Other speakers who followed dealt chiefly with the possible nature of the substance present in the under-layers of the rice, the presence of which prevented the production of the disease. What this is is yet unknown, but probably chemists will ultimately discover its true nature.

Trop. Med. Prevalence of Filaria Embryos A

TABLE I.—SHOWING DISTRIBUTION OF FILARIAL EMBRYOS IN THE SEVERAL MONTHS.

	Nov.	Dec.	Jan.	Feb.	March	April	Total
Embryos of *F. loa* during day only	5	7	8	7	4	—	26
,, ,, ,, day and night	—	4	6	8	7	1	26
,, ,, ,, night only	—	1	—	—	—	—	1
,, *F. bancrofti* during night only	—	3	5	6	3	1	18
,, ,, ,, day and night	—	1	—	—	1	2	4
,, ,, ,, day only	1	—	—	—	—	—	1
,, *F. perstans* ,, ,, ...	—	4	1	2	2	—	9
,, ,, ,, day and night	—	1	3	—	2	1	7
,, ,, ,, night only	—	—	1	1	1	1	4
,, *F. loa*, day only ; *F. perstans*, day only	1	1	—	—	—	—	2
,, ,, day and night ,, night only	1	—	—	—	—	—	1
,, ,, ,, ,, day and night ...	—	—	1	1	3	—	5
,, ,, day only ; *F. bancrofti*, night only	—	—	—	—	2	—	2
,, *F. bancrofti*, night only ; *F. perstans*, day and night	—	—	1	—	1	1	3
,, ,, ,, ,, night only ...	—	—	—	1	1	—	2
,, ,, day and night ,, ,, ...	—	—	—	—	1	—	1
Monthly total infected	8	22	21	26	28	7	112
Monthly total examined	41	90	85	81	104	43	444
Percentage infected	19.51	24.44	24.70	32·09	26.92	16.28	25.22

Trop. Med. Prevalence of Falaria Embryos C

TABLE III.—SHOWING SPECIES OF EMBRYO IN VARIOUS DISEASES.

	Abscess	Hernia	Wound	*Ulcer*	*Fever*	Diarrhœa	Gonorrhœa	*Hydrocele*	Cardiac	*Synovitis*	Cellulitis	Adenitis	*Rheumatism*	Bronchitis	Malingering	Nephritis	Conjunctivitis	Guinea worm	Tumour	Gastritis	Fracture	Phimosis	*Calabar Swelling*	Hepatitis	Constipation	Periostitis	Tetanus	Leucomata	Corneal ulcer	Schistosomiasis	Septicæmia	Pneumonia	Jiggers	Trypanosomiasis	*Elephantiasis*	Phthisis	
F. loa, day	4	3	2	1	1	—	2	—	1	1	2	1	1	—	—	1	—	—	—	1	1	—	2	—	—	—	1	—	—	—	—	—	1	—	—	—	26
,, both	3	1	3	2	2	—	1	—	2	1	—	1	—	1	2	1	1	1	1	—	—	—	—	—	—	—	—	1	1	—	1	—	—	—	—	—	26
,, night	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	—	—	—	—	—	—	—	—	—	—	1
F. bancrofti, night	—	3	—	—	3	—	1	3	—	1	—	—	—	1	—	—	—	1	1	—	1	1	—	—	—	—	—	—	—	1	—	1	—	—	—	—	18
,, both	—	—	1	1	1	—	—	—	—	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	—	—	—	—	—	—	—	—	—	—	—	4
,, day	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1
F. perstans, day	1	—	1	—	—	1	1	—	—	—	—	1	—	1	—	—	—	—	—	—	—	1	—	—	—	—	—	—	—	—	—	—	1	—	1	—	9
,, both	—	—	1	2	1	1	—	2	—	—	—	—	—	—	—	—	—	—	—	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	8
,, night	—	—	—	—	—	1	—	—	—	—	—	—	—	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	—	—	3
F. loa, day ; *F. perstans*, day	—	—	—	—	—	—	—	—	—	—	1	—	—	—	—	—	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	2
,, both ,, both	1	1	—	—	—	1	1	—	—	—	—	—	—	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	5
,, ,, ,, night	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	—	—	—	—	—	—	—	—	—	—	—	—	1
,, day ; *F. bancrofti* ,, ...	1	—	—	—	—	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	2
F. bancrofti, night ; *F. perstans*, both	—	1	—	1	—	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	3
,, ,, ,, night	—	—	—	1	—	—	—	—	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	2
,, both ,, ,,	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1
	10	9	8	8	8	6	6	5	4	4	3	3	3	3	3	2	2	2	2	2	2	2	2	1	1	1	1	1	1	1	1	1	1	1	1	1	112

TABLE II.—SHOWING PARTICULARS OF THE EXAMINATION OF THE HOSPITAL PATIENTS AND THE PRISONERS.

Species of embryo	Number of persons infected		Total of persons infected		Total of *F. loa* infections		Percentage of *F. loa* infections on examinations		Ditto on total infections		Ditto on single infections		Ditto on mixed infections	
	Hosp.	Pris.	Hosp.	Pris.	Hosp.	Pris.	Hosp.	Pris.	Hosp.	Pris.	Hosp.	Pris.	Hosp.	Pris.
F. loa day	26	20	53	25	63	34	14.12	13.27	56.25	50	55.20	47.17	62.5	60
,, both	26	4												
,, night	1	1												
F. bancrofti night	18	19	23	20	Total of *F. bancrofti* infections		Percentage of *F. bancrofti* infections on examinations		Ditto on total infections		Ditto on single infections		Ditto on mixed infections	
,, both	4	1												
,, day	1				Hosp.	Pris.	Hosp.	Pris.	Hosp.	Pris.	Hosp.	Pris.	Hosp.	Pris.
					31	28	6·98	10.93	27.67	41.17	23.9	37.73	50	53.33
F. perstans day	9	2	20	8	Total of *F. perstans* infections		Percentage of *F. perstans* infections on examinations		Ditto on total infections		Ditto on single infections		Ditto on mixed infections	
,, both	8													
,, night	3	6			Hosp.	Pris.	Hosp.	Pris.	Hosp.	Pris.	Hosp.	Pris.	Hosp.	Pris.
					34	21	7.65	8.20	30.35	30.88	20.83	15.09	87.2	86.66
F. loa both, *F. perstans* both ...	5		8	7										
,, ,, night ...	1													
,, day ,, both ...		2												
,, ,, ,, day ...	2	4												
,, night ,, night ...		1												
,, day, *F. bancrofti* both ...		1	2	2										
,, ,, night ...	2	1												
F. bancrofti night, *F. perstans* day		2	6	6										
,, ,, ,, night	2	4												
,, ,, ,, both	3													
,, both, ,, night	1													
	112	68	112	68										

Hospital patients examined 444
Prisoners ,, ... 256

Hospital patients infected 112
Prisoners ,, ... 68

Percentage infection, hospital patients ... 25.22
,, ,, prisoners ,, ... 26.45

ABSTRACTS

PRESIDENTIAL ADDRESS DELIVERED AT THE SECOND MEETING OF THE GENERAL MALARIA COMMITTEE, HELD AT BOMBAY ON NOVEMBER 16, 1911.

By Surgeon General C. P. Lukis, M.D., F.R.C.S.
Acting Sanitary Commissioner with the Government of India.

In his opening remarks, Surgeon-General Lukis stated that the purpose of the present meeting was to ascertain what progress has been made since they met for the first time in Simla in November last, and to make suggestions which will facilitate further advance.

He said that the publication, *Paludism*, two numbers of which have been brought out during the last year, could not maintain its usefulness unless, in the future, we receive from officers engaged in malarial operations far more contributions than have been received in the past.

He also spoke of the new Indian Research Fund with the aid of which we hope to carry out many investigations which hitherto, for financial reasons, have been outside the bounds of practical politics. The first inquiry which will be undertaken at the expense of this fund has already been commenced, namely, an inquiry into the methods by which yellow fever may be prevented from entering our Indian ports, and may be stamped out should it ever succeed in obtaining a footing.

The danger of its introduction which may arise on the opening of the Panama Canal has recently engaged the serious attention of the Government of India, and it has been decided, in consultation with the Right Honorable the Secretary of State for India, to depute Major James to the endemic area by way of the route that will be followed by ships proceeding to India when the Canal is opened.

There are two other inquiries of importance. The first is the institution of malariometric investigations, for which work the central committee consider it desirable to have at least one worker who can devote his whole time to the development of malariometric methods and their application to the study of Indian malaria. The second is an inquiry into the bionomics of anopheles.

Two very important contributions to our knowledge have been made during the past year. The first is the publication of Dr. Bentley's admirable report on the causes of the recent malarial outbreak in Bombay, which has confirmed Major Liston's original observations incriminating Nyssorhynchus *Stephensi* as the carrier of malaria in this city; and which suggests that malaria can not only be reduced, but it can be *absolutely* eradicated from the greater part of Bombay at a cost which would amount to less than a tenth part of the loss estimated to be occasioned each year by the disease. The second contribution is a report which has just reached me from Major Carruthers, who was sent to investigate the causes of malaria in the Andamans. The first thing that struck him was the remarkable fact that a large number of villages were quite free from malaria, in spite of the fact that many of them were surrounded by rice-land, swamp or jungle, whereas others showed a considerable amount of malaria, the spleen rate varying from 25 per cent. to 50 per cent. Eventually it was noted that what determined the healthiness or unhealthiness of a village was its proximity to the sea. Villages near the sea were invariably malarious; those remote from the sea healthy. Even a distance of half a mile from the sea was sufficient to ensure the endemic index being 0 per cent. This distribution of malaria was shown by actual measurement to be exactly coincident with the occurrence of a particular species of anopheles, namely, *Paradimorphomyia Ludlowi*, which appears to breed chiefly in salt swamps and brackish water, and which is undoubtedly the chief malaria carrier in the Port Blair Settlement.

Now so closely does this mosquito, on casual examination, resemble N. *Rossi* that, with reference to those two species, Professor Ficalbi has remarked upon the folly of too nice distinctions in regard to the species of anopheles and the transmission of malaria. Yet the existence of two distinct, though closely related, species of anopheles is the explanation why, in the Andamans, the proximity to rice-lands and swamps is innocuous, provided that these are at a distance from the sea.

The President viewed with concern the tendency amongst malaria workers to divide up into two camps, namely, those who advocate anti-mosquito measures and those who put their faith on quinine prophylaxis. Quinine prophylaxis should go hand in hand with general sanitation and with the destruction of anopheles breeding grounds wherever this can be accomplished at reasonable expense, and it seems to me that recent observations justify us in thinking that this destruction is not likely to be as costly as has hitherto been supposed. Quinine has undoubtedly conferred incalculable benefits upon the individual; but it never has, and never will, be of equal value to the community as a whole; and you cannot get away from the fact that if there were no mosquitos there could be no malaria.

We require two classes of men—the scientific experts and the practical workers—the former engaged in research and ready to aid the latter when in difficulties—and the latter trained in the taking of spleen indices and in the recognition of the commoner varieties of anopheles. It is not necessary that they should be able to dissect them.

Surgeon-General Lukis alluded to the diseases allied to malaria, especially those of the "Leishmania" type. There are several points in connection with these which require further investigation.

The genus Leishmania at present comprises three species:—

L. Donovani—the parasite of kala azar.

L. tropica—the parasite of Oriental sore.

L. infantum—the parasite of infantile splenomegaly in South Africa.

The points in connection with these, which in my opinion require further investigation, are as follows:—

(1) *The Rôle of the Domestic Fly as a Carrier of Oriental Sore.*—Both Wenyon, as the result of his work in Baghdad, and Row, in India, regard this insect as the carrier. On the other hand, Patton, as the result of his recent observations in Cambay, is inclined to incriminate the bed bug. Further investigations on this point are clearly necessary.

(2) *The Question of the Carrier of Kala Azar.*—It is generally supposed, though it is by no means proven, that the bed bug is the carrier in this case. On the other hand, Nicolle regards the dog as the reservoir of the parasite which causes the infantile kala azar of North Africa, and both he and Basili have proved that the parasite is carried from dog to dog by the dog-flea, and he suggests the possibility that it may be conveyed from dog to man by the same means. So far, dogs in India have not been found to be infected with *L. Donovani*, and all attempts to infect dogs with it have failed, but a much more extensive examination of dogs in kala azar districts in India would seem to be indicated.

ORIGINAL COMMUNICATION.

GLORIOSA SUPERBA POISONING.

By Lawrence G. Fish, M.B., C.M.Edin.
Civil Surgeon, Myingyan, Burma.

On September 9, 1911, at about 6 a.m., two Burmans, one aged 17 and the other 20 years, were brought here a distant village in a boat in the Civil Hospital, Myingyan, with a history of recent poisoning. The relatives and friends stated that these two young men had eaten a root which was given to them by a young Burmese woman, the wife of one of the men. She herself had eaten several roots, suffered from symptoms of poisoning, and had died on the way to hospital. The men arrived at about 6 a.m., and at 7.30 a.m. the dead body of the woman was received for post-mortem examination. The root is said to have been that of Gloriosa superba (Burmese Si-ma-dauk), a plant which is common in Upper but comparatively rare in Lower Burma. It is a well recognized poison, but is apt to be mistaken by people in Lower Burma, who are not so familiar with it, for the root of Gon hsan (Burmese Pe-myit), a potato-like tuber, which is boiled and eaten by Burmans with oil and salt. The woman is said to have eaten several roots; one of the men three roots, each about 2 in. long and 1 in. in diameter, and the other man half a root 3 in. by 1 in. One of the men was unconscious and the other semi-conscious on arrival at hospital. All these persons are said to have eaten the poisonous root at about 3 p.m. on September 7. At about midnight there were signs and symptoms of poisoning, and were briefly as follows: Tingling and then numbness in the lips, tongue and throat; burning pain in the stomach; numbness in the skin in various parts of the body; intense nausea followed by vomiting, diarrhea with blood-stained motions; giddiness with loss of power in the limbs; heaviness of eye-lids; photophobia; convulsions; loss of consciousness; difficulty of breathing and, when admitted, the pulse of the two men was feeble and quick; cold perspiration on the body. The patients were given an emetic of zinc sulphate, which acted satisfactorily. They were then stimulated with brandy and given a hypodermic injection of strychnine. They were discharged cured on September 13.

The post-mortem examination of the woman revealed severe congestion of the mucous membrane of the stomach, which contained undigested rice and lumps of the boiled root. There was also congestion of the lungs, liver and the broad ligaments of the uterus. The stomach and its contents, the upper part of the small intestine, liver spleen and kidney were sent to the chemical examiner, who reported that an alkaloid similar in physiological reaction to aconite was exarted from these and from a sample root obtained by me from the jungle here.

In Lyon's *Medical Jurisprudence for India*, third edition, 1904, p. 344, it is stated that large doses of the root of *Gloriosa superba* appear to be poisonous, acting in the same manner as squill, and that Warden has recently isolated a bitter principle from the root, which he has named superbine, and considers to be closely allied to, if not identical with, scillitin. On the same page it is stated that scillitin, apparently a glucoside, is the active principle of squill. In the *National Standard Dispensatory*, by Hare, Caspari and Rusby, as in other standard text-books on Materia Medica, scilla, scillipicrin and scillitoxin are given as the active principles of squill, but no mention is made of scillitin. This, however, is a matter of little or no importance, but it appears to me that the root of Gloriosa superba acts not in the same manner as squill, but like aconite. The signs and symptoms of squill and aconite poisoning are very similar, but there are important differences. With the former there is no tingling, formication or numbness of the lips, tongue, throat or skin, whereas these are marked features in poisoning with the latter. Strangury and bloody urine occur with squill poisoning, but not in that with aconite. The patients under observation passed urine without any difficulty, and there was no post-mortem evidence, in the case of the woman, of irritation of the kidneys or bladder.

According to Moulvi Sherif, native practitioners say that the root of Gloriosa superba possesses nearly the same properties as the root of *Aconitum ferox*, hence its name of country or wild aconite. It is interesting in this connection to read on page 617 of Lyon's *Medical Jurisprudence* that the Burmese, during their retreat before the British in 1842, threw bruised aconite root into a tank, in the hope of poisoning the troops pursuing them. Was this the root of *Gloriosa superba*, which grows luxuriently in Upper Burma and is well known as a poison?

CASE OF PEMPHIGUS CONTAGIOSUS.

By F. H. Macdonald, M.B., Ch.B.Edin.

On the morning of September 19, 1911, a boy native of Bendr, aged about 17 years, arrived at the dispensary.

Appearance on Admission.

There were several raw pink areas, some as much as ½ in. in diameter, on the front of the chest and on the forearms. On the same areas and on cheeks near the angles of the mouth were bullæ. Those on the face were about the size of peas, and so were several of those on the other parts selected, but on the latter parts there were also much larger bullæ. These larger ones were some of them as much as ½ in. in diameter. The small ones were tense and had a somewhat pearly lustre, and on puncturing a clear colourless fluid exuded; they also were perfectly round in outline. The larger flaccid ones also exuded clear fluid on puncturing, but many of them had a sinuous edge. Those which had been previously ruptured before admission displayed a viscous straw-coloured fluid, projecting from the ruptured vesicle in the form of a clot. The boy stated that three days before, at Ita, a place on the Cross River which he had been visiting, he noticed the blisters appearing on his forearms, then on his chest, and then on his face. Microscopic examination of smears from the fluid of the vesicles stained with Loeffler's methylene blue showed numerous diplococci. The boy said he felt quite well, except for the itching sensation in the vicinity of the vesicles which compelled him to scratch. The next day new vesicles were found over the arms and the front and back of the thorax and abdomen, and on the face; and the day after that the boy, in the morning, had difficulty in talking, and examination of the mouth

showed vesicles on the tongue at the edges and tip, and on the roof of the mouth. New bullæ were also found on the parts previously affected, and on the lower limbs. The boy also had a slight cough. For the next two days again new bullæ appeared on the parts already affected.

Some of these bullæ became very large, even about 1½ in. across. These, on rupturing, first exuded clear, watery serum which became later darker, amber-coloured and more viscous, leaving pink denuded areas of skin.

These pink areas, on account of the boy scratching them and effusion of neighbouring vesicles, increased greatly in size. The older areas of skin became varnished in appearance, and the bright pink colour of the recent raw areas faded considerably. The boy presented latterly an extraordinary appearance, on account of the enormous surface of skin, head and neck, body and limbs, involved. He became very depressed and miserable, and had difficulty in talking and swallowing. He became daily weaker, very emaciated, and died on September 29, fourteen days after the beginning of the illness.

Treatment.

The blisters as they appeared were punctured, and the skin frequently washed with the 1 in 3,000 pot. permanganate lotion, and after that an antiseptic dusting powder was freely applied. Later, when there was such a large area of skin involved, boracic ointment on lint was applied and cotton wool bandages to keep the dressing in position. The bronchitis was treated by a simple expectorant mixture; the vesicles in the mouth were punctured, and glicer. acid borac. applied, a pot. permang. mouth wash being also used. At first the boy's appetite was good, and he had ordinary food, but after the mouth was affected only fluid nourishment could be taken. From the fourth to the eighth day of the disease the boy had a slightly raised temperature, and the highest point to which it rose was 100.6° on the seventh day. During the rest of the illness the temperature was normal and sub-normal. This raised temperature was possibly due to the attack of bronchitis.

Points of Interest.

(1) The disease started on the forearms. The axillæ were not specially involved, nor primarily.

(2) Manson and Castellani's text-books make no mention of the disease affecting the mouth.

(3) The enormous area of skin which was denuded.

(4) The disease terminated fatally.

(5) The occurrence of this disease in Southern Nigeria.

Notes and News.

Unusual Weather in South Africa.—East Transvaal has provided an extremely interesting meteorological phenomenon during the month of September. In the first week, quite winter conditions were experienced, with eight and ten degrees of frost every night. A fortnight later the hottest summer conditions prevailed, and the thermometer rose to between 89° and 92° in the shade, day after day, and the nights proved correspondingly close and hot. Statistics showed that the month produced the highest mean maximum shade temperature (80°), and the lowest mean maximum temperature (40.8°), recorded in ten years. Another strange occurrence was the total absence of rain, which, likewise, has never happened during a similar period.

Drugs and Appliances.

Gas Supply for Science Laboratories.—Mansfield and Sons, Ltd., of Birkenhead, have devised an apparatus, the object of which is to place in the hands of scientists, whose laboratories are removed from the advantages of a supply of town's coal gas, a complete plant of great durability and simplicity, which will manufacture and maintain a constant supply of gas. The gas is made from any kind of oil (mineral, animal or vegetable oil); it is permanent, will not condense, and has much greater calorific power than coal gas. All the appliances used for coal gas are readily adapted for use with the apparatus. All requiring such a supply of gas should get the maker's catalogue, which gives full particulars of the installation cost, &c. For the Tropics the Mansfield's Oil Gas Apparatus is essential in many places, the list at the end of the catalogue showing this very clearly.

THE SOCIETY OF TROPICAL MEDICINE AND HYGIENE.

At a meeting of the Society of Tropical Medicine and Hygiene, held at 11, Chandos Street, Cavendish Square, London, W., on Friday, February 16, 1912, at 8.30 p.m., the following papers were read:—

(1) "A Review of Previous Results Obtained in the Experimental Cultivation of the Leprosy Bacillus, and a Demonstration of a New Method," by Dr. H. Bayon, The Lister Institute of Preventive Medicine.

(2) "The Treatment of Leprosy," by Professor Doyle, Hamburg.

(3) "The Experimental Production of Leprous Alterations in Animals," by Dr. Mask, Chief of the Section for Experimental Therapy, Hamburg (Eppendorf).

(4) "Recent Advances in our Knowledge of Leprosy," by Dr. E. Marchoux.

(5) "Early Attempts at the Cultivation of the Leprosy Bacillus," by Dr. Phineas S. Abraham, London.

At the same meeting the following candidates were also elected Fellows of the Society: Donald W. [illegible] M.B., Tavoy, James G. Gibb, M.B., Pekin; George B. McHutchison, M.D., Kuala Lipis; Harold Parsons, M.B., Lewes.

ORIGINAL COMMUNICATION.

A CASE OF SUPPURATION IN AN ENCYSTED HYDROCELE OF THE SPERMATIC CORD.

By J. R. D. Wyse, M.R.C.S. & L.R.C.P.,
S.M.O., British Guiana.

On January 12, 1912, a patient, C——, age 30, male, was admitted by me to the Colonial Hospital, Georgetown, Demerara, with a temperature of 102° F. The abdomen was distended, very tender on palpation, and a flat note obtained on percussion.

A small swelling in the right groin was observed, which the patient said he had noticed for one day. There was no vomiting, and a definite history as to the time at which the last stool was passed could not be obtained.

The tongue was moist and fairly clean. The pulse rapid (110 beats per minute), its volume, tension and force, poor.

A mitral systolic bruit could be heard at the apex, conducted into the axilla.

The general diagnosis on consultation with the other surgeons of the hospital was that of strangulated hernia.

Consequently the patient was treated by elevating the foot of the bed and an ice-bag applied to the groin.

In six hours' time the swelling showed no signs of becoming reduced, so an exploratory incision was made over the lump. A swelling of the cord was observed surrounded by some gelatinous-looking material. No hernia could be discerned, so the incision was closed up and the patient returned to bed.

His condition became much worse, and he was treated with continuous warm normal saline per rectum, hot bottles, and brandy 1 oz. hourly.

The abdomen became very distended and dull on percussion, the pulse very poor and eventually intermittent; death occurring twenty hours after admission.

Autopsy.—On opening the abdomen purulent peritonitis was observed, more or less confined to the pelvic region, and on examining the right spermatic cord, a swelling, the size of a small hen's egg, was found situated just outside the external abdominal ring.

On making an incision into this, two well-formed cavities were observed with definite pyogenic lining to the walls and filled with thin watery pus. Cultures taken from the pus in the cavities of the cord showed *Bacillus coli communis* in pure culture. Culture of the peritoneum showed *B. coli communis* in pure culture.

The left spermatic cord had a small lipoma attached to it in a similar position.

The spleen was slightly hypertrophied.

The lungs congested, and the heart fatty with the valves fibrosed.

The kidneys were also fatty with early cirrhotic changes. With regard to the swelling of the right spermatic cord, a question of filariasis arose, but nothing to confirm this was forthcoming, as on examination of other glands nothing could be found, nor was the typical thickened appearance of the filarial cord present.

It would appear that the condition was an encysted hydrocele of the remnant of the *Processus vaginalis*, which had become infected, and the purulent pelvic peritonitis which was found, was secondary to the infection having spread upwards by means of the lymphatics.

The accompanying photograph was taken after hardening the specimen in formalin for twenty-four hours.

ANNOTATION.

Vital Blood-staining.—Balfour, in the *British Medical Journal*, of February 17, 1912, contributes a preliminary note on "The Value of Vital Blood-staining in the Study of the So-called Infective Granule." In the fourth report of the Wellcome Tropical Research Laboratories, Khartoum, and elsewhere, the author states how valuable the dark-field method of blood examination in studying the extrusion of living granules from spirochætes and trypanosomes was. By this method, combined with the better known laboratory processes, he had been able to discover a good deal regarding the part played by the infective granule in Sudan spirochætosis, both in the blood and organs of the fowl and in the fluids and tissues of the ticks which served as vectors of the disease. At the same time certain gaps in our knowledge remained to be bridged, and it was with the object of discovering, if possible, the missing links, that he decided to see if vital staining of the blood, a method commonly employed by German hæmatologists for studying the morphology of blood cells, would be of service.

After various trials it was found that toluidin-blue was the best stain to employ, and the most suitable strength proved to be one of 0.01 per cent. The solvent used was normal salt solution. The technique was of the simplest—the fresh blood and staining solution being mixed in a Wright's pipette and a drop of the mixture mounted as a sealed cover-slip preparation. The method appeared to have solved many difficulties. It frequently showed up the granules in the living spirochætes, it stained the free and living granules, it had apparently enabled the penetration of the red cell by the granule to be witnessed, and it had shown that not only were granules (spore forms) discharged from the mature intracorpuscular bodies, but that these bodies, unruptured and still containing the spores (merozoites), could be themselves set free from the red cells. Incidentally it had shown that they possessed capsules or limiting membranes. Further, and of the greatest importance, it would seem to have permitted the demonstration of the development of the young spirochæte from the granule in the peripheral blood.

So far as the blood was concerned, one great advantage of its use was that hæmolysis remain restrained, and thus a very disturbing factor in dark-field work was easily eliminated.

ANNOTATION

Dr. Balfour hopes that the publication of this preliminary note may induce any who are working at this granule problem to give the method of vital staining a trial, as it is important to collect all available evidence regarding a phenomenon which he believes to be of very great importance and significance. He thinks it might prove specially valuable in the study of what he has called "cryptotrypanosomiasis," a term which Dr. Bagshawe has accepted.

It will be well to remember, however, that there are many fallacies to be encountered in this vital staining method. It was by such a method, using methylene-blue as his stain, that Bruhlen was led to the belief that stain inclusions in the red corpuscles were a new form of malarial parasite. It will have to be shown that the apparent penetration of the rat cells by the granules mentioned above is not a phenomenon of a similar nature therefore.

Reports on Plague Investigations in India.—In the *Journal of Hygiene—Plague Supplement I*—the *Sixth Report on Plague Investigations in India*, amongst other interesting items, are contained a paper on "Observations on Plague in Eastern Bengal and Assam." The origin of this paper was as follows:—

The Sanitary Commissioner with the Government of Eastern Bengal and Assam addressed the following letter to the Sanitary Commissioner with the Government of India:—

"It has been suggested that an addition to our knowledge of plague might be gained by a study of the conditions under which the people of this Province are living, seeing that they have not hitherto suffered from the disease in an indigenous form, and I have the honour to ask whether the members of the Plague Commission would make it convenient to extend their researches in this direction. I may add that the Local Government would be glad to welcome them and to afford them assistance in their work."

In compliance with this invitation the Advisory Committee arranged that the Commission working in India should make an inquiry in the Provinces of Eastern Bengal and Assam. This inquiry was started in December, 1908, and the results are given in the following conclusions:—

(1) The Province of Eastern Bengal and Assam has suffered very little from bubonic plague; a few epidemics only of pneumonic plague have occurred.

(2) The physical features of the country protect it to some extent from the importation of infection, and would tend to limit the opportunities for spreading the disease if it once broke out.

(3) The freedom of the Province from plague can chiefly be attributed to the scarcity of rats in the houses as compared with other parts of India.

(4) *M. rattus* is comparatively rare in Bengali houses because of the habits of these people in respect to their greater regard for neatness and tidiness both in and around their dwellings, which diminishes the food supply of the rodents.

(5) The structure and design of the Bengali house, whether it be of the solid masonry type on the one hand or of the flimsy matting or grass type on the other, afford little shelter for rats.

(6) The presence of natural enemies of *M. rattus*, such as the musk rat, may assist in maintaining a low rat infestation of the houses.

ABSTRACT

FILARIASIS IN FIJI.*

* From a paper read before the Society of Tropical Medicine and Hygiene, January 18, 1910.

By F. H. Bahr, M.A., M.B., B.C., D.T.M. & H. (Camb.)

Dr. Bahr, after some introductory remarks, said that his investigations on filariasis in Fiji were directed more especially to the Fijians, and confirmed many of the observations of previous workers. Dr. Bahr's conclusions, briefly stated, are as follows:—

I.—A large proportion of all Fijians (37.1 per cent.) harbour microfilariæ in their blood; this figure, however, probably does not represent the aggregate liability of these people to filarial infection. Adult filariæ were found in the lymphatics, especially the lymphatic glands, without the presence of the corresponding microfilariæ in the blood. Again, a large proportion of Fijians are affected with lesions commonly regarded as being of filarial origin, in whom no microfilariæ could be found in the blood; that is to say, the proportion of Fijians carrying microfilariæ (37.1 per cent.), added to the total affected by filarial disease, but without microfilariæ (25.4 per cent.), represented no less than 52.5 per cent. of the entire population. Moreover, all Fijians, as well as foreigners for some time resident in Fiji, exhibited a well-marked eosinophilia, and this even in the absence of evidence of infection with intestinal or other metazoal parasites. In addition to this, microfilariæ have been observed to disappear from the blood-stream of patients while under observation. So it is not unreasonable to conclude that nearly every Fijian has, at one time or another, been the subject of filarial invasion.

II.—(1) At the present state of knowledge it cannot be stated definitely whether the Fijian filaria is a new species or a local variety, or whether it is really *Filaria bancrofti* with the habit of its microfilariæ as regards periodicity modified by local circumstances. There are certain reasons in favour of its being a new species, and others, apparently equally good, against that supposition. In favour of its being a new species are the following:—

(a) The larval form (microfilaria) exhibits in the blood no periodicity, contrary to what happens in the case of *F. bancrofti*; it occurs in equal abundance in the blood at all hours of the day or night.

(b) While capable of development in *Culex fatigans*—the hitherto intermediary host of *F. bancrofti*—this mosquito is not nearly so efficient as intermediary in Fiji as it is in other countries, or as is *Stegomyia pseudoscutellaris* (Theobald), the common mosquito of this group of islands.

(2) In favour of the Fijian filaria being identical with *F. bancrofti* were the following facts:—

(a) The Fijian microfilaria is morphologically identical with *Microfilaria bancrofti*.

(b) The parental form of the microfilaria is, as far as can be ascertained, identical with *F. bancrofti*.

(c) Both nematodes live in the same tissues, and are associated with the same diseases.

(d) The same mosquito, *S. pseudoscutellaris*, is an efficient intermediary for *F. bancrofti*.

III.—Assuming that the Fijian filaria is *F. bancrofti*, it may be that the absence of periodicity is a partial adaptation to the habits of its usual intermediary host in Fiji—*S. pseudoscutellaris*—a mosquito which feeds by day only. This absence of periodicity in the Fijian filaria does not depend on the habits or any racial peculiarity in the human host, for, if a native of India or the Solomon Islands comes to reside in Fiji, his microfilariæ retain their habit of nocturnal periodicity; but when a stranger acquires filarial infection in Fiji, the corresponding microfilariæ exhibit no such periodicity, but in this respect comport themselves in the same way as the microfilariæ of the native Fijian.

IV.—The principal expression of filarial infection in Fiji is the same as elsewhere, viz., elephantiasis.

V.—The lower extremities and scrotum are the parts of the body most frequently affected, but in comparison with the natives of China, India, and the West Indies, the natives of Fiji, and probably of other Pacific Islands, are peculiarly liable to elephantiasis of the upper extremities; on the other hand, chyluria, lymph scrotum,

various groin glands, and other forms of lymphatic varix depending on filarial obstruction of the thoracic duct above the entrance of the chyle vessels are rare. In many cases adult filaria occur in large numbers in the tissues, especially in the lymphatic glands and vessels, but also in other tissues, the epididymis, testis and tunica vaginalis. In the latter circumstance may lie a contributory cause to the well-known infecundity of the Fijian.

VI.—In the situations mentioned, the adult filaria may die and become calcified.

VII.—The adult filaria is not infrequently the cause of abscess, of hydrocele, enlarged testis and of thickening of lymphatic vessels, and even of fugitive swellings resembling Calabar swellings; but whether alive or calcified they are the direct cause of fibrosis and blocking of lymphatic glands and channels. Calcified filaria have been found in the interior of and blocking the vasa efferentia of the epididymis.

VIII.—The microfilaria produced by the parent worm may not reach the general circulation, perishing in the gland or organ in which the worm is lying.

IX.—The occurrence of periodical attacks of lymphangitis, orchitis and funiculitis can best be explained by periodical discharges of microfilaria from the parental worms.

X.—After such inflammatory attacks, the parent worm may perish.

XI.—Lymph from such inflammatory foci may be sterile or may be the seat of bacterial invasion, but lymph abstracted from elephantoid tissue is usually sterile.

XII.—Though the precise mechanism of the production of elephantiasis has yet to be determined, that the filaria is a principal factor is hardly open to doubt.

XIII.—Surgical and medical treatment of filarial disease being unsatisfactory, mosquito destruction directed especially against the important intermediary host, *S. pseudoscutellaris*, is the only means likely to prove of service in mitigating this important form of helminthiasis in these islands.

As regards headings IX to XII, the sections dealing especially with the pathology of filariasis and the relation of the filaria to elephantiasis, Dr Bahr said that the production of lymphangitis, adenitis and orchitis, so frequent an occurrence in filarial invasion, required explanation.

He had been extremely fortunate in possessing a Fijian male, the subject of recurring attacks of adenitis and orchitis, accompanied by rigors and high fever. He had him under minute and constant observation over a period of ten months. In his case the number of microfilariæ in the blood-stream suffered no diminution after the febrile attacks. During each attack of orchitis a collection of fluid was noticed in the tunica vaginalis. On aspiration this fluid was found to consist of a thin purulent material containing numbers of microfilariæ, many of which were active, whilst others were dead and undergoing disintegration. After the cessation of the inflammation this exudate became absorbed. The fluid remained sterile on culture. It was probable that the sudden and periodic discharge of microfilariæ into the tunica vaginalis originated these periodic attacks of orchitis in much the same manner as the production of Calabar swellings in the analogous infection with *Filaria loa*, as had been suggested by Manson.

The presence of microfilariæ in the blood-stream, Dr. Bahr believed, was not essential to the production of lymphangitis. Cases were encountered in whom, while suffering from a typical lymphangitis, no microfilariæ could be found in the blood.

In the present state of our knowledge, it was not possible to ascertain the number of microfilariæ produced by one adult worm, and consequently we were unable to estimate the effect of the death of one or more adult parasites on the numbers of circulating microfilariæ. Should the production of lymphangitis be due to the sudden emission of embryos into the lymphatic system, then it would be reasonable to suppose that the death of the parent worm itself was also the direct result of such an inflammatory disturbance. The frequency with which dead and calcified filaria were found in lymphatic glands and in the testis—organs so frequently the seat of such inflammatory disturbances—lent support to this supposition. In one instance, a dead and partially calcified female filaria was found in a brachial lymphatic six weeks after an attack of lymphangitis in that region.

There apparently existed in Fiji another febrile condition due to filarial infection. Such cases were seen amongst the Fijians in their native villages. This was the condition rightly designated as filarial fever. Microfilariæ, for the most part, were absent from the blood-stream. There were frequent rigors, the eyes were bloodshot, and there was a marked leucocytosis. After forty-eight hours all symptoms had disappeared. It was possible that the condition might be due to an internal lymphangitis. Dr Bahr obtained a *post mortem* on one case directly after such an attack. A great number of calcified filariæ were present in the glands. In the epididymis a recently dead and disintegrating filaria, surrounded by a purulent exudate, was found. All the lymphatic glands were enlarged, and contained large areas of stagnated lymph and giant cell formation. Many microfilariæ in a disintegrating condition were found in exudate from the lymphatics of the epididymis, but none in the blood.

Lymph obtained by gland puncture in cases of lymphangitis always proved sterile, whether inoculated on to agar, blood agar, or hydrocele fluid. The supervention of an infection by septic micro-organisms was noted in two cases, one of which died from septic absorption consequent on the formation of a psoas abscess, which, tracking into the hip-joint, destroyed the acetabular cavity. The case commenced as an orchitis and adenitis. Microfilariæ were numerous in the blood, but disappeared suddenly, and streptococci could be cultivated from the gland exudate. In the second case the glands, which had been inflamed for a long period, were excised. A dead filaria was found coiled up in the centre of the gland, and a staphylococcus was cultivated from the purulent exudate. Microscopical sections showed giant cell formation. Cases of a similar nature had been recorded by Wise in British Guiana. It was probable that general septic infection supervening on filarial lesions was of general occurrence, and that the replacement of the glandular elements by fibrous tissue necessarily created a locus minoris resistentiæ.

The lymph obtained by puncture from elephantoid tissue in cases of elephantiasis proved sterile on culture. Dr. Bahr had only one opportunity of examining the lymph during a febrile attack in a case of elephantiasis, and this, too, proved sterile. All observers were agreed that repeated attacks of lymphangitis preceded the production of elephantiasis. Cases had been recorded by Low, however, in which elephantiasis had supervened without any febrile disturbance. A similar case was met with in a white trader in Fiji who gave an intelligent and accurate history of his disease.

The sterility of the lymph in cases of lymphangitis, observed by Dr. Bahr in Fiji, was in contradiction to the experiences of Le Dantec and Dubruel, who had found staphylococci and streptococci in this fluid. The microbic origin of tropical lymphangitis received support also from the researches of Sabouraud on elephantiasis nostras, which apparently was due to a primary streptococcal infection of the lymphatics.

It was not necessary to assume a microbic infection for the production of elephantiasis. Dr. Bahr had satisfied himself that the blockage of the lymphatic glands and lymphatics took place by the filaria itself, and by the laying down of fibrous tissue in response to the presence of the parasite. He considered that lymph stasis might be produced in the following ways.

A.—*Blockage of lymphatic vessels.*

(1) Mechanical obstruction by the body of the living filaria and by its calcified remains.

(2) Changes in the vessel wall, by fibrosis and by proliferation of the endothelium, eventually leading to organization of the thrombosed contents.

B.—*Blockage of the lymphatic glands.*

Extensive fibrosis of the gland substance or by blockage of the efferent and afferent lymphatic trunks.

It was his belief that the production of tropical elephantiasis could best be explained by the blockage of lymphatic glands and channels by frequent and long continued invasion by filarial parasites.

ANNOTATION.

FAUS

Ulcerating Granuloma of the Pudenda.—Steel, in the *Lancet*, of January 27, 1912, writes on ulcerating granuloma as found in the Government Lock Hospitals, Western Australia. His paper gives an excellent summary of our knowledge of this disease at the present time. As regards etiology, staphylococci, streptococci, and bacilli of all kinds with many large spirilla were constantly obtainable, but their causative rôle was most indefinite. Cultures on the usual media, agar, blood agar, blood serum, &c., produced no constant results, a great variety of germs being obtainable.

Removal of the superficial layers, with scrapings taken from the deeper portions of the indolent ulcers, where there was not much accompanying thickening of the surrounding parts, gave more definite results. Spirilla of a somewhat large size, resembling *Spirillum refringens*, were occasionally seen. Sometimes with them, sometimes in their absence, spirochætæ identical in their morphological characteristics with *Treponema pallida* were found. As this method was open to the objection that these spirochætæ might be extraneous agents, removal of the ulcers with sinuses made from the deeper tissues occasionally showed the presence of similar organisms, but in what percentage of cases these will ultimately appear as constant factors is not yet certain. A similar spirochæta has been described by Wise, Chilland, and others as occurring in these lesions.

Sometimes another parasite was in evidence, usually in the fungating, granulomatous variety of the infection, and often in the enlarged inguinal glands, when such were present. Generally seen in the large, swollen mononuclear cells, and often in considerable numbers, they possessed varying appearances; if for any reason they appeared crowded together the bodies resembled enlarged coccí-bacilli, sometimes kidney-shaped, not unlike huge gonococci; but when spread out, or in mononuclear cells, there was the appearance of a differentiation into nucleus, rod-shaped, and a surrounding protoplasm.

Dr. Steel believes that we are here dealing with two distinct diseases, or an infection of an already diseased subject with another germ.

Many different treatments were tried in the cure of the disease, latterly salvarsan ("606") being employed. In some cases, according to Dr. Steel, the value of this drug was undoubted, beneficial effects in some very bad cases being apparently instantaneous, and paving the way to a permanent cure when all other measures had failed. Grey oil and calomel given intramuscularly, alone, or in alternate doses, have also been given. Dr. Steel does not lay enough stress on early excision. If the cases are seen early enough this is the method of treatment that should always be adopted. In British Guiana, where this disease is very common, such a procedure has been very successful.

Oriental Sore on the Isthmus of Panama.—Herrick, Chief of the Surgical Clinic, Ancon Hospital, reports a second case of Oriental sore on the Isthmus of Panama, the type of the case being unusual.*

* Isthmian Canal Commission, Sanitary Department. *Proceedings of the Canal Zone Medical Association* for the half year, October, 1910, to March, 1911, vol. iii, part 2. I.C.C. Press, Quartermaster's Department, Mount Hope, C. Z.

The case Herrick states is of interest on account of its rarity, being the second case recorded on the Isthmus, and it presents also one of the more unusual forms of the disease, in which the lesions are multiple. It bears a marked resemblance to skin epitheliomata, the initial lesion being similar to a rodent ulcer, and the later nodules, to multiple epitheliomata of the skin.

The patient, Thomas Smith, 53 years old, Jamaican, had lived on the Isthmus twenty-four years. He was admitted from Bohio January 4, 1909, suffering from an ulcer of the right ear and a fairly extensive dermatitis over his body. He had lived at Bohio since 1904, and was employed in the canal work. During the wet season of 1908 he was engaged in one of the survey parties from Gatun to San Pablo. In this work he was frequently wet in wading through swamps and pools, and to this he ascribes the dermatitis. There was considerable itching associated with the dermatitis, which at this time covered almost his entire body, including his right ear. In alleviating this condition he scratched his right ear until it became sore. This occurred a few months previous to admission, but during this period he had no fever and was in perfect health. The sore on the ear promoted by the scratching gradually extended, and when he was admitted to the hospital it presented an ulcer which involved the entire margin or helix of the ear, extending to the depth of the fossa of the helix. The margins of the ulcer were slightly indurated and the base had a granular appearance. There was a low grade generalized dermatitis or *flushing* itch affecting mainly the abdomen and groins. The general physical examination was negative.

The ulcer of the ear was excised and referred to the pathologist for diagnosis, his report being as follows:—

"Extensive ulceration, and the entire corium infiltrated by round and oval cells and occasionally giant cells. Papillæ frequently missing or flattened out with numerous prolongations into the corium."

When the patient left the hospital, the wound having healed, there were six small lumps the size of a pea scattered in the skin over his body. These gradually increased in size and caused his return on *July* 27, 1909, at which time they presented indurated and ulcerated patches varying in size from 2 to 3 cm. The right ear likewise showed a recurrence of the ulcerative process, which had extended from the margins and involved almost the entire ear. All the lesions were excised and the base of each piece cauterized. The wounds slowly healed by granulation, and he was discharged well in November, 1909.

Three months later a ringworm developed on his chin, and he noticed small lumps on his left shoulder, left forearm, and left ankle. These increased in size, and he returned to the hospital August 30, 1910, with an ulcer on his chin almost an inch in diameter. He also had lesions about the same size on his left shoulder and about the size of the palm of the hand on his left knee and left ankle. These were excised September 2, 1910, and the bases of all the surfaces cauterized.

Three specimens were examined by Dr. Darling, chief of the laboratory, and he discovered *Leishmania tropica* in the bases of the ulcers. Three weeks later, after the formation of healthy granulations, an examination was made for the presence of *L. tropica*, but no organisms were found. An enlarged and tender inguinal gland was excised, but no organisms were found in it.

This case, as Herrick says, illustrates the extreme chronicity of the process, as the original sore began two years ago in the fall of 1908. It also shows that the sores are infectious, for the secondary lesions were undoubtedly transmitted by his scratching the areas of dermatitis. The last group of lesions may have arisen in the same manner. Whether the initial lesion was due to the bite of a fly or to some other chance infection, it is impossible to say. This case also illustrates the marked resemblance to epitheliomata, the infiltrated skin presenting the appearance of an epithelial tumor, and the ulcer of the ear a rodent ulcer. The pathologists were in doubt when examining the first specimen as to whether it was a true epithelioma, and it was not until the second specimens were examined that *L. tropica* was found.

ABNETT

Murrina, a New Trypanosome Disease.—During, at the fifty-seventh meeting of the Canal Zone Medical Association, December 7, 1910,* read a

* Internat Canal Commission Sanitary Department. *Proceedings of the Canal Zone Medical Association for the half year, October, 1910, to March, 1911*, vol. iii, part 2, 4-6-G. Press, Quartermaster's Department, Mount Hope, C. Z.

very interesting paper, entitled "Murrina, a Trypanosomal Disease of Equines in Panama."

He said that there had been an epidemic of trypanosomiasis among American mules and workhorses in the Canal Zone. The disease resembled other trypanosomal diseases, such as nagana, surra, mal de caderas, and Sotenguchon horse disease; but it presented a group of symptoms and pathological features which stamped it as a distinct disease.

The disease could be differentiated from mal de caderas by the morphological characters of the trypanosome, the autopsy picture, and the clinical features of the disease.

The disease also resembled in some particulars "swamp fever," or the "infectious anæmia of equines," a disease of obscure etiology, prevalent in some parts of the Western United States.

The disease was probably not introduced from outside sources, but represented an endemic disease of this region, known in the Republic of Panama as murrina and derengadera.

It was distinctly a disease of mules and horses, for cattle were immune to it. The pathogenic agent, *T. hippicum*, had morphological and biological characters which differentiated it from other species of trypanosomes, and the normal reactions of several of the native mammals, including domestic animals, had been determined.

The chief distinguishing features of the disease were: Anæmia; weakness; emaciation and œdema; conjunctival ecchymoses; conjunctivitis; pyrexia; and some posterior paresis. The pathological findings were constant and characteristic: Splenic capsular ecchymoses; acute hæmorrhagic nephritis, with acute glomerulitis and petechiæ; hæmorrhages in renal lymph nodes; epicardial and endocardial ecchymoses, and less constantly pleural, peritoneal, and conjunctival ecchymoses, and pleural effusion. The blood changes were those of anæmia with lymphocytosis, and there was much phagocytosis of blood pigment by endothelial cells of the liver and spleen.

The disease, Darling believes, is probably transmitted mechanically by flies through the broken skin of cuts and various wounds. Saddle horses were not infected, and there were no evidences that any animals were infected by means of stomoxys or tabanids or by ticks or bats.

Darling further states that the epidemic, which threatened to destroy several hundred mules and horses, had been controlled (there having been no new case in six months) by detection of infected animals, by means of daily routine temperature records throughout the corral, the microscopic examination of the blood of all animals having a temperature above 100° F., the isolation in screened stables of infected animals or suspects, and the sacrifice of all infected animals.

SOME EFFECTS OF THE CLIMATE ON THE HEALTH OF IMPORTED TEA-GARDEN LABOUR IN ASSAM.*

* These notes formed part of the writer's Thesis for the M.D. Degree, Cambridge.

By Caspar Rowe, M.D.Camb., D.P.H.

Interesting points arise from a consideration of the effect of climate and mode of life on imported tea-garden labour in Assam. I venture to publish some of my conclusions with a view to learning whether other workers in the same field can endorse them. The figures quoted in this article, and on which the conclusions are based, are taken entirely from tea-garden work, and, with a view to making them as comparable as small masses of figures may be, I have strictly confined myself to two periods, of twenty-four consecutive months' work each, in the two districts considered, thus avoiding errors that might be introduced by the monthly variation in the proportion of cases, and of deaths, due to various causes. The figures are published rather as rough indications based on practical work, than as refined and scientific statistics, bearing on the problems and possibilities concerned in the questions of the health of imported labour in Assam.

A consideration of this subject would naturally appear to call for some differentiation between the races and tribes from which this labour is drawn, and for further differentiation on account of castes and jats, and on account of the local conditions, climatic and other, obtaining in the districts from which individual coolies of the same or of different tribes may have been recruited. A very brief survey of the mass of details concerned convinced me that such an analysis of my figures was impracticable, and that with the material at my disposal it was only possible to mass the heterogeneous items composing "imported labour," in much the same way as it is necessary to mass the very varied classes and conditions of work performed by that labour on the different gardens to which it is distributed. That is to say, to look at the figures as though they were those of the effect of similar work under similar climatic and social conditions acting on similar individuals imported from a different climatic and social environment. As I do not intend to again refer to this point, I may mention that I have instances of gardens close together where the class and amount of labour on each differs very much, and the work varies very considerably; while even more the manager's administration of his labour has to be borne in mind when considering the health problems of each individual garden. As may be readily recognised from these remarks, while the interest and variety of my work gained, the intrinsic value of my meagre statistics diminished; on the other hand, my small mass of figures would possibly conform more to these taken over the whole of Assam, than if the gardens had all belonged to one large company where recruiting, working, and administration were done on one system.

The items making up the totals are those of hospital admissions only, and the periods over which they are taken are January 1, 1908—December 31, 1907, in Lakhimpur; January 1, 1909—December 31, 1910, in Darrang. The chief climatic differences between the two districts are:—

(1) Darrang is further south, consequently it is appreciably warmer.

(2) The hot weather lasts longer in Darrang also, and consequently the plucking season, the stress of which falls on the whole labour force, but distinctly more on the women, lasts appreciably longer.

There are numerous other factors which individually might tend to produce variations in the two districts, but on the whole the resultants are approximately equal. Mention should be made, however, of the facts that in Lakhimpur my hospitals had been under regular and systematic European medical supervision, which was not the case in Darrang, and that, while in Lakhimpur none of the tea was of twenty years' standing, in Darrang several of the gardens were largely old tea, though the district is now extending rapidly.

The populations under consideration in Lakhimpur and Darrang were, roughly, in the proportion of 2 to 3. In Darrang 1910 showed a 6 to 7 per cent. increase in population over 1909. During the four years under consideration the total births were 1,225, while the deaths were 1,094, indicating that at present the increase of garden populations is almost entirely the result of importation of new coolies.

? chart

The following table shows for comparison some of my separate totals for the different years, cases, deaths, and percentage-case mortality :—

TAKE IN TABLE

The effect on garden health of systematic medical supervision appears considerable, but also immediately a striking difference in the two districts is noticeable—in Lakhimpur, a diminution in cases, except as regards anæmia and fever, and a striking diminution of case mortality; in Darrang, a very marked drop all along the line in cases, with a marked rise in case mortality, except as regards pneumonia, which is exactly the reverse—increased number of cases, with decreased case mortality.

It is to be noticed that a column is given for "Total admissions, excluding anæmia." The reason is as follows: A very high majority, possibly all, of the coolies are subjects of anchylostomiasis to a greater or lesser extent. Many coolies, with a considerable degree of this condition, apparently show little or no sign of its presence; others, on the contrary, show marked anæmia, though comparatively few anchylostomata are expelled in the stools after treatment. The effect of anthelmintic treatment on their anæmia is, however, immediate and marked. Throughout the whole period of my work in Assam I medically inspected the whole population of each of my gardens at regular intervals of from one to two months. At these musters I picked out coolies showing signs of anæmia (from 2 to 8 or 9 per cent.) for anthelmintic treatment. The great majority of these coolies were feeling well, and able to go about their work with little or no ill-effect, but the results on the total labour force, after a short period of this system, not only as regarded the diminution of the number of out-patients and cases of minor ailments, but also as regarded the work value of the apparently healthy individual, were very marked. It will thus be seen that it is hardly consistent to put the bulk of the cases of anæmia in line with admissions to hospital from other causes.

With regard to the treatment of this anæmia, one point in particular struck me immediately I went to Darrang, namely, the marked difference in the results of similar anthelmintic doses between the two districts. I never used thymol for this purpose, as its exhibition is so frequently followed by a severe intestinal catarrh in coolies with a considerable degree of anæmia, or in those whose intestinal mucosa is already much irritated by the presence of parasites. Eucalyptus oil and chenopodium were used in a few specially selected cases. My routine course was santonin gr. v, with a purge, generally castor oil, overnight, and three doses of betanaphthol, each gr. x., at two-hour intervals in the morning, followed in two hours by a dose of castor oil; stools were collected for twenty-four hours and then washed. The great bulk of the cases in Lakhimpur showed anchylostomata over 20, and in about 50 per cent. of the cases *Ancylostoma duodenale*, 1 to 3. In Darrang a fairly average result was anchylostomata, 5 to 12; *Ancylostoma duodenale* in about 90 per cent., 3 to 6. Seeing that, in the main, the recruits were comparable in the two districts, and that prophylactic cleansing of feet and ankles in phenyl had been more thoroughly carried out in Lakhimpur than in Darrang, this feature is certainly one to be borne in mind.

Amongst such cases practically no deaths occurred. The deaths given in the group were almost entirely cases of chronic debility, dropsy, and old age, where such debility was not obviously associated with fever, diarrhœa, or dysentery. Looking at the totals for 1906 and 1907, I am convinced that the very marked increase of cases in 1907 was mainly due to my inexperience and consequent diffidence in 1906, rather than to a large increase in the amount of anæmia in 1907; for there was no doubt as to the improvement in the general well-being of the labour in 1907, while by picking out fairly early cases one naturally considerably reduces the inevitable "tail-end" to a labour force at a somewhat subsequent period. These two factors, acting together, bring down the case mortality of anæmia in Lakhimpur in 1907 to somewhere about the right figure, that for 1906 being undoubtedly quite misleading. I consider, therefore, that but little weight should be attached to the comparison of total admissions and case mortality under the heading anæmia for 1906 and 1907, and that 1909 and 1910 give a more fair indication of what should be expected.

It is interesting here to notice, for what it may be worth, a fuller, but still rough and inadequate, analysis of figures relating to anæmia, debility, and dropsy for rather more than half the population in Lakhimpur. I find entries as follows :—

	Cases	Deaths M.	Deaths F.
1906			
Anæmia and Anchylostomiasis	111	3	4
Dropsy	19	8	6
Debility	97	4	8
1907			
Anchylostomiasis	674	1	1
Dropsy and Debility	7	127*	0

* Dropsy, 4; ovarian dropsy, 1; renal dropsy, 8; debility, 81; old age and debility, 5; old age and dropsy, 1.

The total 674 for anchylostomiasis in 1907 is made up entirely of cases selected by myself at muster for the betanaphthol treatment. Unfortunately, I have no record of the total cases admitted under dropsy and debility. Of the seventeen deaths under this head, thirteen have been classed with the deaths from anæmia, debility, and dropsy, and the ovarian and renal dropsy cases with "Deaths from other causes."

For the most part the results of any one muster showed a fairly level sex distribution for the first six months of the year, but towards the end of the plucking season there came a very appreciable increase of the proportion, women : men, and with this sex disproportion, the very marked total rise of cases, shown in Chart A, in the latter months of the year.

INSERT CHARTS A, B and C.

Differential sex death-charts of "Anæmia" and "All Causes" (Charts B and C respectively) show how female deaths from anæmia occur in disproportion to male deaths during the latter part of the year, as compared from deaths from all causes.

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Again, looking at Table III, the excess of female over male deaths is more than accounted for in the age period 35—45, and a comparison of periods of residence shows that this disproportion lies in the total "over five years' residence." Compare this

TABLES 2 AND 3

table with Table II, where the corresponding age periods only show a disparity of about 10 per cent., and of residence 18 per cent, between the two sexes, and bearing in mind that the best pluckers in a garden are to be found amongst adult women of senior residence, I think the just conclusion is that it is the hard work towards the end of a season which particularly affects the women. Again, we see from Table III that the first two years of residence markedly try the coolies, both male and female. Table II shows a similar period of stress, but whereas male deaths from all causes under two years' residence : ditto over five years :: 180 : 118, and similar female figures show the proportion 160 : 138; when considering anæmia cases only males show 28 : 18, and females 43 : 45. That is to say, that height of residence increases the proportion of women dying from anæmia, but this is not so as regards the men.

It was an impossibility for me to subdivide my anæmias under causative heads, *e.g.*, malaria, anchylostomiasis, &c. I certainly did not consider that any appreciable proportion of the cases was purely malarial in origin. My experience has left me in some doubt as to the ultimate pathology of anchylostomiasis, but I regarded my anæmia in Lakhimpur as largely due to the latter cause; while in Darrang the cause was even more composite, the factor mal-assimilation due to intestinal catarrh, the result of other parasites, playing a greater part.

I understand that on some gardens courses of quinine (in 5 gr. doses) were alone given to anæmics. I preferred to follow up my anthelmintic measures with a mixture of iron, quinine, arsenic and strychnine. One great point in its favour being that it was suitable for coolies below par from a variety of causes, and thus led to greater simplicity of distribution. Certainly the amount of quinine was modified at times from 1 to 3 gr., according to the amount of fever prevalent at the time on the particular garam, but per se anæmia I considered too minute of secondary importance. Moreover, when systematically quining the whole labour of a garden, I found that there was but little reduction of the anæmic lists.

I will say nothing more here regarding anæmia, but as may be seen from comparing Charts A and H, the anæmic admission and total admission curves do not correspond closely; on the other hand, their respective death charts are markedly similar (Charts A and K).

INSERT CHARTS H and K

We come now to a consideration of fever as met with on my gardens.

INSERT CHART D

The seasonal chart shows the usual rise from July to October, but the rise is very much less than might have been expected. At least be remembered, however, that the chart is of hospital admissions only. My general rule during the summer was to admit cases with a temperature of over 102° at the time of examination, or cases having a temperature of 100° on the third day of seizure. Save that this was impossible at that season, as a reference to the differential case chart (H) will indicate. In the cold weather, however, it was possible to take in a larger proportion of the fever cases. Moreover, from April or May to October was the season when regular quinine prophylaxis was being carried out. It would not be fair, therefore, to regard my chart as showing the normal proportional seasonal prevalence of malaria. Although there is an entirely disproportionate number of admissions under this heading in Lakhimpur, 765 as opposed to 240, the case mortality was higher in Darrang (1in50 : 1). This was due considerably to the fact that parents brought their children to hospital far more readily in Lakhimpur than in Darrang, while it was mainly amongst children that deaths from fever occurred (half the total for both sexes were under five years of age). I certainly found considerably more fever of a mild type in Darrang than in Lakhimpur, but far more attention was given to quinine prophylaxis in the former district, and in this connection note the marked rise shown in the Lakhimpur totals from May onwards as compared with the gradual drop in Darrang.

Regarding the question of age and period of residence, some unexpected points show up strongly, and it would be very interesting to get a large bulk of figures to see if these points are borne out in large totals.

INSERT TABLE IV.

The total sex deaths being equal (48 and 47 respectively) amongst infants and children up to five years of age, we get males : females : : 30 : 17 (most of these children being Assam born); amongst adults we get females : males : : 23 : 11, and taking those of over four years' residence in Assam, females : males : : 15 : 5, that is to say, that amongst young children malaria was nearly twice as fatal amongst boys as amongst girls, whilst amongst adults, particularly acclimatised adults, this sex susceptibility is exactly reversed.

Regarding "diarrhœa" I can say little definite. Had it been possible to closely study all one's cases, even only clinically, the results would have been interesting, if not scientifically valuable. The bulk of them being acute, however, a large proportion were either better or dead before I saw them, and the labelling of them depended a good deal on the personal equations of my Dr. Fishes.

This heading, therefore, excludes cases arising from very different causes: from cholera down to improperly cooked rice.

INSERT CHART E.

The seasonal curve (Chart E) is quite the usual tropical type, differing not at all between Lakhimpur and Darrang. The marked rise in May in the death line was due to a sharp and very interesting epidemic of cholera on one garden in 1910.

INSERT TABLE 5

Regarding deaths and period of residence (Table V), little is to be noticed except that there is a tendency for males to suffer at a rather earlier period of residence than females, and that the second and third years of residence comprise a period of rapidly diminishing liability; amongst young children boys suffer disproportionately more than girls. The dysentery table (Table VI) may

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well be studied in comparison with Table V. Here, also, is a greater liability, more marked amongst the males, in the earlier years of residence, but in childhood the girls suffer appreciably more than the boys. It is to be noted that two deaths only from diarrhœa or dysentery occur in infants under 1 year of age, and I recollect that the dysentery case arrived in a hopeless condition on the garden. This disproportion of deaths due to amongst the males, in the earlier years of residence, as compared with deaths from all causes is well shown by taking diarrhœa and dysentery together, when we get the following comparison :—

		Under 5 years of residence	Under 5 years of residence	Under 5 years of residence	Under 5 years of residence	Over 5 years of residence
Deaths from all causes ...	M.	69	67	34	41	110
" " ...	F.	71	60	32	34	108
Total ...		304	175	166	75	308
Deaths from diarrhœa and dysentery ...	M.	33	41	26	16	42
Deaths from diarrhœa and dysentery ...	F.	34	22	23	17	32
Total ...		66	73	49	33	74

Another point is that amongst coolie deaths from all causes 1 male in 6½ and 1 female in 14 are above 45 years of age, while those dying from bowel complaints show 1 male in 8, and 1 female in 12 above this age, a very distinct increase in the proportion of aged female to male deaths from these causes.

In bringing the table of diarrhœa and dysentery deaths more or less into combination under the grouping of bowel complaints, I so not wish to confuse the two headings, but I would like to draw attention to Table I again, where it may be clearly seen that it is particularly in these two classes of cases that the effect of systematic treatment is seen in a gratifying reduction of cases and of deaths. Unfortunately, it is also obvious from the Darrang totals that skill in treatment did not keep pace with the success of preventive measures. Methods of treatment and prevention are without the scope of this article. I will therefore only say that measures towards prevention were of a very simple kind for the most part, and that in my opinion expulsion of intestinal parasites was mainly responsible for the drop of cases. It is a question to be considered whether the difference between the two districts in the numerical proportion of the two parasites commonly found, which has been referred to previously at some length, is responsible for the disproportionate amount of dysentery in Darrang, and for the differing tenderness of the case mortality in the two districts.

Some figures given by Brydon (quoted by Davidson in his article on Dysentery in Professor Sir Clifford Allbutt's "System of Medicine") tend to show that there is no acclimatization for dysentery amongst Europeans. My figures, so far as they go, show the reverse amongst imported coolies in Assam.

	Under 5 years of residence	Under 5 years of residence	Under 5 years of residence	Under 5 years of residence	Under 5 years of residence	Over 5 years of residence
Total deaths ...	304	170	106	73	30	308
Dysentery deaths ...	67	81	50	31	8	93

As regards the type of dysentery, the death-rate is very high for bacillary and pseudo-dysentery; on the other hand, clinically the cases were of the bacillary type, liver abscess was very rare (I do not think I diagnosed half a dozen cases altogether), and the specific treatment of little service.

INSERT TABLE 6

It is interesting to note the very marked difference between the incidence of cases and of deaths in the seasonal chart for dysentery (Chart F), while the cases run up from February to the highest monthly total in May; that is to say, when the weather is getting warmer after the dry cold season, the advent of the rains in June at once leads to marked diminution in cases. On the other hand, the death total is at its highest in October, and higher from September to December than in any of the other eight months of the year.

Mention has already been made of a sharp epidemic of cholera on one of my gardens in May, 1910. This resulted in twenty cases and twelve deaths, and is mainly responsible for the great rise in case mortality for diarrhœa over that for 1909. In addition to this, on two gardens close to my bungalow, in 1909, twenty-one cases of cholera or cholerform diarrhœa occurred with eleven deaths, and on the same two gardens in 1910, fifteen cases with six deaths. Three cases having all been under my fairly close supervision I can vouch for their nature, and taking them from the other totals we get :—

Diarrhœa	Cases	Deaths	Case Mortality
1909	504	30	5·95
1910	921	17	1·80

The feature that struck me most of all in the pneumonia I met with was the extraordinary variability from year to year of the case mortality on different gardens, and this independently of whether the Dr. Baker was particularly competent or not, and the garden a healthy one or the reverse. In Lakhimpur my healthiest garden gave six deaths in sixteen cases in 1907 (37.5 per cent.). A very unhealthy garden in Darrang gave eighteen cases with no deaths in 1909, while early in 1910 I got on these gardens forty-six cases with twenty deaths (43.47 per cent.) in three months. One constant feature is that in both districts the case mortality fell in the second year under consideration, though Darrang still shows a most unenviably high one. I regret I cannot subdivide the pneumonias into single, double, and broncho-pneumonia, but figures on two gardens at Lakhimpur show :—

Single	36 (1 death)	6.93 %
Double	17 (1 death)	
Broncho-pneumonia	9 (1 death)	

I fancy this must be above the average proportion of double pneumonia. On the other hand, I met with more cases of broncho-pneumonia in adults than I expected.

INSERT CHART G

The seasonal chart (Chart G) shows a marked double rise in March and November, subscribed to by both districts, and the fact that the rainy season, when, as has been already pointed out, the women do the greater part of their hard work, does not correspond with the period of prevalence of pneumonia is largely the explanation of the great disproportion of male to female deaths (90 : 30) in a population where both sexes spend their time in outdoor work.

INSERT TABLE 7

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Roper's Article

Lakhimpur	Total		Anæmia		Total, excluding Anæmia		Fever		Diarrhœa		Dysentery		Pneumonia	
	Admissions to Hospital	Deaths in Hospital	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths
1906	1,805	162	515	44	1,290	118	334	17	166	31	89	19	123	20
Percentage case mortality	8.97		8.54		9.15		5.09		18.67		21.35		16.26	
1907	2,086	97	736	15	1,350	82	431	16	96	11	54	6	80	10
Percentage case mortality	4.65		2.04		6.07		3.71		11.46		11.11		12.5	
1909 Darrang, ...	6,245	350	2,728	63	3,517	287	492	28	553	49	651	128	172	38
Percentage case mortality	5.60		2.31		8.16		5.70		8.86		19.66		22.09	
1910	4,551	281	1,970	58	2,581	223	453	23	266	34	321	78	216	43
Percentage case mortality	6.17		2.94		8.64		5.08		12.78		24.3		19.91	

Table II.—Deaths from all Causes.

Age	Males. Under 1	1-5	15-16	16-45	45-60	Over 60	Total	Females. Under 1	1-5	5-16	16-45	45-60	Over 60	Total
Residence under 3 months	1	4	2	13	1	0	21	1	3	2	6	3	0	15
,, 1 year	1	14	3	36	11	7	72	0	11	3	35	5	2	56
,, 2 years	0	14	10	57	9	3	87	0	12	8	61	7	1	89
,, 3 ,,	0	2	5	39	5	3	54	0	1	4	45	2	0	52
,, 4 ,,	0	7	3	29	0	2	41	0	2	1	27	2	0	32
,, 5 ,,	0	0	3	11	1	0	15	0	0	1	14	0	0	15
,, over 5 ,,	0	0	5	85	19	9	118	0	0	7	121	7	3	138
No record	2	10	8	37	12	1	70	3	6	11	18	3	0	41
Assam born	22	33	6	0	0	0	61	16	25	14	2	0	0	57
Total	26	84	45	301	58	25	539	20	60	51	329	29	6	495

Table III.—Anæmia, Debility, and Dropsy.

Age	Males. Under 1	1-5	5-16	16-45	Over 45	Total	Females. Under 1	1-5	5-16	16-45	Over 45	Totals
Residence under 3 months	0	0	0	0	1	1	0	0	0	2	1	3
,, 1 year	0	3	0	4	6	13	0	2	0	12	4	18
,, 2 years	0	2	1	9	2	14	0	3	3	16	0	22
,, 3 ,,	0	0	1	7	1	9	0	1	0	17	0	18
,, 4 ,,	0	0	2	3	2	7	0	0	1	4	1	6
,, 5 ,,	0	0	0	2	1	3	0	0	0	5	0	5
,, over 5 ,,	0	0	1	11	6	18	0	0	3	39	1	43
No record	0	1	2	8	3	14	0	2	3	5	1	11
Assam born	2	8	1	0	0	11	3	2	3	1	0	9
Total	2	14	8	44	22	90	3	10	13	101	8	135

Table IV.—Fevers.

Age	Males Under 1	1-5	5-16	16-45	45-60	Over 60	Total	Females Under 1	1-5	5-16	16-45	45-60	Over 60	Total
Residence under 3 months	0	0	0	0	0	0	0	0	0	0	0	1	0	1
,, 1 year	0	3	0	1	1	0	5	0	1	0	1	0	1	3
,, 2 years	0	2	1	1	0	1	5	0	2	0	4	1	1	8
,, 3 ,,	0	1	1	2	0	0	4	0	0	1	0	1	0	2
,, 4 ,,	0	1	0	0	0	0	1	0	0	0	2	0	0	2
,, 5 ,,	0	0	0	0	0	0	0	0	0	1	2	0	0	3
,, over 5 ,,	0	0	0	4	1	0	5	0	0	1	10	0	1	12
No record	0	0	2	0	0	0	2	0	0	1	0	0	0	1
Assam born	8	15	3	0	0	0	26	4	9	2	0	0	0	15
Total	8	22	7	8	2	1	48	4	13	5	19	3	3	47

Table V.—Diarrhœa.

Age	Males. Under 1	1-5	5-16	16-45	45-60	Over 60	Total	Females. Under 1	1-5	5-16	16-45	45-60	Over 60	Total
Residence under 3 months	0	1	0	2	0	0	3	0	0	1	0	0	0	1
,, 1 year	0	1	1	5	1	1	9	0	0	2	4	0	0	6
,, 2 years	0	1	1	11	1	0	14	0	0	0	3	4	1	8
,, 3 ,,	0	0	1	5	0	0	6	0	0	1	1	8	0	10
,, 4 ,,	0	2	0	6	0	0	8	0	0	0	0	3	1	4
,, 5 ,,	0	0	0	2	1	0	3	0	0	0	0	3	0	3
,, over 5 ,,	0	0	1	18	2	1	22	0	0	0	0	15	2	17
No record	0	5	0	5	1	0	11	1	0	0	2	4	0	7
Assam born	0	2	1	0	0	3	0	0	0	0	1	2	0	3
Total	0	12	5	54	6	2	79	1	3	8	13	4	0	59

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Table VI.—Dysentery.

	Males							Females						
Age ..	Under 1	1-5	5-16	16-45	45-60	Over 60	Total	Under 1	1-5	5-16	16-45	45-60	Over 60	Total
Residence under 3 months	0	3	1	6	0	0	10	1	2	0	4	1	0	8
,, 1 year	0	3	2	18	8	4	30	0	3	2	12	2	0	19
,, 2 years	0	1	5	19	2	0	27	0	2	3	16	3	0	24
,, 3 ,, ...	0	2	2	14	2	0	20	0	2	0	9	2	0	13
,, 4 ,, ...	0	2	0	5	0	1	8	0	0	1	11	1	0	13
,, 5 ,, ...	0	0	1	0	0	0	1	0	0	0	4	0	0	0
,, over 5 ,, ...	0	0	0	14	5	1	20	0	0	1	13	0	1	15
No record	0	0	1	5	0	0	6	0	2	0	1	0	0	3
Assam born	0	3	2	0	0	0	5	0	6	5	0	0	0	11
Total	0	14	14	81	12	6	127	1	17	12	70	9	1	110

Table VII.—Pneumonia.

	Males				Females			
	Under		Over		Under		Over	
Residence Age	16	16-45	45	Total	16	16-45	45	Total
under 1 year	0	4	0	4	0	4	0	4
,, 2 years	1	13	1	15	1	2	0	3
,, 3 ,,	0	8	1	9	0	3	2	5
,, 4 ,,	0	8	1	9	0	1	0	1
,, 5 ,,	0	2	0	2	0	1	0	1
over 5 ,,	0	19	9	28	1	13	1	15
No record ...	1	4	4	9	1	2	0	3
Assam born...	4	0	0	4	3	0	0	3
Total ...	6	58	16	80	6	26	3	35

The effect of "Period of Residence" on the proportion of deaths from pneumonia to those from all causes is very marked.

	Under 1 year	1 to 2 years	Under 2 years	2 to 3 years	Under 3 years	Over 3 years	Total
Deaths from all causes	344	176	520	79	599	253	
" pneumonia	8	13	21	10	31	63	

and this increase is shown more amongst women than amongst men.

	Males			Females		
	Under 1 year to 2 years	Over 2 years	Total	Under 1 year to 2 years	Over 2 years	Total
Deaths from all causes	105	113	218	145	138	
" pneumonia	6	10	16	12	13	

We thus see that while pneumonia becomes an increasing cause of death in both sexes as residence is more prolonged, the increased liability is far more marked amongst women.

N.B.—The dotted lines on Charts A, D, E, F and G signify totals for Darrang, the difference between these and the continuous lines being the cases arising in Lakhimpur.

Summary of Conclusions.

(1) The first two years of residence are the most trying for coolies, and much more so for men than for women.

(2) There is some difference between the anæmia met with in Lakhimpur and that met with in Darrang.

(3) The proportional mortality from anæmia in women increases with length of residence; in men it remains about the same.

(4) The death-rate from malaria amongst children under five years of age is about twice as heavy amongst boys as amongst girls. In adults it is two or three times as heavy amongst women as amongst men, this disproportion tending to increase with length of residence.

(5) The mortality from bowel complaints is very disproportionately high in comparison with that of all causes of death in the first two years.

(6) Amongst coolies over 45 years of age the mortality from bowel complaints becomes greater amongst women and less amongst men.

(7) There is reason to think that acclimatisation for dysentery occurs in some degree amongst imported tea-garden labour.

(8) Length of residence tends to predispose coolies to death from pneumonia.

(9) The proportion of deaths amongst acclimatised coolies from pneumonia to those from all causes, while markedly increasing in males, does so in a far greater degree in women.

ANTI-MALARIA WORK IN CALABAR, SOUTHERN NIGERIA.

(1) All Districts Reports show that a most energetic and continuous campaign has been carried on against the "carrier" of this disease. The clearing of "bush" and rank vegetation, reclamation of swamp, destruction of mosquito breeding places, the use of kerosene oil for collections of water which cannot be otherwise treated, the filling in of surface depressions, the use of anti-mosquito wire-gauze for rooms and houses, and the use of quinine as a prophylactic were the chief measures undertaken.

(2) At Abakaliki two mosquito-proof rooms have been provided. This I regard as one of the best anti-malaria measures we possess in this country, where the enormous area of the mosquito breeding-ground precludes complete destruction of the adult mosquitoes. The comfort and protection against diseases carried by house-flies and other insects, which result from the use of this wire-gauze, are most important additional reasons for its universal employment.

(3) The quantity and cost of the quinine issued to Natives gratuitously during the year, for prophylactic use alone, was as follows:—

275,871 gr. at a cost of £39 6s. 9½d.

In addition, 125,000 gr., at a cost of £21 5s. 9d., was issued to European officials. The following quantity was also sold to European non-officials for prophylactic use alone:—

32,000 gr. at a cost of £8 11s. 1d.

(4) I may remark that arrangements have been made for the issue of this drug gratuitously to all children attending Government schools. This will have the effect of destroying the malarial parasite in children, 50 per cent. of whom harbour this parasite.

(5) Kerosene oil. Fifty-five and one-eighth gallons were used for "painting" collections of water, at a cost of £4 6s. 3d.

ANTI-YELLOW FEVER WORK IN CALABAR.

(1) Information was received in the month of May that yellow fever had appeared on the Gold Coast and Sierra Leone, in an epidemic form. In order to prevent the introduction of this disease, energetic measures were immediately adopted, especially in the chief littoral stations.

(2) The chief features of the precautionary work were: Quarantine restrictions, the exertion of quarantine station isolation hospital, visitation of all ships, inspection of crews and passengers, &c., popular lectures were given and leaflets distributed to the people, informing them of the serious nature of the disease, its gravity and prevention.

Destruction of mosquitoes and the abolition of their breeding-places, clearing of all bush and rank vegetation, house-to-house visitation, was vigorously carried out, special attention being paid to receptacles capable of containing water and forming a potential breeding-ground for the Stegomyia mosquito, the carrier of all this disease.

(3) The result of the work done was most beneficial, the general sanitary condition being greatly improved. In Calabar Town two extra sanitary inspectors and a gang of 30 men were specially employed, and every house was inspected and cleaned out.

SOME NOTES ON LEPROSY IN SOKOTO PROVINCE.*

* Reprinted from the *Northern Nigeria Medical Report for* 1910.

By John M. Dalziel, M.D., B.Sc.
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Native Beliefs. Heredity.

The natives do not profess to know the cause of leprosy, but believe that it exists in the blood at birth; it may appear years afterwards as the result of improper food, &c. This suggests an appreciation of the influence of heredity. Puberty is supposed to be the period when the symptoms are likely to appear, but while some declare that it may be latent as long as sixty to seventy years, others deny this.

In this district all are agreed that the children of lepers are immune, but that those of the following generation frequently show the disease usually within six to nine years, or at puberty. In illustration it is stated that if a child of healthy parents is carried on the back of a leper slave-girl the child will become a leper. (It is added that the

disease will appear in the parts in contact with the girl's body.) If, however, the child is the offspring of leper parents he will not become a leper. The reason why the succeeding generation requires leprosy is supposed to be that no alien strain of blood is necessary in order to bring leprosy hereditarily acquired to the surface. Again, a person born of leper parents does not fear to handle leprous sores, &c., believing himself immune, though his children are susceptible.

This curious belief in ateeters (which is, of course, common in many countries in regard to leprosy) is not universal in Hausa-land. Thus Kano eastward the sons of lepers, however well dressed and healthy, are generally saluted by their acquaintances when they meet, and given a nominal slice of two or three cowries in the superstitious hope that the taboo (or hereditary taint) may pass them over.

The native belief in *heredity* is also shown by the fact that in Eastern Hausa provinces, and in Adamawa and Borno, the better classes do not allow marriage with the son or daughter of lepers, or of the land, or of the butchers (either owing to their trade in blood or from some early Mohammedan tradition).

Contagion.

In regard to contagion, native belief is much less definite. It is obvious that, for the most part, little heed is paid to the presence of lepers in markets, &c., where they freely mingle with the people, and may even be seen selling articles of food.

The question whether a man who marries a leper woman (or vice versa) becomes in time a leper is disputed, and has given rise here to heated debate, some denying the occurrence, while others point to actual cases. Many intelligent natives in all the Hausa provinces believe that leprosy may be acquired by intercourse with a leper woman, a belief which has much acceptance in the Pacific, and is widely held in perhaps all countries where leprosy is endemic. Infection by intimate contact, such as that mentioned of a child carried on the back of a leper, is given due credence.

It is quite certain that the idea of isolation in some degree not only commends itself to the native minds, but is in many parts of Hausa-land and other parts of West Africa carried out by themselves. In Kano there is a tendency to segregate lepers in the neighbourhood of the hill Dala within the town. East of Kano it is not uncommon to compel lepers, with their families, to remove to the bush and form farms for themselves. Cases in the early stage of erythematous patches, &c., though often recognised as lepers, are not thus segregated.

The Torubus believe mainly in direct contagion from person to person, but admit other causes, such as wrongly administered medicines, &c. Their practice is to drive lepers to the bush, and in former days young lepers were even killed. Now, however, it is common to isolate lepers in the bush, and even to treat them and admit back to the community those who appear to be cured.

Food and other Theories.

There is no evidence that any native traces leprosy specially to dried or preserved fish. There exists, however, a wide belief in the connection between food and the disease, *e.g.*, (1) bad, dirty, or contaminated food in general; (2) unclean or contaminated utensils; and (3) particular articles of food. In regard to (1) and (2), no definite ideas can be mentioned. There is a fairly widespread belief amongst Hausas, however, that the "Kalba" lizard (or skink—Mabuia *Perroteliis*—a smooth red-bodied species) is capable of causing leprosy, according to some by its bite, and according to others by accidentally boiling food or cooking utensils, water-jars, &c. With this may be compared the belief of some people in Eastern Hausa that if a "Kalba" lizard is eaten accidentally by a fed bull, the latter grows inordinately fat, but the flesh and tripe of that animal will be avoided by those who know the circumstances, in the belief that they cause leprosy.

The *Toroubawa* (the local Fulani people of the higher ranks in Sokoto town and district) have some quite peculiar beliefs in regard to the relation of food to leprosy. Persons with a hereditary taint of leprosy, or those already showing early symptoms, are believed to have the disease brought out or aggravated by certain well-defined articles of food. These are:—

(1) "*Kulawa*," a black species of barbel.

(2) "*Kurdeshi*," also a fish of the barbel tribe. (This species is not found in the waters near Sokoto town, but is known in places not many miles distant.)

(3) "*Kiffo*," the mud turtle.

(4) The goat—whether milk or flesh. (This suspicion attaches by no means solely to the male goat.)

(5) The fish called "*Rabai*." This is a narrow fish of lizard-like shape and smooth skin, and is supposed to be a transformed "*Kulba*." It is avoided as food by those who know it.

Leprosy is common amongst the *Toroubawa*, and the better informed amongst them do not eat those varieties of fish on account of their supposed connection with leprosy. The more careful amongst them also avoid dried fish, for the reason that one cannot be certain that it is not one of the suspected species. Any well-disposed person who sees the "rolai" exposed for sale, or recognizes it in the dried form, will seize it and throw it away. Many of the *Toroubawa*, however, eat dried fish freely, and fresh fish of other species.

The other Fulani tribe of the district, the *Sullubawa*, eat fish freely, as well as the other articles of food proscribed by the *Toroubawa*, and are said to suffer less from leprosy. This requires verification.

The *Toroubawa*, as a rule, do not buy meat exposed for sale in the market unless they are sure that it is not mixed with goat's flesh. For this reason the tail of a sheep is sometimes seen laid beside the meat on the market stall to indicate its origin, but this is a form of fraud which is well recognized in Hausa markets.

Similarly in regard to milk the *Toroubawa* as a rule avoid that sold in the market in case it is adulterated with goat's milk, but use both milk and flesh of the cow and flesh of the sheep in their own houses. Many of these people even extend the taboo to chicken and guinea-fowl except when raised at home.

The *Borroro* Fulani in the bush live chiefly on the products of the cow and are said to have little leprosy, and they probably rarely eat fish except that which they catch themselves in bush streams, but dried fish when opportunity offers at a market.

SEYMOUR.

How leisure some of the native beliefs are is suggested by the fact that in Kordofan goat's milk as the sole diet for forty days is the recognised method of treating leprosy.

According to native ideas it is apparent that heredity is the really important factor, and articles of food and other factors are considered to operate chiefly on those who are believed to have an hereditary taint. This qualification extends in some degree even to the possibility of direct contagion. The habit of the Turkáwa of this province in regard to fish eating might be considered either for or against the fish theory, but it will be observed that *Sobáto District* shows (*vide* statistical table) with one exception the lowest proportion of lepers in the division. It would appear that even if the native mind incriminates fish, it is fresh fish and not the half-cured article which is suspected. The native method of preserving fish is not, as a rule, by salting, but by smoking by means of fire under a low wicker platform on which the fish is laid. Fish thus imperfectly preserved is generally, but not always, eaten without further cooking. All varieties of fish are at times thus treated, from the small species resembling silver white-bait to the giant perch and even crocodile flesh. Along the Benue this industry is one of the commonest sights during the dry seasons, and it will be interesting to compare the incidence of leprosy in the riverine provinces with that found in those further north.

Native Terms.

There is little doubt that the natives are able to recognise the symptoms of leprosy at an early stage, though a natural fear prevents the patient or his people declaring the fact. Quite recently I have had to pronounce a definite opinion on a case which showed no other symptom than two small anæsthetic patches of erythema, yet the person had for some time been suspected by his neighbours to be a leper.

Zafi is the term applied to the early macular stage of erythematous and anæsthetic patches when sufficiently well defined to attract attention.

The term *Zafi* alone is vaguely used of persons suspected, often correctly, of being lepers in an early stage. It corresponds (when used of this disease) more or less with the period of prodromal symptoms with general weakness, feverish attacks, obvious ill-health, pains or peculiar sensation, &c., in the skin, and the less defined types of skin eruption.

Bokin Zafi ("black or perhaps suppressed inflammation") is the special term for obvious *nodular* or *tuberculer* leprosy, while *Kutarbi* is the general Hausa name for the disease, and is the only term used for the classical types of deformity which result from severe leprosy.

Native Treatment.

In regard to native treatment of leprosy nothing of any value or even in the least suggestive of curability can be mentioned. Many different plants could be referred to which are in use in different localities and are practically always combined with faith in written charms obtained from a mallam, or are compounded as a brew with the washing of portions of the Koran written on a mallam's tablet. The Turkáwa are again peculiar in having a preventive treatment of their own, viz., a cold infusion of the leaves of the *Sabara* (a common shrub, *Combretum sp.*) taken daily as an evening draught. This is said to be an indispensable precaution used by all the tribe and commenced at birth. The practice of blood-letting used for leprosy in some other parts of the Soudan, and in this country for various diseases, is not used here for leprosy from observation of the fact that wounds in a leper do not readily heal. I attach a table of the population of lepers in the various districts of *Sokoto Division*, as such figures may some day be of use for comparison with those of other provinces. It will be seen that no less than 16 districts out of 46 show a proportion of over 100 per 10,000 of population, and of these three districts have over 200 per 10,000 (*Kwaiwa* 236.4, *Dingera* 224, and *Zurmi* 216), whereas in only two districts does the figure fall below 20 per 10,000 (*Gamaji* 17.6 and *Sokoto town and district* 17.7).

The populations are those of the assessment papers of March, 1910. The number of lepers is probably under estimated, but the same may perhaps apply to the enumeration of population for purposes of assessment. No comparison of the three Divisions of the province (*Sokoto*, *Gando* and *Argungu*), in regard to tribal and social differences is possible at present. The number of lepers per 10,000 of population is :—

In whole *Province*	52
In *Sokoto Division*	53.2
In *Gando Division*	49.2
In *Argungu Division*	57.8

The proportion of female to male lepers over the whole province is about two to three. In India this figure is two females to five males, and in Japan two to 4.6. In three districts the female lepers exceed the males. *Sokoto town* contains 117 lepers, *Jega* 64, *Gando* 36, *Illo* 10 and *Birnin Kebbi* 21.

The total number of lepers in the province is so large (nearly 6,550) that it is obviously beyond the powers of the native administration to deal with them satisfactorily, and short of such large measures of effective segregation and treatment as can be afforded by Government institutions, it is doubtful whether much is to be expected.

In paragraph 19 of the attached memo. I have indicated what appears to me to be the irreducible minimum of local measures to be put into practice.

ERRATA.

In the article on "Amœbic Dysentery," by Dr. Andrew Duncan, which appeared in our issue of January 15, p. 24, line 3 of sq., from foot should read "suffering for five years. During this time he had exhibited the feature of the disease as described by Drs. Councilman and Lafleur."

SLEEPING SICKNESS IN THE GAMBIA.*

* Reprinted from the Report of the Gambia Medical Department, 1910.

By Eustace Houstoun, M.A., M.B.
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Sleeping Sickness is a well-known endemic disease of the Gambia, but fortunately is at the present time not a common one, though formerly it is said to have been much more so.

Since I have been in the Protectorate (since 1902) I see, perhaps, half a dozen cases a year, all of which have eventually terminated fatally, but during my last tour it so happened that I personally came across none. As I see some 1,500 new patients each tour, this number would show that sleeping sickness only occurs in the proportion of 3 per cent. of all disease. Taking everything into consideration, that many cases are too bad to be brought to me, I do not believe that this disease occurs in a greater proportion than 1 per cent. of all disease. During the same period, I have also known of two Europeans (officials) who have contracted the disease, and I believe that there was also a third case, about 1908, in a European, a Roman Catholic missionary. Of the two first, one (Forde and Dutton's) was the first case in which the disease was recognized in a European, or at any rate the first in which the actual causal organism was discovered. The other case occurred some three years ago; the patient was put on atoxyl early, sent home at once, and after a course of this drug, made an apparent recovery, and kept well while taking it, but suffered a relapse when he left it off, to recover again on resuming treatment. He is, I believe, still alive. A fourth case occurred in a mulatto trader. Of these four cases, in the three that were fatal death occurred within eighteen months.

Among the natives of the Protectorate the disease is well known and feared as always fatal, but all agreed that it is not nearly so frequent now as it was in their forefathers' time. They have no knowledge of its cause, and do not connect it in any way with the bite of the tsetse-fly. Recently, however, a certain number of the more intelligent have believed me when I told them how the disease was spread, and now make some attempt to avoid being bitten. As regards cure, they know of none; but there is a common belief that somewhere to the north (in Senegal) there is a place where the disease is cured, at any rate for as long as the patient remains there. The Residents of Sansanne told me that his brother was taken there, when so ill with sleeping sickness that he had to be carried, and that within six months he was well again. He stayed there a year, and as a sign of and a thanksgiving for his complete recovery, learnt to read the Koran. Afterwards he came home again apparently quite well, but died within six months of his return.

As regards treatment we use atoxyl and arsenic. In no case, however, have we had a permanent cure in the Gambia, though in practically every case, except for one or two in the very last stage, there has been some temporary improvement, but remissions are not uncommon in the ordinary untreated course of the disease. The least discouraging case which has come under my notice was a boy, about 16 years old, from Kedieng, who was brought to me with the disease well advanced. He was nearly always asleep, and hardly woke up even for food. He had been much neglected by his relations, and was altogether in a bad state, much emaciated, filthy and covered with sores. I put him on atoxyl, fed him up and kept him with me till I could send him to the hospital in Bathurst, where the treatment was continued. Within a fortnight after the commencement of the atoxyl he had begun to improve; he slept less, he took interest in his surroundings, and his skin got healthy; after about two months he was apparently nearly well, though still liable to fainting on the least exertion, while his blood still contained trypanosomes, but in much smaller quantities than at first. Five months after all symptoms had disappeared, and he seemed to be in perfect health. He remained in Bathurst for nearly a year, still taking arsenic at gradually increasing intervals, and keeping well, except for some slight troubles due to the arsenic, on account of which its administration had to be temporarily interrupted. His people then, seeing, I think, that he was now well and strong enough again to work, insisted on taking him back to Kedieng; here he died during the following rains of "dysentery," they said, and that he had never shown any signs of a return of the sleeping sickness. We can hardly count this as a cure, but at any rate life was much prolonged, and a mere vegetative existence changed into one of tolerable enjoyment of the attractions of this world, and I believe that had it been possible to keep him under the treatment, he might still be alive.

The sleeping sickness patients I have seen have come from various parts of the Protectorate, and not, I think, more from one part than another, though I am rather under the impression that the Kunjes have provided rather a larger proportion of the comparatively small number of cases I have seen than they should have, but then I have spent probably more time there than in any other one district. Without my register of cases to refer to, I cannot give a list of all the cases I have seen. But I remember patients from the following places: Faraba in the Upper River, Lamin Koto, McCarthy Island and Sutu in the McCarthy Island Province Saldieni (2) in Baddibu, Alreda in Niumi, Kauff and Kwinella in the South Bank, Mandowa and Williams in Kiang, and two cases in Bathurst, either from Bathurst itself or some adjacent town in Kombo.

One may say, therefore, that no part of the Gambia is safe from the disease, and its presence must always be a constant menace. In the neighbouring French territory, the Upper Gambia, above the Barraconda Rapids, has, or rather till within the last few years had, the reputation of being a bad country for sleeping sickness and to absolutely swarm with tsetse-flies, so much so that for some 150 miles above our boundary villages were few and far between, but within the last few years, I hear from people who have been there recently that the villages are increasing in numbers and are along this part of the river, though, from all accounts, the tsetses are as abundant as ever.

The course of the disease, as seen in the natives of the Gambia, shows a gradually increasing torpor, which, within two or three years, interrupted perhaps by longer or shorter intervals of quiescence and apparent return towards health, develops into an almost constant slumber, from which at first the patient wakes at meal times to take food, but which later on becomes heavier and more continuous, so that he has to be violently wakened to be fed. Eventually he dies, absolutely comatose, unless some intercurrent disease carries him off before the typical termination is reached. Long before the actual sleeping stage comes on, the patient is noticed to be dull, indolent, and to lose interest in his surroundings and occupation; he is liable to irregular attacks of fever and severe headaches, and may have an occasional fit, while a very constant concomitant of the malady is the presence of an itching impetiginous rash on the skin, which at first the patient scratches till it is raw, but later on, as his feelings become dulled, he leaves alone, so that towards the end the skin is almost normal, though often slightly cracked and much drier than it is in health. From quite an early stage a sleeping sickness patient is distinctive to talk, a most unusual state of affairs in a negro—he will hardly answer when spoken to, always seems tired, looks sleepy, as if he can hardly keep his eyes open. When the disease is well developed, but before the stage of torpor is reached, the heart shows signs of failing, and the least exertion is often followed by palpitation, shortness of breath or syncope.

In Europeans the disease is more rapid—they appear rarely to live till the real sleeping stage is reached. First of all irregular fever, not amenable to quinine, is noticed, and this is accompanied by frequent headaches, gastric disturbances and a distinct change in temper and demeanour, the patient becoming abnormally unreasonably

notable or unusually careless and truthful. In the European the skin change is a peculiar dryness associated with a red macular eruption, which changes position from day to day, but tends to preserve a more or less circular or crescentic outline. This kind of skin-lesion Sir Patrick Manson has pointed out is exactly the counterpart of that so seen in the black races, which one would expect to find in the thinner, cleaner and commonly covered skin of the European.

One year I examined for the presence of enlarged post-cervical glands all the children who, in the ordinary routine, came to me for medical treatment or vaccination. I cannot now remember the percentage which showed this clinical sign, but it was not a very large one, and the few whom I have since seen of those who had such enlargement, are still well. The main fact, however, impressed on my memory by this examination was that, however valuable this sign may be as an index to the disease, the occurrence of such enlargement of glands varies from extraneous causes enormously in different races; in my series I find this glandular enlargement about four times as frequent among the Jolaffs as among the Mandingoes, and this proportion expresses well the relative ideas of cleanliness of these two races in the Protectorate, of course, dirty heads are a frequent cause of such chronic adenitis in all races.

Among the Mandingoes in the Gambia it is the almost universal practice to "cut the neck-stones" kunte-berre (kuntu) of all the male children, and this operation is believed to prevent the occurrence of sleeping sickness in later life. The operation consists of making a small incision on each side under the centre of the rumus of the jaw, removing a small piece of tissue (supposed always to be a gland), and then keeping the wound open for some days so that a distinct scar is left. The incision is usually about over the sub-maxillary salivary gland, but I am pretty sure that this is scarcely ever (or never) reached, and rather doubt if in most cases even a lymphatic gland is removed, so the cut is never a deep one and the bit removed always most minute. Our knowledge though of the connection of the trypanosomiasis and the lymphatic gland makes this native custom of particular interest, as showing that they, too, seem to have or imagine some similar connection, but one can hardly believe that the practice can confer any sort of protection, even if the glands were really removed. Practically every Mandingo bears the scars of the operation, and I can remember at least one case of sleeping sickness who died in spite of the presence of good scars.

I ought to have mentioned before that, as far as my experience goes in the Gambia, males are much more frequently affected with sleeping sickness than females. There would seem to be but little reason for this, as all the rice cultivation is done by the women, a laborious work, which takes them into the swamps, and therefore into tsetse-fly areas at the very worst season, namely, during the rains.

Tsetse flies are found practically everywhere in the Gambia, but are much more numerous in some places than in others. The parts of the country most infested are Niumi, Fogni, and Western Kiang, along the Vintang and all the other creeks below McCarthy Island, at any rate, all those which I have been up, for in such places these flies absolutely swarm, and travellers by boat, in spite of constant watchfulness, cannot avoid being frequently bitten. In Bathurst I have only seen tsetse flies at the end of the rains, and there but few, though within six miles, near Jeshcumu, there is a place where they are numerous and to be found all the year round. There are two quite different kinds of locality which these flies haunt in the Gambia, one, the typical situation, the water or swamp-side, where thick grass and dense jungly growth often shaded by large trees abounds, or (in Niumi particularly) in real forests, damp but not necessarily close to water. The second locality is among the bamboo, belts of which clothe the sandstone ridges near or along the boundary, especially from behind Chakunda, on the south bank of the Upper River, to behind Existf, in the South Bank Provinces. Here, in by no means the kind of place one would associate with tsetse flies, as they are waterless and for the greater part of the year dry and burnt up, tsetses, a horse-biting species particularly, are most numerous and troublesome even during the dry season. There is one little point which is worth noting about these tsetses; when three or four horses are travelling, riding in single file along the ordinary bush path, the leading horse will be covered with the flies, the second may occasionally carry one or two, but those following will be left absolutely unmolested.

From specimens caught in the Gambia, the two common species, *Glossina palpalis* and *G. Morsitans*, the carriers of sleeping sickness and horse trypanosomiasis respectively, have been identified as occurring in the Gambia together with at least one other species. Of those sent home so far, the larger number have been found to be "palpalis," but this may be merely accidental, and the proportion may be reversed when more identified. At any rate, a knowledge of the country and relative frequency of horse and man trypanosomiasis would make one think that the horse-biting species must be much the more abundant.

Native tradition asserts that in earlier times the disease was much more prevalent in the Gambia than it is now, and whole districts, now desirable dwelling-places, are said to have been uninhabitable. In the Protectorate, this particularly applies to Niumi, which, in former days, bore such evil name that its inhabitants were few or non-existent, but it is now a rich and fairly thickly populated country, inhabited mainly by Tarankas, a branch of the Foolah race and a prosperous people, who are the owners of large quantities of cattle. Accounts, too, of the slave trade and the frequent awful mortality among the slave gangs and slave-ship cargoes from this disease, all provide additional evidence to show in those days sleeping sickness was a much commoner disease in the Gambia, one of the chief centres of the export trade in slaves, than it is now.

May we not hope that this awful scourge is really on the wane here, and that cases will get fewer and fewer year by year?

Can it be that the natives have acquired some degree of immunity against trypanosome infection?

Several facts seem to point this way. Tsetse flies of all sorts abound in the Gambia—a country which is merely the banks of a tropical river and which consists for at least half its area of the alluvium and swamp which fringe such a river. Here there is every environment favourable to the life and increase of these flies. Cases, few in number though, do occur every year, so that foci of possible infection are present, and practically everywhere we have the tsetse to carry the infection. Human natives, too, would always be numerous, for travellers are many, some for trade, others for agricultural purposes, these being the hundreds of "strange farmers" who come in every year for the rains to plant ground-

nate in British Territory. As peace and prosperity prevail everywhere, there is absolutely nothing to hinder frequent intercourse between all parts of the Protectorate, and of the surrounding portions of French Territory. This intercourse is large and widely spread, and means continual coming and going, for our river is still, as it has been for a century or more, the main highway from the sea to the Soudan and the interior, so that nearly all the produce of, and nearly all the imports for the neighbouring countries, as well as our own, are carried to or from our river, which provides easy water-transport to Europe. With such frequent movement, therefore, from one end of the country to the other, there must be every facility for the spread of sleeping sickness, as there are so many places where travellers in our territory must meet with tsetse flies—in many places, indeed, it would be impossible even to take the shortest journey without passing through a tsetse haunt.

How is it, then, that under these conditions, instead of one case here and there, we do not see one case followed by others infected from it, till by now the terrible state of affairs which prevails elsewhere has been reached, if our people are not more immune to the disease, having acquired this immunity in the days when sleeping sickness was much more prevalent than at present?

The general conditions favourable to the incidence of the disease must, one would think, be much the same round the Uganda Lakes or in the Congo as in the Gambia: the actual morbid agent, the trypanosome, in the same, the same carrier, the tsetse fly (more particularly *G. palpalis*) is present. Yet in one place the disease is decimating (or worse) the people, in the other, though fatal to those it attacks, it is uncommon. Our people no doubt have the advantage over the inhabitants of Uganda in the matter of stamina, as the Gambia natives are a fine, strong people, of good physique and constitution; many are quite wealthy, all are comfortably off, and there are certainly nowadays no very poor or absolutely destitute. So everyone can get enough to eat, and nearly all live really well. The ground-nuts they grow bring them in good returns in cash, and their cereal crops provide a great part of their food, while any additional foodstuffs they require or little luxuries can be obtained at prices but little above those ruling in Europe, at the numerous trading factories, which are dotted at frequent intervals all the way up the river. Wherever, too, there has been any failure of the food crops, or the slightest likelihood of a coming shortage of food, the Government has always been in the habit of issuing rice at cost price on credit to all who required it. In every way, therefore, our people have all the aid which good food and good living can give towards good health and resistance to disease.

The situation of the towns, too, probably compares favourably with what is the case in Uganda. Practically all the native towns are situated at a distance (generally at least two miles) from the river, and usually at least half as far from any swamp or other likely hold for tsetses, and they are always surrounded by a cleared tract, the cultivated area, the extent of which naturally varies with the size of the town, but is always round all the towns or villages of any size, at least a mile across. Tsetse flies never live in such towns, but the same cannot be said of any of the 30th villages in Fogni, a thickly-wooded part, full of swamps and abounding in tsetse flies, or of the numerous trading stations on the river, or its creeks, or stations, which are increasing in size and number every year. Most of these are situated actually in the swamp which borders the river, while the usual dense water-side growth is, as a rule, only cleared along the actual frontage of the station.

From the health point of view, one can only say that most of the trading stations are most unsuitably situated, but on the other hand, such positions are necessary from the trade point of view, as close access to waterway is essential to facilitate landing and shipment of goods.

Another minor point of difference between Gambia and Uganda is the fact that our people eat large quantities of Kola nuts, a habit which, I believe, does not extend to East Africa. This habit can scarcely give any real protection against trypanosomiasis, but I mention it as the natives thoroughly believe that Kola is "good medicine" and a preventative of many diseases, and it is, undoubtedly, a wonderful stimulant and antidote to fatigue, and its use in moderation, seems to do nothing but good to its votaries.

Although all these are favourable factors on the side of general resistance to disease, one can hardly believe that to them alone is due our present comparative freedom—long may it continue—from the scourge of sleeping sickness. So that taking everything into consideration—the established presence on the Gambia of the trypanosome, of myriads of its carriers, the tsetse flies, and of its results, cases of disease—I am driven more to the belief (and hope) in a degree of acquired immunity among our people.

On this question of immunity, the presence and effects of trypanosomes in the domestic animals only throw some light, reasoning on the lines of analogy.

Horses live but do not really thrive anywhere in the Gambia, though in the Upper River Province they do much better than elsewhere. In most places it is quite the exception to see a really fit horse, and nowhere can one say of them, as one certainly can of the donkeys and cows, that practically all look fit and well. Trypanosomiasis is the disease most fatal to them, and to it they are extremely susceptible. If a horse is taken into a tsetse district even for the shortest time, there is every likelihood of his being infected, while in those districts where the fly is most abundant horses will not live a year.

Donkeys do well and look well nearly everywhere, and though they are not nearly so well cared for as, and do much more work than the horses, especially in carrying the ground-nuts to the wharves, and therefore go much oftener into tsetse areas, trypanosomiasis is rare in them. Captain Todd, the veterinary surgeon who visited the Gambia a few years ago, found only one case of this disease in a donkey, which also, I believe, was the only sick donkey he saw, as against innumerable sick horses.

Cattle take us a step further, for they most surely have reached immunity. Trypanosomes are commonly found in their blood—in the blood, too, of absolutely healthy beasts (Dutton and Todd, 1902), and yet our cattle are by far the healthier of our domestic animals and in every way do the Gambia credit. They are extremely numerous all over the Protectorate, and practically always look fit and well, except for occasional slight epidemics of other cattle disease, and towards the end of the dry season, when they may suffer from shortage of pasturage. Their range, too, is spreading into districts where formerly cattle could not thrive. Both in Fogni and Niumi during the last nine years one has seen a great increase in the number of cattle kept, especially so in the first-named. With this may be compared the increase of population which has in former years taken place in certain parts of the Gambia, and with that which is now occurring along the French Upper Gambia. Is it not fairly reasonable to suppose that the people in the one place and the cattle in the other have increased as their resistance to their respective diseases increased?

ALLISTONE.

MEDICAL REPORT FOR BASUTOLAND FOR THE YEAR 1910.

By Edward C. Lows,
Principal Medical Officer.

Leprosy is still increasing and a count of lepers made during the year showed that there are at least 700 cases scattered about the country. At any rate, we have that number recorded in our registers and there are probably a few who have evaded registration.

The question of the formation of a leper settlement has been under consideration, and it is hoped during the coming year to accomplish something in this direction. I am glad to say that native public opinion is favourably disposed towards some scheme for the isolation of lepers. In a native territory like Basutoland, we could not hope to maintain successfully a leper settlement without the co-operation of the people. With such co-operation the difficulties would be small and the possibilities of establishing a leper settlement would be governed mainly by the question of expense.

Some investigations into the cause of the spread of leprosy have been made by the writer. A short paper embodying the result of my investigations to date is attached to this report. Experiments are still in progress and few lepers are maintained in tents on the Museum Reserve for experimental purposes.

A NOTE ON THE TRANSMISSION OF LEPROSY.*

* In "Medical Report for Basutoland for 1910."

By Edward C. Lows,
Principal Medical Officer, Basutoland.

The means by which the leprosy bacillus is introduced into the human body have not yet been definitely established.

Communal feeding, direct inoculation or contagion have been generally accepted as being the most likely methods of introduction, but no proof of either of these methods has yet been adduced, and I believe the leprosy bacillus has hitherto not been found outside the human body.

The fact that leprosy is most common among people of careless personal habits and living in unhygienic surroundings, points to some co-existing source of contagion.

The possibility of the bacillus being carried by vermin occurred to the writer. With a view to testing this hypothesis bed-bugs obtained from huts which had never been inhabited by lepers were caused to bite lepers in the neighbourhood of leprous nodules on the face. The bugs were then killed and the alimentary track and its contents examined. In every bug that bit freely a bacillus was found which in shape, size, and staining reactions is similar to the Bacillus leprae.

Control bugs from the same hut gave, in every instance, a negative result.

The experiments are still in progress and it is intended, as soon as circumstances permit, to solve the following questions:—

(1) How long the bacilli remain in the bug's body?

(2) If bugs which over a period of weeks have fed on the blood from leprous nodules present any evidence of growth of bacilli in their tissues.

(3) What organs of the bug contain bacilli?

(4) Whether any other vermin, *e.g.*, fleas and lice, contain bacilli.

These experiments are only regarded as preliminary to a thorough investigation of the subject, but the question is so important that I have ventured to record my results in the hope that other observers may be induced to experiment on the same lines. I think it will be found that lepers may be inoculated by infected bugs, and this point can be elucited to causing infected bugs to bite lepers on parts of the skin on which there are no leprous lesions.

If my hypothesis is correct a great many facts regarding the spread of leprosy which have hitherto been inexplicable would be made clear.

Inquiries into the past history of certain lepers go to show that they could only have become infected with leprosy through some intermediate host.

The fact that plague is carried by fleas warrants, at any rate, the inference that leprosy may possibly be carried by bugs. Further, the fact that only a percentage of human beings are attacked by the bed-bug, or, for the matter of that, by the flea, would serve to explain why it is that only some of those people who live in close association with lepers become lepers also.

All lepers that I have questioned admit that bugs bite them freely, and it is not unreasonable to assume that such a voracious feeder as the common bug must, in the course of his nightly meal, ingest a considerable number of leprosy bacilli if his bites were in the neighbourhood of leprous nodules, which are often swarming with the *Bacilli leprae*. If such infected bugs were to bite a non-leper there would be a good chance of the bacillus being introduced into his system.

The following history of a recent case of leprosy is only explicable by assuming some method of infection as suggested above.

A native, X, residing in a village about three miles from Maseru presented himself as an out-patient about three months ago with some well-marked tuberculer leprous patches on the face. They had appeared about six weeks previously. There are no lepers in his village and none of his relatives are lepers. Inquiries as to how he had spent his time and where he had been during the preceding year elicited the fact that he had during that period visited on three or four occasions a village about fifty miles away, where there was one leper, who was, however, driven from the village during the period in question. He had been in the leper's hut, but had never partaken of food there. After the leper had been driven away, X spent one night in the hut and was severely bitten by bugs there.

The closest questioning failed to elicit any further evidence of contact with lepers or their dwellings, and one is almost forced to the conclusion that X was inoculated by leprosy-infected bugs or other parasites on the one night he spent in the infected hut.

ANNOTATION.

The Vaccine Treatment of Typhoid Fever.—Sir David Semple, writing in the *Journal of Vaccine Therapy* for February, 1912, on the vaccine treatment of typhoid, concludes:—

(1) That the treatment of typhoid fever by means of vaccines rests on a sound theoretical basis, as proved by the increase of protective substances in the blood of patients undergoing treatment.

(2) That if any reliance can be placed upon a limited collection of figures, vaccine therapy treatment is a practical method by which the death-rate can be lowered, relapses diminished, and complications in typhoid fever lessened.

(3) That the treatment is devoid of all risks, and can be easily carried out and to the best advantage by any physician with a knowledge of bacteriology, and the leading facts connected with immunisation. Further, a knowledge of the blood changes which take place during bacterial infections and the result of the injections of bacterial vaccines is of importance; and finally a knowledge of the methods employed in measuring the protective substances in the blood.

(4) That the results already achieved indicate that it is a method of treatment worthy of the serious attention of those who are called upon to treat typhoid fever.

ANNOTATIONS

A Case of Cysticercus Cellulosæ.—Krishnaswami, in the *Indian Medical Gazette* for January, 1913, publishes an interesting case of *Cysticercus cellulosæ* infection. The patient, a low-caste South Indian Hindu, was admitted into the General Hospital, Rangoon, for weakness of the lower extremities. On admission he was seen to be a well-nourished man about 35 years old. He could both stand and walk, but complained of being very quickly tired and that his legs were painful after slight exertion. Sensation was normal in the lower limbs. Knee-jerks could not be obtained. Muscular power fair: his intelligence was that normal to a man of his description. With the exception of disease of both eyes and the muscular condition to be described his organs appeared to be healthy, both eyes were blind, the left from the effects of an injury four years before, the right from recent extensive corneal ulceration. Scattered all over the body but more particularly in the muscles of the calves were numerous hard, slightly painful nodules about the size of small beans: fifty-six were counted by the Sub-Assistant Surgeon in charge of the ward. There were no nodules under the tongue and the nodules were larger than those usual in trichinellasis. A nodule was excised for microscopic examination, and within it a scolex of *Taxia solium* was easily detected. An examination of the stools was made but taenia ova were not found. The patient being blind remained in hospital, but beyond the fact that he was not capable of very active exertion, there were no signs of real illness. He ate and slept well and took an active part in most of the petty ward quarrels. In November he fell sick with an attack of lobar pneumonia and died.

Dr. Krishnaswami found the following lesions on post-mortem examination:

The right lung was the seat of lobar pneumonia of the lower lobe: at the apex of this lung were one or two small cavities lined with fibrous tissue. These may have been the remains of cysticercus cysts, but there were no scolices. The left lung was normal. In the heart were numerous cysts, situated both superficially beneath the pericardium and also deeply embedded in the muscle substance. The majority of these cysts contained scolices. Apart from the presence of these cysts the heart appeared healthy. The abdominal organs with the exception of the pancreas were healthy. The pancreas was large and hard and crossed with numerous areas of fat necrosis, while similar areas were present in the fat of the neighbouring omentum and mesentery. Within the substance of the pancreas were a fair number of cysts. The gall bladder contained a few small biliary calculi. The brain was studded with cysticercus cysts. Thirty-three were counted just beneath the pia mater upon the right cerebral hemisphere and in the deeper parts of the brain they appeared to be equally numerous.

Scattered throughout all the voluntary muscles examined, cysts were found in great abundance. In the specimens of the right calf muscles—dissected and kept as a museum specimen—twenty-six could be counted. No cysts were found in the eye-balls.

The case is of interest in showing what an enormous number of these cysts may be present with practically no clinical signs as a result.

NOTES AND NEWS

Leprosy.—Dr. Barbera, of Valencia, has used Antileprol, a purified form of chaulmoogra oil, in the treatment of leprosy with success. The antileprol was given in gradually increased doses until the patients took, in some cases, up to the equivalent of 300 to 350 minims daily.

Bacillus coli cystitis.—Helmitol, in 30-gr. doses, thrice daily, well diluted in barley water, answers well in cystitis due to *Bacillus coli* infection. The dose is diminished as improvement obtains.

ORIGINAL COMMUNICATION.

"SALVARSAN" AND LEPROSY.

By T. Lennar Sandes, M.D.,
Government Bacteriologist, Robben Island Leper Asylum.

The immediate and startling effect of the arsenical preparation, No. 606, Dioxydiamidoarsenobenzene dihydrochloride, on syphilitic lesions suggested its tentative application to leprosy. The beneficial action of "606" is not confined to the venereal disease alone; it seems as if many of the diseases due to spirillar or cork-screw shaped organisms are profoundly affected, aborted, or cured by this compound. Leprosy is, however, due to infection by an organism of a lower group, and there were therefore no *à priori* grounds for expecting successful results.

Thirteen typical and active cases representing both varieties of the disease were selected. Complete and accurate notes and charts of their condition were made. The nasal discharge was bacteriologically examined and found to contain *B. leprae* in all the tubercular forms. In the anæsthetic cases, where the nasal secretion showed no leprosy bacilli, they were demonstrated elsewhere; in one only of these anæsthetic cases I failed to establish a positive bacteriologic result.

One tubercular patient had a serious concomitant syphilitic lesion in the shape of a large perforation of the soft palate—the lactic ulceration being at the time in a state of destructive activity.

From the date of commencement of the treatment the patients were seen daily as far as possible, and any observable alteration, improvement or retrogression was at once recorded.

With respect to the method of administration of the preparation employed, patients Nos. 1403 and 1214 each received one intra-muscular injection; but as this method was accompanied by violent pain, was followed by local destruction of muscular substance, and seemed less likely to be as efficient as the intravenous mode, it was abandoned. All the other injections, forty-eight in number, were intravenous.

The solutions were prepared as follows:—

Into a sterilized flask 0·6 grams of the salt were poured. To this was added about 100 c.c. hot physiologic saline solution and the flask shaken. The drug at once went into solution, forming a clear yellow liquid with a markedly acid reaction. By means of a pipette a 15 per cent. solution of KOH was instilled, drop by drop, until complete precipitation and re-solution into a clear liquid had taken place. More physiologic sterile saline solution was then added until the total contents registered 250 c.c.

This solution was at once injected by means of static pressure through a glass container, rubber tube and curved needle directly into one of the larger veins of the arm, or on one or two occasions into one of the dorsal veins of the foot. The apparatus was washed through into the vein at the conclusion with 20 or 30 c.c. of the saline solution. Strict asepsis was observed throughout.

The subjoined statement, marked A, shows at a glance all essential details of the injections.

The patients complained of no discomfort during the actual process. They left the operating room, walked unaided to their yards—being, however, under the supervision of a special attendant. Some of the less neurotic, after the injection, immediately resumed their interrupted employment, and seemed to suffer no inconvenience whatever.

Toxic effects appeared, as a rule, about one hour later. These consisted, in brief, of cerebral throbbing or headache, vomiting and intestinal peristalsis, leading to a few evacuations. Such sequelæ were not always present, but appeared in the majority of instances. The temperature during the immediate toxæmia rose to 99° or 100° F. At the end of twenty-four hours all ill-effects had passed off, nor did any subsequently develop. In fact, al-

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Salvarsan and Leprosy

STATEMENT A.—A TREATMENT OF CASES OF LEPROSY WITH "SALVARSAN."

Number of Patients	Variety of disease	Dose of drug at each injection	Number of injections	Total quantity of drug injected	Intervals in days between each injection	Date of last injection	Presence of bacilli previous to treatment	Presence of bacilli subsequently	Result of treatment at time of writing, September 14, 1911
		Grm.		Grm.					
610	Tubercular	0.6	1	0.6	...	April 10	+	+	No improvement.
1,021	,,	0.6	1	0.6	...	May 16	+	+	,,
1,104	,,	0.6	2	1.2	72	September 7	+	+	,,
1,308	Mixed	0.6	2	1.2	14	June 27	+	+	Considerable improvement.
1,224	Tubercular	0.6	2	1.2	10	April 27	+	+	No improvement.
1,353	Mixed	0.6	4	2.4	10-64-65	August 3	+	+	Slight improvement (?)
710	Tubercular	0.6	4	2.4	7-14-14	June 27	+	+	No improvement.
1,130	,,	0.6	4	2.4	31-32-14	,,	+	+	,,
1,047	,,	0.6	4	2.4	7-14-14	,,	+	+	,,
1,365	Anæsthetic	0.6	5	3.0	7-7-14-14	,,	+	+	Considerable improvement.
1,157	Tubercular	0.6	6	3.6	10-45-12-21-14	,,	+	+	No improvement.
1,316	,,	0.6	8	4.8	17-18-13-12-7-14-14	,,	+	+	,,
1,235	Anæsthetic	0.6	8	4.8	13-18-13-12-7-14-14	,,	−	−	Slight improvement (?)

through two patients received each eight maximum doses with intervals of less, on an average, than twelve days between the injections, there were no undesirable complications such as optic atrophy, nor indeed any lesion attributable to the use of the preparation.

It will be observed from the tabular statement that no beneficial results were obtained in any of the pure tubercular cases treated. Three months (excepting in one case) have almost elapsed since the date of the last injection, and I believe I am justified in definitely stating that, so far as external appearances or physical examinations indicate, the disease is in no wise retarded or affected in any of these cases. Bacilli have been demonstrated in all of them on several occasions within the last month, but it is a fact of some importance that the bacilli were distinctly fewer and more difficult to find as a rule in smears made subsequently to treatment than in those previously obtained.

Professor P. G. Unna, of Hamburg, has evolved a means of differentiation of living and dead bacilli by double staining. I believe it would be nearer the mark in this to substitute the terms "younger" and "older" for "living" and "dead" bacilli. The application of this means of staining to the sections of tissues showed as great a proportion of degenerated bacilli in the sections taken prior to the injections as in those taken subsequently. Both types were constantly present, and indeed seem invariably to be in any positive slides made by me from leprous tissues in which I used this compound staining. As this method of staining is not generally known, and may perhaps be of value in estimating the action of drugs on bacilli, I append a brief note (marked B) in explanation.

The syphilitic ulcer in No. 1157 began to close after the first injection, had completely healed after the second, and has remained a sound scar.

With respect to the remaining cases, two are termed "mixed"; practically, however, they were well-marked anæsthetic cases showing early facial signs of a tubercular superimposition. The other two were pure cases of the anæsthetic variety.

Case 1353.—Seems to me to be no better. He is a man of education and intelligence, and he, together with the other officials associated with this investigation, maintains that there is a slight improvement. In deference to these views I have marked him thus.

No. 1308.—Previous to the exhibition of the "606" showed patches of brilliant annular erythema, a distinct puffiness about the face and a frequent fascicular twitching of the facial muscles. The swelling and occasional twitchings are still observable, but the rash has entirely subsided, leaving only areas of diminished pigmentation.

Smears from both these cases are, unfortunately, still positive.

No. 1305.—Was almost a duplicate of 1308, with a well-marked rash, muscular twitchings, but no tumefaction of the face. His active rash has quite disappeared, leaving the patches of diminished pigment. The muscular contractions are undoubtedly less frequent, and improvement, as far as appearances are concerned, is quite definite. Bacilli are still demonstrable in the nasal secretion.

No. 1325.—Is an old anæsthetic case. His disease was still in active progress. There were large patches, with active edges distributed, over his trunk and limbs. There was well-marked paresis of his facial muscles, organic contractures of the muscles of the forearms and attenuation of some of the digits. At present, nearly three months after cessation of treatment, the macules still display reddened, active margins, but modified for the better. The other organic changes are unaffected. Leprosy bacilli are not to be found in the nasal secretion nor elsewhere; however, as I could never find any in his case this fact does not help one much.

To sum up the results of these experiments: Tubercular leprosy does not seem to be benefited by the administration of the Ehrlich-Hata preparation. The cutaneous eruptions of the macular-anæsthetic form of the disease do seem to be influenced, but whether this is merely a temporary improvement or an actual sign of a prolonged amelioration or cure I am not yet in a position to say. Histologic changes in this disease occur very slowly. It were premature then to give a final verdict on the effect of "606" on leprosy. Taking all factors into consideration, however, results at this date are not encouraging.

TAKE IN STATEMENT A

Method of double staining for the differentiation of younger leprosy bacilli from more senile or degenerated forms.—

I.—*Fuchsine-Methylene Blue Method.*

(1) Fixation of skin in HNO_3 (1 per cent.) 2 hours.
(2) Harden in abs. alcohol and embed in celloidin.
(3) Cut sections 10—15μ.
(4) Cachol fuchsine on slide 1 hour.
(5) Wash water.
(6) HNO_3 (30 per cent.) a few seconds.
(7) Alcohol.
(8) Tolyl-chrome methylene blue solution ½ hour.
(9) Water.
(10) Orcein solution (1 per cent.) ½ hour.
(11) Alcohol.
(12) Water—dry on slide with filter paper.
(13) Aniline Oil HNO_3 (1 per cent.) decolorize.
(14) Aniline Oil, Xylol, Balsam.

II.—*Victoria-Blue-Safranine Method.*

(1) Fix skin HNO_3 (1 per cent.) 2 hours.
(2) Harden alcohol abs. and embed celloidin.
(3) Cut sections 10—15μ.
(4) Thymen Victoria blue 12 hours.
(5) Water-wash.
(6) Alcohol till no stains come away.
(7) Water-wash.
(8) Thymen-safranine (½ per cent.).
(9) Water-wash.
(10) HNO_3 (30 per cent.) 2 seconds.
(11) Alcohol.
Bergamot, oil Balsam.

ORIGINAL COMMUNICATION

EXPERIMENTAL TREATMENTS FOR LEPROSY.

By T. Lennox Sarles, M.B., M.D.,
Government Bacteriologist, Robben Island Leper Asylum.

THE following is a condensed report on some of the diets, drugs and preparations tried by me in the Robben Island Leper Asylum in the hope of evolving a curative or ameliorating treatment for leprosy.

The tabular statements show at a glance the details, and appended to each are a few concise explanatory and supplementary notes. In all cases treatment was continued until the wish for cessation was emphatically expressed by the patient and the inutility of such treatment amply demonstrated to both patient and medical attendant.

TAKE IN TABLE A

The diet of fruit in the initial stages seemed to have a beneficial effect on the patients' general condition. In consideration of the fact that the great majority of the patients do no physical labour and obtain a liberal allowance of other foods, the ration of meat (3 lb. daily) is too much. It is a source of considerable digestive trouble and of more remote ill-effects to an extremely lethargic people. When, therefore, a fruit or vegetarian diet is substituted it not only constitutes an agreeable change, but also leads presently to a salutary diminution in the activity of nitrogenous metabolism. Unfortunately the novelty wears off, the monotony of the diet asserts itself, the leprotic manifestations are not (so far as I could see) directly affected and the patient, observing no improvement to compensate for what he now considers a privation or hardship, lapses from the diet.

Considering all factors I do not think that a vegetable or fruit diet exclusively is of much value in the treatment of leprosy as a disease.

B.—"Jacota's Root" Cure.

Acting under instructions, this reputed cure was given a re-trial. Twelve anæsthetic cases with definite circumscribed macule were selected. The prescribed instructions, as follow, were accurately carried out:—

(1) The affected parts or white patches were bathed with warm water, rubbed, presumably to remove scales, and a paste of powdered bark No. I applied from twelve to twenty-four hours. The resultant blister was pricked and the elevated epidermis removed.

(2) The raw sore was then treated with a paste of powdered root No. II and continued till healed.

(3) Powdered roots Nos. III and IV were added occasionally to preparation No. II.

(4) Powdered root No. II was mixed with patients' food at one meal daily.

Of the twelve patients, nine finding the application highly uncomfortable and irritating tore off the paste and refused to reappear for further treatment, affirming that this root had been already tried without avail and that they would not be further victimised. By the exercise of much persuasive eloquence three carried out instructions to the end.

Number of patient	Variety of Disease	Treatment commenced	Results
1246	Anæsthetic	1911 December 1	Disease unaffected.
1193	"	"	"
643	"	"	"

The application raised large blisters, which in the case of No. 643 became ulcers requiring attention for months afterwards. The pigmentation of the patches had not returned, nor sensation of a normal acuity, at time of compiling these notes. The treatment had apparently no effect whatsoever on the disease, although hiding or covering one of its principal cutaneous manifestations for a time.

TAKE IN TABLE C

Thyroid gland, then, certainly does no good in tuberculer leprosy, in so far as this table indicates: rather, it has a bad effect. This I ascribe to the high iodine content in thyro-albumen, the principal and most active constituent in the glandular secretion.

D.—Treatment by Vaccines.

Much attention has been recently directed to the treatment of diseases caused by the activities of micro-organisms by what is known as vaccine or the injection of the specific bacteria, dead or of modified virulence, in order to accelerate or increase the production of those substances concerned in affording immunity. A bacillary emulsion was therefore made containing at first approximately 10,000,000 leprosy bacilli, dead, per *c.c.* Later the concentration of the bacilli was doubled, trebled and quadrupled.

Allowing for the vagaries of the patients and interruptions due to occasional indisposition, inoculation was performed regularly three times weekly for many months. There was apparently no local or general reaction. Estimations of the opsonic index in my hands gave no constant results nor guidance as to modification of treatment.

TAKE IN TABLE D

In consideration of these results the treatment by vaccines is distinctly a failure. This treatment, however, on a larger scale and with suitable modifications merits a re-trial and should not be forthwith condemned.

TAKE IN TABLE E

The preparations "Soamin" and "Orsudan" are trade names, representing Burroughs Wellcome and Co.'s manufacture of two of the Arylarsenates. "Soamin" is chemically sodium-amino-methyl-arsenate, and "Orsudan" is sodium 3-methyl-4-acetylamino-phenylarsenate.

Both these drugs have a rapid and beneficial effect on syphilitic lesions, but, in common with the ordinary preparations of arsenic, seem devoid of action in leprosy. The use of these drugs was in all cases gradually pushed until finally toxic symptoms appeared, when appropriate moderation was applied.

There were no serious nor permanent sequelæ such as optic neuritis or other dangerous disturbance of the nervous system. None of the cases treated showed improvement.

TAKE IN TABLE F

The salts of iodine seem frequently to have a profound influence in causing the disappearance of pathologic products. Potassium iodide, in particular, is in constant use for this purpose. It has frequently been tried in leprosy, but instead of helping to arrest the progress of this disease, or of assisting in curing its open sores, or of aiding the absorption of morbid cellular accumulations, it seems rather to aggravate every phase and symptom. One hesitated, however, to discard so valuable an adjunct to medicine without trial of a modification. I therefore experimented with the calcium equivalent. It undoubtedly had a pernicious effect which one need not hesitate to ascribe to the iodine constituent. It is not without significance to observe that the cases marked (*) in the above table have since succumbed. All compounds of iodine, in my experience, are harmful in leprosy. They reduce the patient and accelerate the disease. Chloride of calcium proved likewise of no avail. The soluble compound of mercury, so useful in the venereal complaint, had also a noxious action. The baneful effect of thyroid gland in leprosy I have ascribed above to the high percentage of iodine in the thyro-albumen, though this percentage is subject to considerable variation.

TAKE IN TABLE (Folio 13)

ALLISTONE.

I cannot give any definite or succinct reasons why I was lead to try metals like lead and silver in the hope of relieving the disease. Silver accumulates in the tissues and remains a long time in the economy. Many of its salts are excellent antiseptics. It was perhaps the fugitive hope that saturation of the tissues with the chloride or other combination might bring about a direct inhibitive action on the growth and activities of the bacillus. The exhibition of the drug was pushed to the limit of tolerance, but without observable action on the disease. These remarks also apply more or less to the use of lead. This metal has a profound injurious effect, leading to degeneration of the peripheral nerves and central nervous system; to inflammatory changes in all the great glands and systems, and far-reaching biochemical alterations. The dangers of treatment in this, as in all cases, were explained to the patient, and I take the opportunity of recording the fact that in no case, even when serious bodily injury was a probable result or the itself undiagnosed, was I met with a refusal. Patient No. 1177 was gradually brought under the influence of the lead salts until in a few months' time he was taking daily the large dose of 4.25 gr. of the acetate and oxide. He suddenly developed an acute degeneration of both his eighth (8th) nerves, an encephalopathy with serious and repeated epileptiform seizures and other associated phenomena of a dangerous toxaemia. The drug was stopped and he gradually recovered without hindrance except the deafness. Although every organ was saturated with the drug with wide cellular injury, the elastic lepra bacillus displayed a callous indifference, and remained apparently totally unaffected. The poison, after four months' use, was rapidly depressing the patient, without benefit to the disease; it was therefore discarded.

Radium was supplied in three tubes, 2 in. long, of violet glass, each containing 5 milligrammes. It could obviously be only applied locally. The full details of these applications it were beside the mark to expatiate on here. In brief, however, it was found that the fixation of a tube containing 5 milligrammes of the bromide for twelve hours continuously to a suitable cutaneous site showing well marked and diffuse lepratic infiltration was followed as a rule by no reaction; very occasionally there was a subsequent transient erythema. A continuous twenty-four hour application was followed by a distinct circumscribed erythema culminating on the seventeenth day after, or an average, in a small definite vesication and necrosis. The exact site of the ulceration was invariably where the lower extremity of the tube impinged on the skin—no doubt because the contents during movement mainly gravitated there. A seventy-two hour continuous application showed an immediate severe reaction. On removing the tube the infiltrate and slightly oedematous skin displayed a slight impression of the tube. It was surrounded by a broad area of erythema. At the extremities of the impression were blisters, small but distinct. Three days later these vesicles had become purulent and covered deep erosions. Thirteen days after removal of the radium there was a deep basal ulceration corresponding to the position of the tube. The ulceration, however, extended laterally and longitudinally beyond the dimensions of the original mechanical impression. One month after date of application there was a long, wide, indolent necrosed area covering approximately nearly one half the posterior surface of the forearm where the tube had been fixed. It was 6 in. long and on an average 2 in. broad. Shortly afterwards it showed signs of healing, but it was not till six months had elapsed that the surface had again become entirely covered with epithelium. The necrosis at no time penetrated entirely through the true skin.

All immediately local lepratic manifestations had disappeared or were in abeyance, and bacilli, dead, deteriorated, or otherwise, were not demonstrable in the immediate vicinity. Various modifications of these applications were made, such as fixing the three tubes of 5 milligrammes in slots separated by varying distances cut in a piece of wood and moving the wood with its inset tubes systematically and for definite times to different suitable areas. It would have been much better if the radium had not been distributed in tubes but diluted with an innocuous powder and spread over a large surface in a rubber or similar medium; this would have permitted the wrapping up of part or the whole of a limb and the subjecting of this area to a weaker, more prolonged, accurate, and homogeneous exposure.

Reviewing the results of these applications after the lapse of twelve months, and similar experiments in vitro, it seems that radium has a definite inhibitive action on the vitality and growth of the lepra organism; that it exposes with no benefit was observed from these applications unless they were continued so long as to lead to severe local devitalisation of the tissues of the host; the bacilli seemed to have as much resisting power, or to be no more susceptible to the action of the rays, than the cells among which they lived; that the destructive effect on the bacillus and its manifestations was strictly local and gradually transient; the activity of the radium was no doubt due to the so-called β and γ rays. For these reasons, then, radium as an external application and in the form supplied is of no practical value in the treatment of leprosy.

H.—CHAULMOOGRA OIL.

I now come to a treatment indubitedly slow, and not very satisfactory, but in my experience superior to any other known remedy or reputed cure for leprosy, namely, the vigorous and prolonged use of chaulmoogra oil. I submit two tables. The first shows a number of patients who have taken the oil diligently by mouth for a number of years. In the opinions of all concerned they are improved to varying degrees. It must not be considered that every patient who used the oil was benefited by it. Many who originally took it, finding no change or getting worse, lapsed from its use. Many are not present to record condemnatory evidence. But allowing for all derogatory factors, and for that percentage of lepers (about 10) whose disease becomes naturally arrested, I believe from 30 to 40 per cent. of the patients, at a low estimate, who use chaulmoogra oil continuously and conscientiously are markedly improved, and many approximate a cure.

The second table shows a series of patients where hypodermic injections of the oil were tried, in addition to oral administration. All patients using the oil supplemented its internal use by occasional vigorous insertion.

TAKE IN TABLE 'Chaulmoogra Oil—Oral Admin.'

The above represents a series of patients collected through the wards who have benefited to a greater or less extent by the oral administration of the oil. Many of them are in an odontologically healthy condition, and have remained so for years, though showing traces of the previous activity of the disease.

Chaulmoogra Oil Table—2 (Infir 17)

Patients treated by hypodermic injections of the oil suffered occasional lapses from indisposition, from saturation with oil when the subcutaneous deposits of oil were very slow of absorption, or from other incidental distraction which led to temporary suspension of treatment. It is important to recall that some of these patients would probably have improved without any treatment. Again, that improvement, even for periods of eighteen months, does not necessarily indicate the beginning of an uninterrupted progression to a cure. Some may

unfortunately relapse and lose more in a few weeks than they have gained in so many years, for a great feature of this disease is the extraordinary fluctuations in its evidences of activity. (Such fluctuations I personally associate with proliferation of bacilli in an apparent or cryptic tubercle, rupture into a blood-vessel, or large lymphatic channel, with bacteraemia, dissemination and injection in widely distributed capillaries leading by local bacillary growth to the rapid formation of new tubercles and a consonant general reaction.) Improvement, at any rate, points towards cure, and stimulates that most essential factor, the mental attitude. I shall not enter into a metaphysical discussion on the influence of mind on matter, but certainly, in combating leprosy, the solitary effort of hope should never be left out of consideration. It is a new pal sea in the treatment. I hesitate to ascribe any exact value to the hypodermic injections of chaulmoogra oil. It seems to assist slightly, particularly in those individuals who have to limit to small quantities the consumption of oil per os on account of gastronomic sequelæ. It is doubtful if the increased benefit, allowing such, received from the injections at all compensates for the pain and inconvenience occasioned by this heroic method of administration. One is compelled here to pay tribute to the stoicism, fortitude and courage of the patients in undergoing this severe and protracted treatment.

At the risk of being tautological, may I emphasize that the use of the oil must be prolonged, five years or more; it must be as far as possible continuous, and the inhibition of the oil should be pushed gradually to the extreme of susceptibility. Relapses will undoubtedly occur, particularly in the earlier stages, but such should not be permitted to foster discouragement. To expect sudden amelioration is to look for disappointment. Surgical assistance should always be ready to intervene when natural processes or medical applications have failed in discarding devitalized food or opposing inflammation. The value of surgery in the treatment of leprosy cannot be over-estimated. It is an essential. In view of the subgastric terms which I have employed above concerning chaulmoogra oil, until a more efficient substitute is evolved I believe it were well that all new arrivals be briefly and lucidly instructed as a matter of course in the principles of oil consumption and injection. That written instructions in English or Dutch or Kaffir be handed to them for perusal and consideration at their too abundant leisure; and that their attention be directed for further advice and sympathetic counsel to patients of their own race who have benefited and are encouraging examples of the value of chaulmoogra oil.

Experimental Treatments for Leprosy. Leather Section.

A.—Diet of Fruit and Vegetables Exclusively.

	Number of patient	Variety of leprosy	Treatment	Date of commencement of treatment	Period of treatment	Remarks
				1910		
1	622	Tubercular	Fruit only	March 4	10 days	Period too short for fair comment.
2	407	Anæsthetic	..	October 10	8 months	No improvement.
3	836	Tubercular	..	..	5 ..	Worse.
4	1,113	..	..	August 29	1 ..	..
5	1,089	..	..	October 1	8 ..	No improvement.
6	736	..	..	March 31	10 days	Period too short for comment.
7	971	..	..	October 31	2 years	Improvement at first. Later retrogression.
8	986	Mixed	..	August 29	5½ months	Worse.
9	792	Anæsthetic	Vegetables and fruit	Continuous	Over 3 years	Improvement.
10	1,139	Tubercular	Fruit only	October 10	4 months	Worse.

C.—Thymol Olive Extract.

No. of patient	Variety of disease	Date of commencement and of treatment	Period under treatment	Daily dose in grains	Total quantity administered	Presence of bacilli at first date	Result
1,117	Tubercular	Aug. 9, 1910	14 months	1 and 10	6,000 gr.	+	No improvement. Worse.
1,277	..	June 5, 1910	9 ..	2	600 ..	+	Much worse.
1,206	..	Feb. 3, 1911	6 ..	3	503 ..	+	..
1,265	..	June 9, 1910	6 ..	3 and more	1,350 ..	+	..

D.

Patient's number	Variety of disease	Concentration of hæmolymph emulsion	Frequency of injections	Amount of each injection	Total quantity thus injected	Period of treatment. Date: April 5, 1910	Disappearance of tuber-bacilli on first date	Results
1,259	Mixed	First month 10,000,000 per c.c., later 20,000,000; 30,000,000; and 40,000,000 per c.c.	Three times weekly	(First month) 1 c.c., after 2 c.c.	33 c.c.	6 months	+	Worse.
1,190	Tubercular	..	Three times weekly	..	123 ..	7 ..	+	No improvement.
1,243	..	..	Three times weekly	..	134 ..	7 ..	+	..
1,277	..	..	Twice weekly	..	48 ..	3 ..	+	Worse.

E.—Preparations of Arsenic.

No. of patient	Variety of disease	Preparation of arsenic	Dose and method of administration	Total quantity of drug taken	Date of commencement and of treatment	Period of treatment	Bacilli at first date	Result
			By mouth daily		1910			
1,018	Tubercular	Arsenious iodide	⅛ gr. increased later to ¼ gr.	Each salt 10 gr.	Sept. 10	9½ months	+	No improvement.
1,124	..	Mercuric ..	⅛ gr. ; ¼ gr. of each salt	10 gr.	..	..	+	..
1,208	Mixed	Arsenious acid	By mouth, ⅛ gr. later to ¼ gr.	45 ..	Sept. 10	9½ ..	+	..
		Antimony	.. ..	45 ..	Sept. 10	9½ ..	+	No improvement. Worse.
686	Anæsthetic	Sod. arsenate Arsenious acid	.. ..	30 ..	Sept. 10	9½ ..	+	No improvement.
			Hypodermically					
1,259	Mixed	"Sozarsin" *	1 gr. thrice weekly	330 ..	.. 10	6 ..	+	Worse.
1,124	Tubercular	"Sozarsin" *	.. ..	330 ..	.. 10	6 ..	+	..
1,139	..	"Orsudan" *	.. ..	330 ..	Dec. 4	6 ..	+	No improvement.
1,265	..	"Orsudan" *	.. ..	180 ..	.. 6	3 ..	+	Much worse.

* See below.

F.—Calcium Chloride, Calcium Iodide, and Mercuric Iodide.

Patient's number	Variety of disease	Drug	Daily dose (average by month)	Date of commencement of treatment	Period of treatment	Total quantity of drug consumed	Presence of b. bacilli after treatment	Result
1,009	Tubercular	Calcium chloride	10 gr.	Feb. 16, 1910	3 months	810 gr.	+	Worse.*
611	..	Calcium iodide	10 ..	April 4, ..	8 ..	1,200 ..	+	Worse.
690	..	..	10 ..	.. 8, ..	8 ..	2,440 ..	+	No improvement.
624	..	..	7 ..	Feb. 17, ..	14 ..	447 ..	+	Worse.
598	..	..	10 ..	.. 17, ..	14 ..	1,500 ..	+	Worse.*
1,136	..	..	10 ..	Jan. 26, 1911	8 ..	5,577 ..	+	Worse.*
1,276	..	Mercuric iodide	⅛ ..	June 5, 1910	16 ..	23 ..	+	Worse.*

G.—Various Drugs.

No. of Patient	Variety of disease	Drug	Quantity and mode of administration	Date of first application of treatment	Total period of treatment	Presence of bacilli after treatment	Total quantity of drug consumed	Results
				1910				
1,177	Tubercular	Lead	By mouth. Began with ½ gr. pb. citr. mortar daily, to crossed to 2 ½ gr., another 0·75 iodide pb. daily	June 1	4 months	+	Pb. subacetate, 48 gr.; pb. acetate, 110·6 gr.; pb. iodide, 78·6 gr.; total salts pb. 239·6 gr.	No improvement.
1,224	..	Silver	Oxide in pills, 4 gr. later 6 gr. and more daily	..	3 ..	+	636 gr.	..
982	..	..	Oxide in pills, 4 gr. later 6 gr. and more daily	March 10	13 ..	+	1,272 gr.	Improvement.
780	Mixed	Quinine	Hypodermically 1 gr. ad. bond phatic bi-weekly	June 1	4 ..	+	166 gr.	No improvement.
681	Tubercular	Radium Bromide	16 mg. in 3 glass tubes, directly applied to cutaneous surface	Dates of series of applications: May 3, 1910, Sept. 8 1911, Dec. 6, 1911		+	Ultimate loss improvement.	

Chaulmoogra Oil.—Oral Administration.

Patient's number	Variety of disease	Period of treatment	Average daily dose	Remarks
1,145	Tubercular	2 years	2 to 30 capsules*	Slight improvement.
1,022	..	6 ..	..	Considerable improvement.
130	..	6 ..	..	Ulcers healed; cure or arrest.
1,209	Mixed	5 ..	..	Considerable improvement.
985	..	7 ..	..	.. ..
1,054	Tubercular	5 ..	..	Great improvement, almost arrest.
736	..	3 ..	..	Considerable improvement.
666	..	6 ..	..	Slight but definite improvement.
415	..	6 ..	..	Considerable improvement.
588	Anæsthetic	4 ..	..	.. ..
587	Tubercular	4 ..	..	Greatly improved, apparently cure.
158	..	6 ..	15 to 40 capsules	.. ..
180	..	6 ..	2 hæmoptoids	.. ..
984	Mixed	9 ..	2 to 30 capsules	Slight improvement (?)
971	Tubercular	6 ..	..	Great ..
603	..	6 ..	..	Great ..
690	..	3 ..	..	Slight ..
1,085	Anæsthetic	2 ..	..	Considerable improvement.
630	Tubercular	9 ..	..	.. ..
223	Anæsthetic	8 months	..	Slight improvement.
1,172	..	2 years	..	Great ..
1,115	Mixed	2 ..	..	Considerable improvement.
1,138	Tubercular	1 year	..	Slight improvement (?)
1,139	..	1 ..	..	.. ..
1,262	..	1 ..	..	Considerable improvement.
1,023	..	1 ..	..	Great improvement.
241	Anæsthetic	2½ years	..	(?)

* Capsules contained 5 minims.

Chaulmoogra Oil.—Administered Orally and Hypodermically.

(Treatment continued to date.)

Number of patient	Variety of disease	Average dose per os, daily*	Average dose hypodermically per c.c.†	Frequency of injection	Total No. of c.c. injected	Period of treatment with injections	Remarks
1,030	Tubercular	6 to 10 capsules	4·5 c.c.	Twice (later three times) weekly	431 c.c.	1½ years	Greatly improved. Disease almost arrested.
710	..	6 to 10 capsules	3·0 ..	Twice (later three times) weekly	332 ..	..	In statu quo ante. No worse.
794	Anæsthetic	3 capsules	3·5 ..	Twice (later three times) weekly	475 ..	..	Disease apparently arrested.
1,047	Tubercular	6 ..	4·25 ..	Twice (later three times) weekly	409 ..	..	No improvement.
415	..	..	4·50 ..	Twice (later three times) weekly	395 ..	..	Disease practically arrested.
1,246	..	..	4·25 ..	Twice (later three times) weekly	353 ..	..	Recommended to be discharged cured by last Commission.
1,054	..	..	4·50 ..	Twice (later three times) weekly	408 ..	..	Slight improvement.
382	..	..	7·75 ..	Three times weekly	1,037 ..	..	Considerable improvement.
626	Anæsthetic	..	6·50 ..	.. ..	553 ..	..	Great improvement. Disease quiescent.
600	..	..	6 ..	.. ..	518 ..	7½ ..	Discharged cured.
611	..	..	5·75 ..	.. ..	132 ..	3 ..	Transferred to Rhandirmwyn. No re-formation.
630	Tubercular	..	5·50 ..	.. ..	366 ..	3 months	Considerable improvement.
626	Anæsthetic	..	5·50 ..	.. ..	277 ..	..	.. ..
1,013	Tubercular	..	5 ..	Twice weekly	153 ..	..	Not much changed so far.
607	Anæsthetic	..	4 ..	.. ..	151 ..	..	.. ..
701	Tubercular	..	5·5 ..	.. ..	155 ..	..	No improvement. Worse.
644	..	..	840 and 10	Do not take oil hypodermically	Intra-	..	Considerable improvement.
614	..	..	614	Dosed in this table by error	..	..	Leprosy improved. Serious complication. Intra-
583	..	..	5 c.c.	Three times weekly	350 c.c.	3 months	No change yet.
611	..	..	6 ..	.. ..	396 ..	..	Improved considerably.
641	..	..	6·50 ..	.. ..	504 ..	..	Improved.
616	..	..	6·50 ..	.. ..	520 ..	..	..

* 1 capsule contains 5 minims or drops. † 1 c.c. = 16 drops about.

"Bulletin of Entomological Research," vol. ii, Part 4, pp. 279-372. January, 1912.

The above number contains some very interesting papers. "New African Species of Tabanus," by E. E. Austen; "Notes on the Preliminary Stages of *Glossina morsitans*," by Allan Kinghorn; "Colour Corrections to Indicate the Distribution of Blood-Sucking Insects and the Diseases they Transmit," and "Entomological Research in British West Africa," by J. J. Simpson; "Observations on the Breeding Haunts of *Glossina morsitans*," by R. W. Jack; and "On a New Genus and Species of Glossinidæ (*Costalimaya*) from Uganda," by the Rev. N. C. Rothschild. Mr. Simpson's article on his entomological research work in Northern Nigeria affords very interesting and instructive reading, and the photographs which illustrate his text are really splendid, and give an excellent idea of the country traversed. Other good photographs illustrate the breeding grounds of *Glossina morsitans*. These will be found in Mr. Jack's paper.

"The Philippine Journal of Science," vol. vi, October, 1911, No. 4.

Amœbiasis.—Sellard describes a series of immunity reactions with amœbæ. He states that the injection of cultures of amœbæ into rabbits resulted in the production of serum which was cytolytic for amœbæ.

This serum possessed only a low grade of activity. No inactivation resulted after exposure to a temperature of 60° C. for periods varying from thirty minutes to three hours, or 70° C. for thirty minutes. However, the antibodies of the serum were not proved to be thermo-stable, since normal serum became active when heated for one hour at 63° C.

Of the sera produced by four cultures of amœbæ obtained from parasitic and from saprophytic sources each serum was cytolytic for the corresponding culture, but not for the other three. This specificity indicates that these amœbæ are biologically distinct. Subsequent examination showed that these amœbæ were also distinguishable from each other upon a morphologic basis.

Examination of the sera of amœbic dysentery patients failed to demonstrate any production of immune bodies for amœbæ during the course of the disease. However, the method which was employed was not satisfactory when applied directly to amœbæ occurring in bloody mucus stools. Consequently, the results do not represent any reaction upon amœbæ which are known to be pathogenic. Tests upon cultures of amœbæ did not give any definite evidence of the presence of either cytolysins or agglutinins in the patient's serum.

Unfortunately, as Sellard says, these results do not lead to any definite conclusion, but merely indicate that either immune bodies were not produced or that the cultures under consideration do not bear any etiologic relationship to amœbic dysentery.

"Annals of Tropical Medicine and Parasitology." December 30, 1911, Series T.M., vol. v, No. 3.

Mosquito Destruction.—Wise, writing on "An Examination of the City of Georgetown, British Guiana, for the Breeding Places of Mosquitoes," states that a most serious disadvantage under which the inhabitants allow themselves to labour is an excess of vegetation and litter in their yards and lots. No less than 231 premises were kept in a condition which can only be described as disgraceful. The exclusion of the sun keeps the premises damp and dark, and provides excellent cover and breeding places for mosquitoes, rats, and other noxious insects, vermin, &c. The exclusion of fresh air and the general dampness encourage and aid the spread of tuberculosis.

"The extraordinary collection on some premises of old tins and other worthless rubbish giving rise to stagnant water has to be seen to be believed.

"The city of Georgetown," the author goes on to say, "is richly supplied; not only with mosquitoes but also with convenient and comfortable breeding places. It seems almost impossible to realize that during the wet season over 70 per cent. of all premises in this city are breeding countless myriads of these pests, and that during the dry season nearly 60 per cent. are equally incriminated."

"This state of affairs, occurring as it does in a city priding itself on being up to date, is scarcely to be credited, and reveals the urgent necessity for vigorous and prompt action by those responsible for the health of the city.

"Undoubtedly the presence of numerous unscreened barrels contributes most to this state of affairs, and the close screening of a barrel and the provision of a tap near the bottom should be a *sine qua non* for even tolerating their existence."

And this is the year 1912; further comment is unnecessary.

"Public Health and Marine Hospital Service of the United States, Public Health Bulletin," No. 50, October, 1911.

Currie and Hollmann continue their studies on rat leprosy. After a series of exhaustive experiments they find that they cannot get the bacillus of this disease to grow. Media of various kinds were tried, and especially Clegg's method of growing in symbiosis with amœbæ and cholera germs; but all ended in failure. In one instance a streptothrix appeared, but this the authors look upon as an accidental contamination.

Lancet, January 20, 1912.

Intestinal Myiasis.—Cockayne reports an English case of this condition. The child, a boy, aged 1 year and 2 months, was brought because his mother, very much alarmed, noticed that when she lifted him up from the bed, there were a number of living "worms" under a small piece of flannel upon which he had been lying. More of these where found whenever he was left on the bed, though none were noticed elsewhere. The greatest number, probably about 50, were seen in the morning, and always under the flannel or mackintosh upon which he had been left all night. Fewer were found in the same situation during the day. The mother said that there were never any in the napkin, and that the stools were always free from them, and that they were found even when the child had not passed a motion. The infant, though rather poorly nourished, had remained in his usual health and had had no sickness, constipation, diarrhœa, abdominal pain, or loss of appetite.

Mr. Austen, to whom the larvæ were sent for identification, stated that they belonged to *Musca domestica* (Linn.), the common house-fly, one larva of *Pannia canicularis* (Linn.), the small house-fly, also being present. The condition is not very uncommon, larvæ of many different flies having been found in cases of intestinal myiasis in Europe and North America.

Annotations.

The Life-cycle of Spirochætes.—Fantham, in the *Annals of Tropical Medicine and Parasitology* for December, 1911 (Series T.M., vol. v, No. 3), contributes a very interesting paper on "Some Researches on the Life-cycle of Spirochætes."

The spirochætes considered in his paper were *S. duttoni*, *S. recurrentis* and *S. marchouxi* (= *gallinarum*) among blood-inhabiting forms, also *S. balbianii* in *Ostrea edulis* and *Tapes aureus*, *S. anodontæ* in *Anodonta cygnea* and *S. solensis* in *Solen ensis*. Both living and stained material were used.

The conclusions Fantham reaches after his study of these forms are as follows:—

(1) True longitudinal division, as well as transverse division has been observed in these spirochætes. There is a periodicity in the division of the blood-inhabiting spirochætes, transverse division occurring when the parasites are numerous in the blood, longitudinal division occurring at the beginning and end of infection.

(2) Transverse division following flexion, or "incurvation," has been observed, but somewhat rarely. Transverse division usually occurs in relatively straight or unflexed forms. The author does not consider that "incurvation" is a necessary preliminary of transverse division.

Intertwined forms have not been mistaken for longitudinal division.

(3) The protoplasmic contents of some of the spirochætes of the blood may break up into a number of small, round, or ovoid bodies, lying loose within the periplast, which ultimately ruptures at one end and sets them free. These minute bodies, variously known as "coccoid bodies," "granules," or "spores," are formed at the crisis. Fantham doubts if these bodies represent an essential phase in the life-history of the spirochætes in the vertebrate host, but are rather an anticipation of the similar phase in the invertebrate hosts of these spirochætes. However, occasionally "granules" may occur inside the red-blood cells.

(4) Certain *S. duttoni*, when ingested by *Ornithodorus moubata*, and certain *S. gallinarum* ingested by *Argas persicus* pass through the intestinal wall of their hosts, and then form minute coccoid bodies, spores, or "granules" by multiple transverse fission. Such granules, as well as spirochætes, may be found in the hæmocoelic fluid of the ticks, in the Malpighian tubules and in the gonads.

(5) Some of the spirochætes and spores reach the ovaries and ova of the infected parent tick. The spores concentrate in the Malpighian tubules of the developing embryo, which may be born infected.

(6) Many nymphs of *O. moubata* born of infected parents are themselves capable of infecting. In the case of nymphs or *Argas persicus*, although various observers have recorded negative results, more experiments are necessary before it can be asserted that nymphs born of infected parents are themselves not infective.

(7) The main source of infection from both adult and young ticks is the white excrement passed from the Malpighian tubules.

(8) Elongation of the coccoid bodies, spores or "granules" to form short rods, and growth of these rods to form longer (or vibrio) forms has been observed in the tick. In this way young spirochætes are developed.

(9) The spirochætes of Lamellibranchs do not necessarily depend on a carrier for change of Lamellibranch host. Cross-infection is brought about by water, which conveys not only active living spirochætes from the alimentary tract and mantle cavity of infected molluscs to the inhalent apertures of other molluscs, but also coccoid bodies (spores) may be thus conveyed and cross-infect. Coccoid bodies have been observed in process of formation in *S. balbianii* and *S. anodontæ*. (Fig. 5.)

(10) The life-cycle of the spirochætes of Lamellibranchs and of the spirochætes of the blood of vertebrates follows a similar course. Their morphology is much the same, allowing for differences of size. There appears to be no justification for separating generically the spirochætes of Lamellibranchs from their allies in the blood of vertebrates.

The Journal of Hygiene, Plague Supplement I., 1911.

Plague.—The sixth report on plague investigations in India published as a supplement of the *Journal of Hygiene*, contains the following papers: Major George Lamb, M.D.Glasg., I.M.S., with portrait (Obituary Notice); Epitome of some Recent Observations on Rat Fleas; Preliminary Observations on the Protective and Curative Value for Rats of the Serum of a Horse Immunized with a Toxic Nucleo-protein extracted from the Plague Bacillus, by Sydney Rowland; Second Report on Investigations into Plague Vaccines, by Sydney Rowland; Statistical Investigation of Plague in the Punjab, second report, On the Connection between Proximity to Railways and Frequency of Epidemics, by M. Greenwood, junr.; Statistical Investigation of Plague in the Punjab, third report, On Some of the Factors which Influence the Prevalence of Plague, by M. Greenwood, junr.; Observations on Plague in Eastern Bengal and Assam; Observations on the Breeding of *Mus rattus* in captivity.

British Medical Journal, February 24, 1912.

Ruptured Spleen.—Clarke describes a case of ruptured spleen where splenechomy was performed, recovery taking place. The patient lived in England, and had apparently never been abroad, the cause of the injury being a fall from a hayrick.

Two blood examinations were made after the removal of the spleen, as follows (operation July 20, 1911):—

First Examination, July 28, 1911.

Red Cells.—Number 2,000,000 per c.mm. Rouleau formation fair. Some tendency to agglutination. Marked poikilocytosis. Macrocytes and microcytes present, and ghosts. Polychromatophilia. Granular and vacuolar degeneration marked. Normoblasts and megaloblasts present. Blood platelets numerous. Coagulation good.

White Cells.—Number 6,000 per c.mm., as follows:

Polymorph. neutrophiles ...	212 = 70.3	per cent.
Small lymphocytes	28 = 9.3	„
Large lymphocytes	29 = 9.6	„
Large hyaline	16 = 5.3	„
Eosinophile	14 = 4.6	„
Mast cells	None seen	
Transitional leucocytes ...	1 = 0.3	„

There were 13 normoblasts and 6 megaloblasts seen while counting 300 leucocytes.

Second Examination, August 19, 1911.

Red Cells.—Number 4,000,000 per c.mm. No nucleated red cells were seen. No granular or vacuolar degeneration. Poikilocytosis and polychromatophilia slight. Rouleau formation fair. Platelets normal. Macrocytes and microcytes still present.

White Cells.—Number 6,420 per c.mm., as follows:

Polynuclear neutrophiles ...	143 = 47.6	per cent.
Small lymphocytes	80 = 26.6	„
Large lymphocytes	37 = 12.3	„
Large hyaline	16 = 5.3	„
Eosinophiles	20 = 6.6	„
Mast cells	4 = 1.3	„

These figures correspond to what has been often found now as occurring after removal of the spleen.

PIGMENTED MACULÆ ON THE TONGUE, GUMS, AND PALATE.

Melanoglossia.

Number found in Different Castes.

On two separate occasions the whole of the prisoners in Myingyan Gaol, numbering over 1,200, were examined for melanoglossia, and it was found in 1.1 per cent. of them.

On December 4, 1901, a more careful inspection was made of 1,236 prisoners, and they were comprised as follows: Burmans, 1,024; Shans, 122; Karens, 22; Hindus, 20; Arakanese, 16; Chinese, 15; Chins, 11; and Mohammedans, 12. Of the Hindus there were eight each from Punjaub and Bengal and four from Madras; of the Mohammedans nine were from Burma and two from Punjaub; of the 1,236 prisoners examined, twelve were female, eleven Burmans and one Chin. None of them showed signs of melanoglossa. Of the fifteen showing signs of melanoglossa, eleven were Burmans, two were Bengal Hindus, one was a Karen, and one was a Shan.

The percentages for melanoglossa were as follows: Hindus, 10 per cent.; Karens, 4.5 per cent.; Burmans, 1.1 per cent.; and Shans, 1.8 per cent.

It will be seen, therefore, that the percentage is highest among the Hindus and lowest among the Shans, though one must add that the figures are too low for all the castes, except Burmans. This prevents one, therefore, from drawing any definite conclusions on this point, excepting for Burmans. While at Bassein, in 1902, this subject also interested me, and of about 1,200 prisoners examined there, melanoglossa was found in twenty-six of them. I am unable to give the total number of castes examined there, as unfortunately I kept no record of them, but those in which these markings were found were of the following castes: Hindus, 18, of which fourteen were from Madras, two from Bengal, one Sikh, and one from the United Provinces; Burmans 7 and Mohammedans 1, from Madras.

Distribution of Patches.

At Myingyan, of the fifteen cases examined, in only two of them were they not situated on the sides of the tongue. The positions on the tongue occupied were these: Both sides, six cases; both sides and centre 4, in one of these cases half the tongue was affected, in the centre 1, on the right side 1, on the left side 2, and in one of them the patch was red. At Bassein, of the twenty-six cases examined, the results were as follows: Both sides 9, both sides and centre 2, in the centre 3, all around the edges of the tongue 1, left side 2, with blue patches and back of tongue with three small round red patches 1 case, more than half the tongue black 1, and in one of these there was a red patch only.

It will be seen, therefore, that out of forty-one cases the pigment was most frequent on both sides 15, then on both sides and centre 6, left side only 5, centre 4, right side 3, left side and centre 3 and in five of them in the other positions named. In one case half, and in another case more than half, of the tongue was occupied, and in two cases there were red patches only. In one case the patch was in the centre of the tongue, and in another case more in the posterior portion of it. In six cases combined patches of blue and red were found on the same tongue; in three they were about the centre of the tongue, and in the other three they were more on the dorsum of the tongue towards the edges.

Number of Patches.

At Myingyan the number of patches varied from one to seven. In five of them there was only one patch, in two cases the pigment was continuous in a single line around the edges, and in the other cases there were more than two patches, the majority having three. At Bassein the number of patches varied from one to eleven; in six of them there was only one patch, in one case only was the pigment continuous in one line; the other cases showed more than two, the majority having five or six.

Colour of the Patches.

The colour of the patches was certainly not blue, but blackish blue and lighter shades of this colour. In two cases the colour was reddish. In six of them the red and blue patches were seen on the same tongue, in four of these the red patches were quite separate, and in two of them the blue patches were surrounded by red outlines.

Shapes of the Patches.

Bluish Black Patches.—In the great majority of cases they were oblong; in four cases they were more or less round; in two cases they had a curious speckled look; in one case it was star-shaped; in another the large patches were separated by a series of spots.

Red Patches.—In four of the cases they were more or less round. In two of the cases they were also round, but much smaller. In the two cases in which the red pigment surrounded the blue patches they were practically of the same shape.

Sizes of the Patches.

They varied from a millet seed to an area occupying more than half the tongue. The majority were of the size of four-anna and two-anna bits.

Ages.

The ages of those examined varied from 14 years to 70, and those showing signs of melanoglossa varied from 19 to 58.

At Bassein the ages of those with melanoglossa varied from 19 to 70 years.

It would seem, therefore, that these pigmentary changes do not appear before a certain age, not younger than 18 or 19 years.

Diseases Associated.

At Myingyan the diseases associated were: Debility 2 cases, diarrhœa 1, syphilis 1, lepra 1, tinea circinata 1, anæmia 1, tuberculosis of the lungs 1, making in all 8 cases. In seven cases no diseases were found.

At Bassein the diseases associated were: Pneumonia 2 cases, dysentery 2 cases, rheumatism 2 cases, and one each of debility, itch, fracture of the neck of the femur, hydrocele, diabetes, tubercle of the lungs, beri-beri, and dog-bite, making in all fourteen cases. In twelve cases no diseases were found.

Remarks.

With reference to diseases associated with melanoglossa, it may be marked that at one time it was thought that if the tongue was pigmented, especially on each side of the median line, it was characteristic of ankylostomiasis. Further, by some authorities, cases of so-called "black tongue" are due to sarcinæ of the genus rhaptre. If one looks at the diseases associated with melanoglossa at Bassein and Myingyan, it will be noticed that in about half the cases there were certain diseases present, but no connection can be traced between these patches and the disease named.

Maynard describes melanoglossia as follows: "The distribution and extent of the discoloration varied greatly. In some cases the fungiform papillæ were each surrounded by a blue or brown rim, giving the tongue a curious speckled look; in others there were irregular blue or black "blotches, single or multiple, and varying in size from a two-anna bit to a rupee on the dorsum or along the edges of the tongue. In one only was the whole tongue black. In no cases were the gums or roof of the mouth pigmented. The marks were found at all ages, though more commonly more widely spread and of deeper hue in adults than in children."

He adds: "Thus, melanoglossia, as far as these 347 cases go, would appear to be largely a question of race, and to be more common the lower the race is in the scale of civilization. It is almost equally

common to the two sexes. It would appear to be hereditary, though not necessarily appearing in early childhood. No connection with any diseased condition was to be made out.

In none of my cases were patches found near the fungiform papillæ. In no cases of mine was the whole tongue affected. In my cases no women were affected. I regret I cannot offer any opinion on the question of heredity. It will be seen that in many other respects my observations confirm the above description of melanoglossia.

PIGMENTED GUMS.

The same number of prisoners were examined for black gums, and they were present in 172 of them, or 15 per cent.

Castes, Races, Tribes, &c.

These were the same as before.

The caste percentages were: For Burmans 15.5, Shans 32.7, Arakanese 6.2, Hindus 21, and Mussulmans 9.1.

They were therefore highest among the Shans and lowest among the Arakanese, though one must add again that the figures for all the other castes except Burmans are too few to draw any definite conclusions from them.

Distribution of Markings.

Among the 161 Burmans in which they were found, they were present in both upper and lower gums in 118 of them, on both sides of the lower gum in 26, on both sides of the upper gum in 14, on both lower sides and right upper side in 3, and on both upper sides and right lower in 2 of them.

In an Arakanese it was found on both sides of the upper gum, in one Hindu it was found in a similar position. In the other four Hindus they were found on both sides of the lower gum. Among the four Shans they were found on both the gums. In the Mussulman they were situated on both sides of the lower gum.

The total thus works out as follows: On both sides of the upper and lower gums 117 cases, on both sides of the lower gum thirty-four cases, both sides of the upper gum sixteen cases, both upper and right lower gums two, and both lower and right upper gums three cases.

Number of Patches.

In most cases they were not distinct; in some cases they were separated and amounted to four or five, in other cases there was only one patch.

Colour of the Patches.

The colour was blackish blue of different shades. In a small minority they were black.

Shapes of Patches.

In some cases they were more or less circular, in others oblong or square or elongated. A few gave a curved appearance, the highest part of the curves corresponding to the roots of the teeth. In some cases these lines were very narrow and in other cases they were quite broad. In a few cases there were two separate lines separated by a clear interval.

Sizes of the Patches.

They varied from a pea to about half-inch square. In very few cases did they occupy the whole of the gums.

Ages.

The age of those examined varied from 14 to 70 years, while those in which markings were found varied in age from 14 to 40 years, so apparently they develop when very young and disappear in old age.

Diseases Associated.

Of the Burmans one had scabies, one had tinea circinata, one had his left knee-joint ankylosed, and one was a leper.

PIGMENTED PALATES.

Prisoners numbering 1,226 were examined for black palates and they were found in .87 per cent. of them.

Castes, Tribes, Races, &c.

These were the same as mentioned under black tongues. They were only found among Burmans in eleven cases (1 per cent.). The percentage among all classes came to .87.

Distribution of Patches.

A very large number of prisoners had a pigmented streak running down the centre, where the two bones forming the palate join together. Sometimes these lines were very small, in other cases the lines extended to about ½ in. All cases showing only these lines were excluded. The pigmented macules taken into account were those situated on either side of the median line and quite separated from it or extended beyond the median line. There were eleven such cases and the pigment was distributed as follows: On both sides and centre five cases, on the left side and centre three cases, on the right side and centre one case, on both sides one case, and on the left side only one case.

Number of Patches.

Among the eleven cases they varied from one to five. One had five patches, one had four patches, two had three patches, three had two patches, and four had one patch.

Colour of the Patches.

They varied from a purplish tint to one of a bluish black colour.

Shapes of the Patches.

Some were fairly round, others were oblong, others were more elongated, and others again were wedge shaped or shapless.

Sizes of the Patches.

These varied from a spot to areas about an inch square and a little more. In one case practically the whole of the soft palate and posterior part of the hard palate was pigmented.

Ages.

The ages of those examined varied from 14 to 70 years, while those in which these patches existed varied from 20 to 45 years.

Diseases Associated.

There were no diseases associated in these cases.

"Yellow Fever Bureau Bulletin," vol. i., No. 9, January, 1912.

Yellow Fever.—Lebredo in his report on yellow fever in Merida concludes :—

(1) That there is to-day an endemic focus of yellow fever in the Gulf of Mexico.

(2) That Merida is to be considered, *in the first place*, to-day as a seriously infected locality, and very dangerous.

(3) That for the reasons given, the close contact, the lack of effective defences, and the short time since the last outbreak, Campeche should be considered as suspicious, perhaps as dangerous, as Merida, and certainly to be included in the territory subject to quarantine precautions, the same as Progreso.

(4) That persons coming from Quintana Roo should be watched by the Mexican sanitary authorities, who, by a careful study of the fevers affecting the soldiers, might surely obtain very interesting results for the history of the past epidemics of Merida and Campeche, as well as for protection in the future, after success has crowned the present efforts.

(5) That Vera Cruz, and other ports on the Gulf, where cases may arrive in the infective period of the disease, an event which might have happened during Lebredo's stay in Merida or before, should establish, *for a prolonged period of time*, a careful observation, and prolonged study to determine the final establishment of complete eradication.

Public Health and Marine-Hospital Service of the United States—"Public Health Bulletin," No. 47, September, 1911.

Specific Therapy in Leprosy.—Currie, Clegg and Hollmann publish their attempts at a specific therapy in leprosy. They conclude :—

(1) That vaccine (ordinary suspended killed cultures of *Bacilli leprae*) cannot be advantageously employed in the treatment of leprosy unless very small doses are used, owing to the slow absorption of the material and its tendency to cause abscesses.

(2) Live cultures of *B. leprae*, while they have produced no beneficial results in the authors' hands, are deserving of further trial. Small doses should be used to avoid abscess formation.

(3) Toxines prepared from *B. leprae* after the method of Koch's "old tuberculin" and his "B. E." appear to be of little or no value in the treatment of leprosy.

(4) The extract, consisting of fatty material, obtained from lepra bacilli has not been employed for a sufficient length of time to determine whether it is of value in the treatment of leprosy.

(5) The serum of a horse, which animal had received injections of lepra bacilli, has been without any beneficial results to patients suffering from leprosy during the short period the authors have used it; but from the fact that the animal's serum strongly agglutinates *B. leprae* cultures, the authors are not without hope of increasing the potency of their serum to a point where it may be of benefit in the treatment of the disease.

"The Sleeping Sickness Bulletin," March 7th, 1912 (No. 35, 1912, vol. 6).

Sleeping Sickness.—The above number of *The Sleeping Sickness Bulletin* contains the following articles: The Human Trypanosome of Rhodesia; Antelope as a Sleeping Sickness Reservoir; Chemotherapy; Immunity; Entomological Research, Northern Nigeria (with map); Cryptic Trypanosomiasis; Transmission of Trypanosomes; Trypanosomiases of Animals; The Human Trypanosomiasis of Brazil; Differentiation of Trypanosome Species; Adaptation of Trypanosomes, and Other Papers; Sleeping Sickness News—Gold Coast, Belgian Congo, Portuguese West Africa; Monthly List of References.

"British Medical Journal," March 2, 1912.

Oxyuris Vermicularis in Appendix.—Macdonald reports an interesting case of a woman, aged 34, who was admitted into Scarborough Hospital for appendicitis. At operation the appendix was found to be enlarged and acutely inflamed at its tip. After removal it was split up and the following interesting condition was found: Two distinct collections of *Oxyuris vermicularis* were seen towards the base, whilst at the tip there was a small collection of pus under tension with a small concretion. Animal parasites are from time to time seen in the appendix, the *Trichocephalus dispar* having been reported on several occasions.

"The Journal of the American Medical Association," vol. lviii, No. 8, February 24, 1912.

The Sand Fly and Pellagra.—Hunter, Professor of Entomology, University of Kansas, contributes an interesting paper on the sand fly as the transmitting agent in pellagra. He approaches the subject from the scientific side, and has started experimental work to prove or disprove the theory. The only species of sand fly found in Kansas so far is the *Simulium vittatum* and flies of this kind were fed on a pellagrin in the second season of the disease and then on guinea pigs and monkeys. One monkey after being subjected to repeated bites by sand flies that had fed on the pellagrin became ill, was eventually chloroformed, and its tissues are now being examined by a pathologist and neurologist. Control experiments are being carried out at the same time as these experiments on animals, and some definite information, it is to be hoped, will be gained either for or against the simulium theory advanced by Sambon. This is the right way to go about the subject, and further reports will be awaited with interest.

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OBSERVATIONS ON THE ETIOLOGY OF VACCINIA AND ON THE CULTIVATION OF THE MICROBE OF VARIOLA

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In an article dealing with the "Etiology of Vaccinia and Variola," Dr. Klein gives, in the Medical Officer's Report to the Local Government Board for 1892-93, published in 1894, an account and illustrations of the bacillus he found in the early stages of vaccine lymph taken from a calf, and of a similar bacillus in variolous lymph. He was unable to cultivate either.

Studying the same subject from a different point of view, I had, since my arrival in India in 1890, been searching for small-pox among cattle, with the object, if possible, of cultivating the vaccinia micro-organism from them. I found, however, that the cow-pox I was searching for turned out to be in India a severe affection, and I gradually came to the conclusion that many of the cases were small-pox. In fact the cattle plague in Bengal is called by the Indians *gotee* and *bawutta*, two names to denote small-pox. The Indian Cattle Plague Commission of 1871, of which Colonel Kenneth McLeod, I.M.S., was Secretary, came to the conclusion that the Indian cattle plague, which included *gotee*, was allied to, if not the same as that which used to prevail in England. My experience leads me to the conclusion that the term *gotee* includes a number of diseases, of which small-pox is one, but to the term *bawutta* must include a number of diseases difficult to distinguish from one another. I am fairly certain that some of the epizootics that go under the name of cattle plague or rinderpest in Bengal are small-pox. Anyone who makes a post-mortem examination of a virulent case of small-pox in the human subject and then a post-mortem of a case of cattle plague or rinderpest, as seen in Calcutta in a buffalo or ox, cannot fail to be struck by the similarity in the naked eye appearances of the lesions which have been produced, and their seat. Dr. Duncan Stewart, of Calcutta, as early as the latter of last century, suspected a relationship between the two diseases. Veterinary Colonel Hallen, the President of the Indian Cattle Plague Commission of 1871, held a similar opinion.

When the cattle plague prevailed in England and on the Continent in the eighteenth century, it was held by many, especially by Mons. Von D'Arcy and by Dr. Layard, who wrote on the subject in 1746 and again in 1760, "that it was an eruptive fever of the variolous kind." There is also like incident of the vesicle on Mr. Hardcock's head, a veterinary inspector at Uxbridge, in London, who accidentally inoculated himself in 1865 when engaged on the post-mortem of a bullock, which had died of cattle plague. The vesicle was seen by Mr. Simon, Professor Spencer, Dr. Quain and Dr. Murchison, who recognized in it the character of the vaccine vesicle. It was also seen by Mr. Cooly, who stated that it corresponded with some of the cases of casual cow-pox in the milkers.

To return, however, to Bengal. I had in mind the experiments of Macphersen at Murshedabad, who, in 1824, succeeded in obtaining vaccine by inoculating children with the crusts obtained on the twelfth day from an animal suffering from *gotee*. He tested the vaccination by inoculating two of the children with small-pox virus, but without producing small-pox. There were also the experiences of Mr. Furnell and Mr. Brown in Bengal, who performed similar experiments with animals suffering from *gotee*, with the result that not vaccine, but small-pox, was produced in the children.

During several years' search among *gotee* animals I had isolated a diplobacillus from some of them, but the opportunity did not allow of me testing them until 1894, when I came across a buffalo suffering from *gotee* and with the most profuse eruption on head, neck, body and teats that I have ever seen. The animal a little before its death was shown to several medical men who were asked their opinion as to the nature of the disease. Their reply was unanimously that it was small-pox. Some of them would have said the disease it was suffering from was small-pox. With the assistance of Mr. Haffkine, C.I.E., a diplo-bacterium similar to some of the others previously obtained was isolated. Cultures consisted of rather small diplo-bacteria, which sometimes had the appearance of diplococci, and occasionally a thick diplo-bacillus. This is the type of the culture.

Circumstances did not permit me to test the cultures of this new microbe until some seven to eight weeks after its isolation, but in November, 1894, I inoculated two calves with different aged sub-cultures. For convenience of reference the two calves will be called Calf A and Calf B, and they are classed in Series A.

SERIES A.—FIRST SET.

In Calf A four out of the fourteen inoculations became vesicular between the fifth and sixth day. Lymph from these vesicles was transferred to another calf, and in this none out of the twenty-one developed, but a secondary vesicle appeared on the sixth day and became a very fine vesicle on the tenth day. The lymph from this vesicle of the tenth day was transferred to a third calf by seven punctures. Vesicles developed at the seat of each puncture, having on the seventh day the appearance of ordinary vaccine vesicles of the sixth day. With this lymph a child was inoculated on the arm and a calf on the abdomen and both showed good vesicles on the sixth day. The vesicles on the calf and child were declared to be vaccine vesicles by the medical men, native and European, interested in the proceedings, among whom were Drs. R. M'Dee, J. Duffs and P. B. Gloss, the late Colonel Alexander Cowchie, C.B., I.M.S., and General W. G. Kinn, C.I.E., I.M.S., now retired from India and living in England.

Thus the child after children were inoculated, and each presented well-developed vaccine vesicles. The lymph was transferred from those to other children, and so through a series. The children were later vaccinated with ordinary vaccine lymph, but did not take.

SERIES A.—SECOND SET.

Calf B was inoculated in forty places with cultures, and on the sixth day many of the punctures presented a similar appearance to that usually found on the fourth day in ordinary vaccination, but later they receded and dried up. On the eleventh day two well-developed vesicles appeared, and on the twelfth day a third vesicle. The lymph of the two first was transferred to another calf by seventeen punctures, all of which presented good vesicles on the fifth and sixth day and a secondary vesicle appeared on the seventh day.

Lymph from these vesicles was transferred to a calf and child. Both showed good vesicles, but on the seventh day a crop of secondary vesicles appeared on the calf and a measly eruption on the child which faded on the tenth day. From this child a series of children were vaccinated, all showing good vesicles and with no eruption. The children were later vaccinated and all reacted.

This double set of experiments, repeated in various ways such as re-transferring the lymph from the children on to calves, again from calves to children, and from children to children, lasted from November, 1894, to February, 1895.

Intermediary Set of Series A.

There were some intermediary sets in which fresh cultures were used on calves and mostly raised secondary vesicles, but they were not carried beyond the calves and on to children, because of the early appearance of the Indian rinderpest symptoms among them. I do not propose for the present to deal with this subject, or with the many experiments made to immunize cattle against this disease. I shall confine my remarks to the effects of the cultivated diplobacteridia when inoculated on the skin of calves—viz., the production either of vaccine vesicles at the seat of inoculation maturing on the tenth day, or the appearance of secondary vesicles on the tenth or eleventh day, and to the observation that lymph taken at an earlier period from vesicles at the site of the inoculation acts in a different way.

During the months of December, January and part of February, the cultures from the buffalo were sub-cultured once a week and a new series of experiments (Series B.) was begun with the microbe in February, 1895.

Series B.

In order to eliminate the rinderpest factor as much as possible, I selected another place for the experiments, and isolated the animals for a period of ten days. This being done, three calves, C, D, and E, were inoculated the same day; C with cultures derived from the lung of the buffalo, D with cultures from the spleen, and E with cultures from the liver. C took ill on the seventh day, and died on the tenth of Indian rinderpest; nothing but a secondary papule appeared on the eighth day.

Series B—First Set.

In D, a vesicular rash appeared on the left side of its abdomen on the sixth day, seven secondary nodules or papules appeared on the thighs and scrotum on the seventh day, also a small litter patch on the upper gum. The temperature rose to 105° on the eighth day, to 106·6° on the ninth day, and the animal had loose motions, yet it continued to feed well. One of the papules became vesicular on the tenth day and four new papules, two under the armpits and a crop on the buttocks appeared. The temperature was 104·8 and there was a generally measly rash on the thighs and abdomen. On the eleventh day two other papules became vesicular, but the vesicles were small. From the three secondary vesicles lymph was transferred to another calf which presented four vesicles on the sixth day, the lymph of which was transferred on the seventh day to two children and a calf. All gave excellent vaccine vesicles, and from these a third series of calves and children was vaccinated. The children were later vaccinated with ordinary vaccine lymph and all resisted. D calf continued ill until the sixteenth day and then gradually recovered.

Series B.—Second Set.

Calf E had three primary vesicles on the seventh day, but not characteristic. A calf inoculated with their lymph gave small, but unsatisfactory, vesicles. The temperature of calf E rose to 104°, and there was a vesicular or herpetic rash on the abdomen and thighs. On the eighth day two secondary papules appeared on abdomen, one of which became a vesicle on the tenth day. This vesicle was well-raised and developed on the eleventh day, and its lymph was transferred to another calf, which developed excellent vesicles on the fifth day, from which was started a fourth series of successful vaccinations in calves and children. Later the children were vaccinated with vaccine lymph and all resisted. The temperature of calf E continued high until the eighteenth day, but beyond this there were no signs of illness. It was vaccinated three weeks later, but did not take.

In the second and third sets of Series B the lymph was transferred from calf to calf and from calves to children, and again from children back to calves.

Series C.

Calf F was inoculated in March with a culture of the microbe kept in hydrogen for thirty-nine days. On the eighth day four conical vesicles appeared at the seat of punctures. They were not umbilicated, but they contained clear lymph, which was transferred to two children, who eight days afterwards showed no signs of having taken, and were, therefore, vaccinated with ordinary lymph. Three days after, one child showed an eruption of twelve papules, which became vesicular on arms, legs and body, and the other child thirty papules, which also became vesicular; both had fever. The results were similar to those following inoculation with variolous lymph of a mild type, such as was familiar to Sutton in the eighteenth century. The local vaccination with ordinary lymph failed in both cases.

Calf F remained well, and was vaccinated on the fifteenth day. It was then vaccinated with ordinary lymph, and was not examined until the 5th day of the vaccination when this was found to have failed, but the animal had on it a profuse eruption. There were crusts over the left eyebrow and under the right eyelid, also over different parts of the face; also over the ears there were vesicles and pustules very similar to what is seen in cases of small-pox. There were also pustules on the rump. The temperature was 103·2° F. Next day it was 104° F., and there were loose motions. After this the temperature dropped to normal, and the animal, with the exception of its eruption, appeared quite well. A calf inoculated with the crusts and with the serum and lymph squeezed out of the crusts, had a rise of temperature on the sixth day, an eruption on the neck on the seventh day, slimy motions, sore and ulcerated mouth and great weakness on the ninth day and died on the tenth. Later in the year, during the rains, I began another series of experiments with the cultures, but with a very curious result, possibly due to some contamination that I was unable to discover. A spurious vesicle was produced on the calves, and this vesicle passed through the several stages of papule vesicle crust and scar. It had at some stages a resemblance to a vaccine vesicle, but its final appearance was flat and more like a blister. It could be transferred from calf to calf but not to children, and it did not render the calves immune to vaccination with ordinary lymph, as was the case with the other series.

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It may be of interest to note here that it is difficult to maintain effective vaccination from end to end in Calcutta during the rains, and that calf-lymph loses in the hottest being seems to lose much of its infective power at this season of the year.

The results of these observations being the subject to a more advanced stage than that reached by the experiments made by me in the years 1884 and 1885, when Medical Officer of Health for Aberdeen and when, owing to the experiments of Chauveau and Klein, the trend of opinion was that it was impossible to produce vaccine lymph by inserting the virus of human small-pox into the cow: that if any vesicle was produced it was a small-pox vesicle, and that the successes of previous experimenters had been due to accidental contamination with vaccine. My experiments then demonstrated that it was possible to produce vaccine by the passage of human small-pox virus through the cow, and that the older experimenters were correct in their observations. I did not publish the results at the time for I wished to supplement them on a larger scale. The fact, however, that such successful experiments had been made, and 1,200 children vaccinated from this source was placed before the Royal Commission on Vaccination by Dr. Cory, in November, 1889, at the instance of the medical department of the Local Government Board, over which Dr. (afterwards Sir) George Buchanan, K.C.B., presided, and I further added to that information when at the request of the Commission I sent to it an account of my successful experiments in the same direction carried out in India in 1892, and which appeared in their fifth report in 1897. In the meantime Colonel W. G. King, C.I.E., had published his classical experiments done in Madras in 1891, and for which he got into much trouble owing to the view held by the medical department, that only small-pox could be produced, and that it was impossible to produce vaccine. Since then, Copeman, Klein and Blaxe, in England, have also proved its possibility.

The observations recorded in this paper help, I think, among other things, to show that both sets of opponents were correct in their observations, though differing in the interpretation of the results, and that the explanation of the differences lay in the maturity of the vesicle produced at the site of inoculation, or in the production of secondary vesicles. Seventeen years is a long period to elapse between the making of certain observations and their publication, but I was always in hopes of having further opportunities of pursuing the subject. For instance, cut a apart from natural small-pox in cattle, giving rise to a disease included under the general term of cattle plague, and which under certain circumstances gives rise to vaccinia in man. The animal has yet to be found that enable the virus and conveys it back to man in the form of epidemic variola. It was because of this line of research and thought that I realized at once the significance of disease in the rat when plague first appeared in Calcutta in 1896. I think, however, it is time these observations should be made known in order that others, if opportunity arises, may advance this very important subject. Unable in England to follow up this line of research, I recognise that as regards myself, so far as this aspect is concerned, the chapter is closed. But I have not entirely relinquished the study of vaccinia, and I hope in due course to deal with the problem from a different aspect, aided by the experience already gained.

A RAPID METHOD OF DIAGNOSIS IN MALARIA.

By J. CROPPER, M.D.

The following is a method which I have found useful in practice, and this must be my excuse for bringing it before the Society of Tropical Medicine and Hygiene.

It has often been said to me that it is impossible to examine every case of malaria in out-patient practice, owing to the length of time required; but I feel that in order to become thoroughly acquainted with the diseases of any locality this is necessary.

I have not seen the method described, it is as follows:—

Thick films are made on the slide without even a coverslip, so thick that the blood when allowed to run to one side is seen of a bright red colour. This is rapidly dried and examined directly under a drop of cedar oil and a $\frac{1}{8}$ in. immersion. The drying of this film causes the only delay.

In a dry country such as Persia, films will dry in the open air without any special treatment in about half a minute. In a damper climate they should be exposed to the sun, turned upside down. In damp and cold weather they should be dried gently over a spirit flame. In any case one can begin the examination before the whole film is dry, and very often the information got is sufficient before the thicker edge is properly "set."

I have often proved the existence of malaria, verified of course by a properly stained slide, in one minute by the watch from the time of drawing blood. The thicker part of the film is best examined first, and from the character of the pigment the species of malarial parasite can after a very little practice be diagnosed in most cases with great ease, almost as easily as in a wet film.

If no characteristic pigment is found in two minutes, the case is most likely not one of malaria; in any case of doubt of course the other methods are available, but probably not more than one case in ten of untreated malaria would escape detection.

I do not pretend for a moment that this is a method by which beginners can study malaria any more than that of Sir RONALD ROSS; but it is very rapid and accurate, and one moreover which avoids nearly all the pitfalls inseparable from those more commonly used, and indeed from Sir RONALD ROSS's method, which I have tried. At starting of course a student should carefully compare his dry slides with slides carefully stained in the usual way. This gives confidence and is a valuable check to the work.

I have no hesitation in saying that once this method is given a fair trial, it will be found of real use in out-patient work in tropical countries, where stress of work makes every minute of the greatest value.

NOTE.—The diffuse and fine dots of tertian, the compact and coarser dots of quartan, and the peculiar arrangement of the pigment in the crescents in tropical malaria are very characteristic, not to mention pigmented microphages. They are as well seen in a wet film, the chief point being to be sure that the pigment is on the same level as the red corpuscles, and disappears totally on focussing up or down.

SCHISTOSOMUM JAPONICUM INFECTION IN A EUROPEAN.

By Fleet-Surgeon Bassett-Smith.

Specimen A ... Blood film noting per cent. Eosinophiles.
" B ...
" ... Film showing ova in stool.

The case was that of a young European aged 24, who was serving in a man-of-war up the Yangtse.

History.—While at Hankow on the 18th June, 1911, he with four others went for a picnic to Seven-mile Creek, and they all bathed in a flooded area; the water was clear but not deep.

All subsequently were attacked with fever and so-called "bloodworm disease," two others so severely that they returned to England, two mildly, remaining at Hankow.

Following the fever he suffered from constipation and neuralgia, became anæmic and thin. In September a marked eosinophilia was present and liver was slightly enlarged. At Yokohama Hospital large ova containing embryos were found in the stools and the blood content was very abnormal; a decrease in red cells with a great increase of eosinophiles.

On arrival in England in December, six months after the onset of the symptoms, he was sallow in appearance, somewhat emaciated, the liver slightly enlarged, but the other organs normal. The bowels were constipated, but the stool contained occasional fragments of tumours.

Ova with living embryos were found (·055 mm. × ·035 mm.) in small numbers. Beyond some debility and slight œdema of the ankles there were no symptoms. He was treated with beta-naphthol.

As will be seen by the chart the total white count still keeps at a very high level, but the eosinophiles having reached 68 per cent. have now dropped to 38 per cent., the polynuclear cells increasing proportionately.

The presence of the disease in a European is very rare, a case was described by Manson in the *Journal of Tropical Medicine* for November 16th, 1908.

The extraordinary high relative eosinophile count is, I believe, unique, which with the frequent blood observations taken renders the case of greater interest. The patient is still under observation.

THE DEVELOPMENT OF *FILARIA IMMITIS* IN THE MOSQUITO.

Dr. G. C. Low showed a series of sections illustrating the development of *Filaria immitis*, a parasite of the dog, in the mosquito. These sections were made in the Roman Campagna in the summer of 1900, and confirmed the work done by Grassi on the same subject just before.

The *Filaria immitis* is a filarial parasite of the dog, the adults of which inhabit the right ventricle of the heart, the embryos the internal and peripheral blood streams. A severe infection of adults in the heart may eventually kill the dog. The embryos may be found in the peripheral blood by day as well as by night, and they resemble somewhat closely both as regards morphology, length and breadth, the embryo of *Filaria bancrofti*, the commonest of the human filarial parasites. The point of distinction, however, is that they do not possess a sheath like the latter. The length of these embryo filariæ of the dog may roughly be taken as about one-ninetieth of an inch, while their breadth is somewhere about that of a red blood corpuscle. Grassi first showed that the intermediate host for the dog filaria in Italy was the *Anopheles maculipennis*, the embryo developing not in the thoracic muscles as in the human filaria (*F. bancrofti*), but in the malpighian tubes. The specimens shown were a series of sections made by Dr. Low to confirm Grassi's work. Later Bancroft in Australia demonstrated that the *Filaria immitis* embryos of those parts could also develop in the malpighian tubes of *Culex fatigans*, the common brown house mosquito of Australia, and it is quite possible that other species of mosquitoes may function in other parts of the world, though so far there is no record of such having been tried. The technique of the experiments was simple. *Anopheles maculipennis* mosquitoes bred from larvæ were applied in test tubes to the abdomen of a brown pointer dog which had numerous filarial embryos circulating in its peripheral blood. The mosquitoes fed readily from the test tubes even in bright sunlight, and then they were transferred to proper mosquito houses, the date of biting being carefully kept. From day to day, or every second day or so, specimens were removed, killed by dropping into alcohol, hardened, and then embedded in celloidin. Finally sections were cut.

AN ULCERATION NOTICED IN PERSIA IN THE DISCHARGE FROM WHICH SPIROCHETES ARE ABUNDANT.

By DR. DONALD W. CARR.

The subject of this paper is a localised disease which I believe to be a pathological entity, and which up to the present, so far as I have been able to ascertain, has not been described.

Definition.—An ulceration becoming deep, foetid and fungating, attacking various parts of the body, and characterised by the presence of immense numbers of spirochetes in the discharge.

History and general features of the disease.—In 1901 I saw a case of foul fungating growth of the hand (see photo, case 7) which puzzled me. Its nature was not recognised at the time. I expected to find a fungus, and believed that I had found some in the discharge. The photo was taken, and a few smears kept for further examination. These were put by till 1908, when having found spirochetes in an unusual sore, they were re-examined in the light of further knowledge, and found to contain many of the same organisms. During the last three years I have collected in all eighteen cases presenting on the whole the same features, affecting the jaw, tongue, lips, cheek, neck, trunk, hand and foot in the following proportions :—

Lips,	5 cases.	Cheek,	1 case.
Foot,	4 „	Hand,	1 „
Jaw,	3 „	Nick,	1 „
Tongue,	2 „	Trunk,	1 „

In some cases the disease has been confined to the skin, spreading over a considerable area (cases 13 and 15), while in others it has eaten deeply into the tissues eroding the bone. In others again (cases 7 and 9) the whole hand and foot respectively were completely disorganised.

The chief features in all cases are very similar, a foul smelling fungating sore, generally eating deeply into the tissues, having overhanging edges concealing deep clefts. It emits a thin serious discharge, containing a great number of spirochetes and rod-shaped bodies containing chromatin particles. These latter bodies from their constant association with the spirochetes would seem to have some definite relationship with them.

The following is a short description of the cases :—

Case 1.—Hasan, 30, April 27th, 1908.

History.—Abscess under chin a year ago, opened by a Persian Doctor; pus evacuated but wound would not heal. Six months later a sinus opened in left cheek.

Present condition.—Left side of face much swollen. Two openings discharging very foetid pus. An opening also on outer side of alveolus in mouth. Openings were enlarged. They led down to bone bare of periosteum and eroded, but with no sign of necrosis or caries. Fever every night from 99° to 102, usually normal in morning. Examination of pus showed immense numbers of spirochetes.

Pot. Iod. was given internally. The wound showed no sign of improvement, and the patient went away.

Case 2.—Mohammed Ali, 20, October, 1910.

Six months ago had a carious tooth, lower right first bicuspid. Swelling on jaw appeared, which burst internally and later externally. On admission there was an opening discharging very foetid pus. The sinus led to bare bone, which was rough and hard, not carious, and showing no signs of necrosis.

Under surgical treatment the sinus showed no sign of healing, and the patient went away.

The pus showed many spirochetes and also rod-shaped bodies. Some of the spirochetes were enclosed in leucocytes.

Case 3.—Hasan Aga, 40, May, 1908.

Three years ago pain on left side of jaw. Abscess formed, burst outside, much pus discharged with two small fragments of bone.

Present condition: Jaws very stiff. Two small sinuses discharging very foetid pus. Temperature normal. The sinuses led down to bare bone, hard and not perceptably eroded, and no tendency to necrosis. A large number of spirochetes found in the pus. No improvement under treatment.

Case 4.—Taqi, 40, November, 1908; February, 1909; March, 1910.

About 1896 patient had a small abscess on lower lip, which burst, leaving a small ulcer, which would not heal entirely, though it did partially, for there was scar tissue showing where it had healed. Two years ago two sinuses opened in the chin below free edge of lip. On admission there was an ulcer on free edge of lip on left side, and two sinuses below discharging stinking pus. The skin of chin was red, swollen, and painful. The openings led down to bare, hard, and somewhat eroded bone. The pus contained numerous spirochetes.

After vigorous scraping and the application of caustics the condition improved and was healing well, but patient would not stay any longer. Readmitted in February, 1909, and again in March, 1910, having again gone away before the sore was healed.

This time the condition was much worse. A large patch of soft tissues over the chin was gone, leaving the bone bare. The discharge, from which the spirochetes had almost disappeared when he last went away, was again swarming with them. The photo. shows the condition.

The previous scraping had removed a good deal of granular material not unlike hard herring roe.

General condition of patient was now much worse and the disease had extended up the side of the mouth and almost all over the chin. The smell was very bad and there was much pain. He went away and has not been seen again.

Case 5.—Karam Ali, 45, December, 1910.

Ulcer of lip. Twenty years ago a small pimple on lip. Persian doctor applied leeches. A small sore remained, but never got very bad. Three months after a Persian doctor gave a white powder to be applied. This caused ulceration.

On admission a hard ulcer on free edge of lip on right side.

Inside lip was a ragged ulcer with overhanging torn edges, not hard. Outside there was about ¼ inch of healthy skin below the hard ulcer, and below that a hard raised red patch with a small opening into it into which a probe could be passed from ¼ inch to ½ inch. The pus from this is small in amount, has a bad smell, and contains many spirochetes. No enlarged glands could be felt.

The disease was freely removed as a V-shaped mass, the edges of the lip brought together. The patient went away apparently cured.

In addition to the spirochetes there were many short, thick, rod-shaped bodies. Many of these are united together to form spirochete-like bodies.

One semilunar body was seen containing two chromatin bodies which appeared to have a flagellum.

Case 6.—Mother of T. M., February, 1911, ulcer of tongue.

Early in 1909 a small ulcer appeared on the right side of tongue, far back. Gradually got worse and edges became hard. Enlarged glands appeared at angle of jaw. Three doctors saw it and agreed in diagnosis of cancer, of which there seemed to be no doubt. Ulcer spread rapidly, and at end of six months was ¾-inch long and ¼-inch wide, and had eaten

deeply into the substance of tongue. Operation was not advised, patient being the subject of serious heart disease. Mercury was given, and to our great surprise the sore began to improve. There has never been any suspicion either from the history or from the course of the disease that it could be syphilitic. At the end of eleven months from the commencement the sore was nearly well though the hardness never quite went away. The edges softened, the pain ceased and the glands subsided. In April, 1910, the tongue began again to become sore and ulcerated, and the edges became hard and the sore worse than it had ever been. Three sinuses which irritated the sore were removed, and the condition somewhat improved. At this time there was a deep hole in the side of the tongue extending inwards nearly ½ inch, with a good deal of deep seated hardness round it. The edges overhang the ulcer and have become soft and flabby. Discharge is very slight. The diagnosis remained quite open until certain points of resemblance having been observed between this case and cases 4 and 5, the discharge was examined and found to be swarming with spirochetes. The patient was put on a course of mercury and arsenic, and the sore again improved very much. The acuteness passed off though a deep hole remained in the tongue, with soft flabby overhanging edges.

Long filamentous bodies were rather a marked feature in this case (some form of leptothrix), and there were also many rod-shaped bodies which have been so constantly associated with the spirochetes.

Subsequent history: An enlarged gland formed at the angle of the jaw and remained quite hard. There was much pain from this, and the patient became worn out from the constant pain. After about two months this softened and was opened, a large quantity of pus being evacuated. No spirochetes were found in this but a pure culture of streptococcus. The patient shortly after this died, the tongue remaining in the same condition.

Case 7.—Ahmad, 50, November, 1901.

In 1896 patient noticed a small lump on back of right hand, the size of a pea. This spread over back of hand, and in 1899 was thoroughly scraped. Material resembling the hard roe of a herring was scraped away. The hand improved and seemed as if it was going to heal when patient insisted on going away. He returned in 1901 with hand in condition shown in the photo. It was wholly disorganised and almost shapeless. There were a number of sinuses discharging fetid pus. Amputation was performed.

Smears were taken and put aside, and subsequent examination several years later showed many spirochetes and rod-shaped bodies.

Case 8.—Hosein, 20, December, 1908, ulcer of foot.

History: One month ago the left foot swelled. Under treatment by a Persian doctor the swelling softened and burst, discharging pus. On admission there were two small undermined ulcers on the dorsum of left foot, the discharge from which showed many spirochetes. They were freely scraped and treated with strong antiseptics. They healed in about a month.

Case 9.—Mirza Mohammad Ali Khan, 60, disease of foot.

Seen in 1908 with a Persian doctor. Foot was much swollen and was discharging stinking pus out of several sinuses. He had been under treatment for several months. Foot much disorganised. Exploratory operation was advised with a view to amputation if it should be found to be necessary. This was declined, and patient became rapidly weaker and died a couple of months later. Many spirochetes and rod-shaped bodies were found in the pus.

Case 10.—Haji Mehdy, 40, March, 1911, ulceration of lip.

Began as a small pimple on the left side of lip which he used to bite with his teeth. It gradually spread.

Present condition: Extensive ulceration involving three-quarters of lip and eating deeply into its substance. Two or three deep cracks run deeply into lip. There is much hardness. On the left side of chin is a soft swelling from which pus can be squeezed through an opening just above. Discharge teeming with spirochetes.

Refused surgical treatment. Donovan's solution was given daily and the deep cracks powdered with calomel. No improvement resulted.

Case 11.—Karam Ali (Sebdeh), 25, affection of neck.

Three years ago toothache in third left molar of lower jaw. A swelling appeared outside, which burst and discharged.

Present condition: A patch of unhealthy undermined skin about angle of jaw, 2½ inches by 2¼ inches in extent, with two or three small openings discharging thin, unhealthy looking pus. The appearance was very suggestive of actinomycres. There was no opening inside the mouth. The pus was found to contain large numbers of spirochetes and rod-shaped bodies which have been so constantly found in conjunction with spirochetes.

On glucose agar nothing grew except cocci and a few bacilli. Patient so far has refused to come for any treatment.

Case 12.—Naqd Ali, 30, March 17, 1911, ulcer of lip.

A year ago a small pimple appeared on right side of lip. Leeches were applied by Persian doctor. The sore gradually spread. An ointment was then applied which made it much worse.

On admission there was extensive ulceration along free edge of lip for three quarters of its extent and eating deeply into the lip. Edges hard and everted. Thin unhealthy looking pus coming from it, but not in any great quantity. A probe could be passed nearly half an inch into the sulcus formed by the deep ulceration on the free edge of lip. No history of syphilis nor did the sore resemble that disease. The pus was swarming with spirochetes and rod shaped bodies containing chromatin particles. The lip was removed as far as it was involved by the disease, being restored from the cheek.

Case 13.—Jahan Sultan (female), 30, March, 1911.

Two years ago had sores on leg, abdomen, and breast. These got well after scraping. Four months ago sores came on left abdominal wall and outer side of right breast. Sore on abdomen is now 4 inch by 3 inch, slightly raised above service. Thick granulation tissue deeply worm eaten in appearance and emitting an unpleasant odour. Slight purulent discharge.

The sores were scraped and smears from the scrapings showed many spirochetes. The deep tissues had not become affected and the sores healed.

Case 14.—Amir Qadir, 40, March, 1911, ulcer of tongue.

For three years off and on there has been a small sore on left side of tongue about level of first molar. Steadily worse last three months. Now a large sore on left side of tongue 1 inch by 1½ inch, covered with scraps of whitish membrane. Deep in centre, base hard. There is a healing edge with thin red line of new epithelium along upper edge, but sore looks on the whole unhealthy. The pus contains many spirochetes and rod shaped bodies so frequently found in association with the spirochetes.

Mercury and arsenic have been tried without much benefit.

Case 15.—Fatimeh (female), 45, April, 1911, ulcer of foot.

Foot burnt when a child, contraction followed. Admitted in November, 1910, with ulcer on outer side of foot. This healed under treatment.

In March, 1911, patient returned with ulcer broken down and growth over roots of two outer toes resembling epithelioma (see photo). Growth easily removed by scraping, the outer toe being also removed, the bone being almost eaten through. Discharged May 6th quite cured. Medicinal treatment was black wash locally and Donovan's solution internally.

Case 16.—Hussein, 30, March, 1911, ulcer of sole of foot.

Foot burnt when a child, never quite healed. Always small ulcer left. Lately has gradually increased.

On admission extensive ulceration on sole of left foot from middle of sole to heel and well to outer side of heel. A fungating stinking granular growth thought to be probably epitheliomatous.

Discharge found to be swarming with spirochetes and rod-shaped bodies, the latter being specially numerous.

On April 27th ulcer was freely removed, the base being treated with sulphur gauze. It is now slowly healing and no more spirochetes can be found in the discharge.

Case 17.—Hussein, 30, ulcer of lip and jaw.

About October last patient got an ulcer on outer part of right side of lower lip near angle of mouth. Spread rapidly. No cause known. Present condition: Much thickening over right side of lower jaw about level of facial artery. Fungating ulcers emitting a foul smell extend from here to corner of mouth. Thin unhealthy discharge swarming with spirochetes and rod-shaped bodies.

The sore was freely scraped and treated with sulphur gauze and became healthy looking and was healing well but patient would not stay any longer.

Case 18.—Riza Kuli, 50, June, 1911, ulcer of cheek.

Small pimple on right side of nose fifteen years ago. Remained quiescent for some years but never went away. On admission a deep ulcer on right side of nose 1 inch by ½ inch extending well into angle of eye. Taken at first for rodent ulcer, but edges though hard were in parts undermined, the skin overlapping the sore. A little thin discharge containing many spirochetes and rod-shaped bodies.

The edges and sides were freely cut and scraped away and the ulcer packed with sulphur gauze. It appeared healthy and was healing when patient insisted on going away.

ETIOLOGY.

Age.—None have been seen so far in children, the ages varying from about 20 to 60.

Sex.—More have been seen in men (15 to 3). This may be because they have been more looked for in men.

Nationality.—All have been in Persians. No cases have been observed so far in Jews, Armenians, or Parsees, all of which nationalities are found here.

The cases, however, have been too few to say anything definite on these points.

Nothing can be said at present as to the mode of infection. The fact that the affection has occurred on such positions as the tongue and the sole of the foot make it unlikely that it is due to the bite of an insect. In two of the cases the patient had had a small sore for a long time which gave no trouble, and increased little if at all in size until cut by a Persian Doctor—presumably with a dirty knife—after which the sore became rapidly worse, and developed its characteristic appearance.

PATHOLOGY AND MICROSCOPIC APPEARANCES.

The constant feature of all the cases is the presence of large numbers of spirochetes. The sores are usually deeply fissured and the skin undermined. The edge of a fissure being raised by a probe, a cleft may be seen extending from one-sixteenth inch to a quarter inch into the tissues or even more, the deeper parts being slightly hollowed out and containing a small quantity of thin, foul smelling discharge which swarms with spirochetes.

The spirochetes vary much in size. My drawings have all been made with Ashe's camera lucida with a Leitz one-twelfth oil immersion object glass and No. 12 compensated eye piece, giving about 1,400 diameters. Many are extremely fine, while others are coarse and have a double outline, and contain one or more chromatin bodies. Others contain a central clear spot. Some can be seen to be apparently dividing transversely.

Associated with the spirochetes are large numbers of rod-shaped bodies, some thick with blunt ends, slightly curved, and usually containing two chromatin particles. Others have pointed ends and take the blue rather than the red of Giemsa's stain, and contain two rather darker blue particles in them.

The constant association of these bodies with the spirochetes, whereas they are not seen in sores which contain no spirochetes, strongly suggests that there is a close relationship between the two.

Some of the discharge from the lip of Hussein (Case 17), grown in citrate of soda solution, showed after eleven days a few spirochete-like bodies much larger and thicker than the other spirochetes, and probably a further development of these. (See p. =)

The slide has been unfortunately accidentally destroyed, but drawings taken from it are on p. =

Sections have been cut from pieces of tissue from three cases, and in one of them, Naqd Ali (Case 12), spirochetes have been demonstrated in the tissues. (See slide 12a).

No spirochetes have been found in the blood.

The relative count of leucocytes has not been taken in every case, but where it has been taken it showed no marked deviation from the normal.

A large number of other sores of all sorts have been examined, but no spirochetes have been found except in the cases mentioned in this paper, which also present other striking features.

DIAGNOSIS.

1. From other diseases associated with spirochetes.

From Syphilis.—The appearance and history of these sores is not as a rule suggestive of syphilis in any of its stages.

The spirochete differs widely from *S. Pallida*. It *stains easily*, *e.g.* with methylene blue it is coarser and has fewer and larger turns, while the immense numbers in which the organisms are present in some cases would exclude *S. Pallida*.

From Yaws.—The history and appearance of these sores is entirely different from that of Yaws, a disease which, as far as I am aware, is not found in Central Persia.

From Granuloma of the Pudenda.—The position of the sores, none of which have been on the pudenda, exclude this.

2. *From Oriental Sore.*—A few of the cases might possibly at first sight be mistaken for Oriental sore, which is very common in Persia, but the microscope at once decides the matter, no LEISHMAN-DONOVAN bodies ever being found in the sores while they swarm with spirochetes.

3. *From Cancer.*—Some of the cases have been very suggestive of cancer, especially case 6, ulcer of the tongue. The history and later appearance of these, however, has differed markedly from cancer.

4. *From Actinomyces and Mycetoma.*—Some cases, such as case 9 of the foot and case 11 of the neck, suggested Madura foot and actinomycosis respectively. The microscope set the matter at rest.

PROGNOSIS.

The prognosis on the whole is serious. Some have gone from bad to worse, in spite of all treatment. Of the 18 cases, 6 are believed to be cured, 3 by scraping and 3 by free removal.

TREATMENT.

Iodide of potash has had no effect. Mercury and arsenic in one case (No. 6) seemed to have a beneficial effect, and not only kept the disease in check but the condition improved very materially, though complete cure did not result.

No other treatment which has been tried has seemed to be of any use except very thorough scraping and treatment with caustics, or free removal where this is possible.

I have not yet had an opportunity of trying the effect of salvarsan, but I have obtained a small quantity and hope to try it on the next case that I see.

GENERAL CONCLUSIONS.

It is well known that spirochetes are found in immense numbers in the mouth in certain positions such as in the soft creamy deposit round the neck of dirty teeth and they are very easy to demonstrate in this deposit. The earlier cases I noticed were in connection with the mouth, and I thought that the spirochetes found in the discharge might be merely saprophytic, and that the S. Buccalis and other spirochetes from the mouth having found a favourable soil in the diseased tissues had grown luxuriantly. The finding, however, of similar organisms in sores far removed from the mouth seems to render this explanation unlikely.

The fact that we have here a series of sores affecting various parts of the body which have in themselves attracted attention by their unusual appearance, history and course, and led to search being made for a definite cause, together with the fact that spirochetes have been found in abundance in the discharge from all of them, organisms not usually found in sores and ulcers, leads me to believe that we have here a definite pathological entity, due to the spirochetes, which, as far as I can ascertain has not been hitherto described. It is highly probable that the disease is not confined to this district round Isfahan, but that if it is looked for it will be found to occur over a much larger area of Central Asia.

N.B.—Since writing the above paper I have seen the paper on *Ulcus Tropicum* by KEYSSELITZ and MAYER, and it is possible that the disease I have noticed is identical with what they have described. The cases I have noticed, however, do not seem quite to agree with the description they give.

DYSENTERY

Although the word "dysentery" serves to designate a disease possessing fairly well-defined clinical characteristics, it is possible, nay probable, that several ailments which ought to rank separately are associated under the term. Of these, dysentery ascribed to hepatic derangement, to malarial infection, to scorbutus, to bad food, impure water, or other sanitary defect, to the presence of the amœba coli, and to other micro-organisms in the intestines, are a few of the varieties commonly enumerated. The epidemic form of the disease met with in colder climates, and the dysentery met with in the tropics in an endemic form, illustrate further the wide divergence of types which obtain. Of these, however, the only variety which approaches scientific precision is the so-called "amœbic dysentery." That the amœba coli is met with frequently, but by no means invariably, in dysenteric stools is undoubted; that it is met with in every case during certain epidemics may be also true, and yet its presence may in no sense bear the pathological significance claimed for it by many writers. With this equivocal exception, therefore, no scientific division of the group of diseases, believed to be covered by the name "dysentery," as determined by their parasitology, etiology, or pathology, has been as yet arrived at.

Symptoms.—Acute dysentery is characterised by an intestinal flux, consisting, at the commencement of the illness, of loose flocculent matter mixed with blood and mucus. The flocculence speedily disappears, and the stools present a flocculent, slimy, jelly-like substance, mixed with blood. In aggravated forms of the disease the mucous and submucous coats of the intestine undergo necrosis, when the evacuation yields a putrid odour, and contains gangrenous sloughs floating in a thin, brownish, blood-tinged liquid. The flux is accompanied by febrile disturbance, by acute abdominal pains, by tenesmus, and by nervous and physical prostration. Dysentery may end in resolution and complete recovery, in permanent damage to the gut (chronic dysentery), in liver abscess, in gradually advancing asthenia, or in death so speedy that the term "malignant" is applied to it.

Etiology.—That several varieties of dysentery possess a specific cause is the present-day belief, although little or no direct evidence can be said to justify the conclusion; *malaria* is said to be a cause of dysentery, because dysentery prevails endemically in malarial countries, because the febrile disturbance accompanying the disease resembles malarial fever, but more directly still because some cases of dysentery are cured by quinine. The frequent association of malarial infection with dysentery must never be lost sight of; many hold the opinion that malaria is the principal determining factor in the etiology of the disease, and it is well-nigh imperative, before proceeding to treat a case of dysentery, that the blood be carefully examined for malarial parasites. Malaria absolutely cured, a complication by a sequela is so intimately associated with dysentery that quinine must never be neglected in the treatment of the disease.

Scurvy, if not an etiological factor, is not infrequently a concomitant ailment in dysentery. In simple scurvy the bowels are usually constipated, but as lowering of the vitality is apt, under certain conditions, to invite a scorbutic condition, so in dysentery of some standing, when the patient is unable to consume anti-scorbutic nourishment, scurvy may supervene. The appearance of the symptoms of scurvy in the course of an attack of dysentery will determine the line of treatment to be adopted.

In climates such as the Soudan, in which there is a marked difference between the night and day temperatures, *chill* is a potent factor in causing dysentery. During a military campaign, be it in India, Southern Europe, or the United States, when the troops are insufficiently protected from the cold of the night, dysentery develops with a rapidity and certainty which can only be put down as cause and effect. Whether it is the liver and consequently the portal circulation which is primarily affected by the cold, or whether it is the direct action of cold on the intestines themselves, is not known; possibly both viscera directly suffer.

Parasite Bacteriology.—In 1875 Losch described a protoplasmic parasite, the *amœba coli*, as occurring in the stools of dysenterics in Russia, and since then the amœba has been met with by many observers in many countries. The writer met with the amœba in nine consecutive cases of dysentery in Hong Kong; in three cases of malignant dysentery, however, he failed to find it; and others record a similar experience. When a small fleck of the flocculent mucus of a dysenteric stool is placed on a warm (100° F.) microscope stage, immediately after being passed, the presence of the amœba coli is easily recognised. Its large size (6 to 35 μ), its

mobility, its pale-greenish colour, and its strongly refractive powers, arrest the attention. The mobility is in most cases best in air, very marked. Pseudopodia are extruded from the circumference, and then withdrawn to again appear at another part of the mass. The amœba is not only altered in shape by the pseudopodia, but the mass changes its place, travelling either towards the point of least resistance, or in the direction of alimentation. Cold (75° F.) and heat (110° F.) arrest the movements which, under favourable circumstances, might continue for a couple of hours or more. At rest, the body of the amœba coli is seen to consist of a thin, pale-greenish, outer covering or ectoplasm, and an inner, granular, darker endoplasm. A nucleus is present, and in stained specimens a nucleolus. The amœba may engulf red corpuscles, micrococci, bacilli, and more rarely leucocytes and pigment. Vacuoles are a fairly constant phenomenon. The arguments for and against the amœba coli being the cause of dysentery are—(1) That many observers have found it in scores, in one case in hundreds, of well-nigh consecutive cases. (2) That the injection of material containing active amœbæ into the rectum of several varieties of animals has been productive of dysenteric symptoms. (3) The amœba coli, however, is met with in health, with or without the exhibition of a severe purge, and it is [possibly] a constant occupant of the cæcum and upper part of large intestine. Several other micro-organisms, some of them normal inhabitants of the intestines, such as the bacillus coli commune, streptococci, staphylococci, etc., have been credited with being the causal factor, but as yet on no conclusive grounds.

Location.—The nature of the specific cause of dysentery is [unknown], and whatever value is to be attributed to the several conditions which experience shows are so frequently associated with its occurrence, a further variety in its clinical course and features is to be observed in various epidemics and in different localities. "These," says Dr. Manson, "and other circumstances seem to point to radical differences in the several forms—differences of cause as well as differences of symptoms, course, and sequelæ. It is well, therefore, to regard the term "dysentery" as but the name of a symptom, or group of symptoms, indicating an inflamed condition of the colon, and not as indicating a well-defined disease."

Geographical distribution.—Leaving the epidemic dysenteries of colder climates out of the question, dysentery increases in frequency as the Equator is approached. Dysentery is endemic in many tropical localities, but may spread thence in an epidemic form to adjacent countries. It may be safely stated that in those countries in which a real improvement in sanitation has taken place, dysentery has well-nigh disappeared.

Dysentery, to be [carried] by water-borne disease, and certainly in those towns in which an improved water-supply has been obtained, dysentery has abated in virulence, and in the extent of its prevalence. On board ship confirmatory evidence as to the pollution of the water-supply being a direct cause of dysentery is plentiful; an infected source being often the cause of an outbreak of the disease on board ship. The possibility of direct infection [by] the use of a common latrine must [be] the anus, by the mouth or nostrils. Any condition which tends to lower the strength or derange the health of the individual during the prevalence of dysentery, especially in an epidemic form, is calculated to reduce the powers of resisting the toxic agency of the disease.

Symptoms.—A typical case of **acute dysentery**, as met with in practice in the tropics, is characterised by the following signs and symptoms:—During what appears to be a simple intestinal catarrh, or commencing suddenly, shreds of mucus appear in the evacuations; the stools become more frequent, and are attended by some sweating and a feeling of abdominal weakness after being passed. Blood tinges the mucus, or is in sufficient quantity to stain the whole fluid of the stool. Gripings (tormina), tenesmus, and an increasing desire to pass a motion supervene, and the patient's calls for the bed-pan become almost incessant. All trace of fæculency disappears, and at an evacuation a tablespoonful of blood-stained, jelly-like material, attended by great straining, may be all that is passed. The tongue becomes coated and furred, the mouth is clammy, the saliva tenacious, a feeling of nausea frequently occurs during the early stools, but vomiting is rare. The abdomen is tender, especially over the lower part of the colon in the left iliac fossa, the anus is excoriated, hot and burning, and the bowel may be prolapsed. Movement causes palpitation, and the pulse becomes small and frequent. Urine is scanty, high coloured, and occasionally suppressed; strangury and retention are also possible complications. Increase in temperature is constant, but, except in the malignant form, the thermometer seldom registers more than 101° or 102°. In the acute form dysentery may continue several days, or in young strong men for as many as twenty or more days, and yet the patient may make a good and

permanent recovery. Frequently, however, if signs of abatement do not appear towards the end of the first week or earlier, the disease assumes a type which betokens danger to life. The stools may consist of shreds and sloughs floating in a fluid of dark-brown hue and smelling abominably. The tongue looks red and glazed, or is coated by a dark-brown fur; sordes cover the teeth, the abdomen becomes tympanitic and tender, and hæmorrhage may occur from the bowel, or from the mouth and nose. The temperature rises to, and continues at, 104° or higher; the pulse at the wrist is small, feeble, extremely rapid, and frequently irregular. Hiccough may become persistent, and the patient, after passing through a low, nervous state, during which all painful sensations abate or cease, dies in a state of coma.

The disease may end in one of three ways:—In convalescence and complete recovery; in chronic dysentery, with permanent damage to the intestinal wall; or in death from collapse, from hæmorrhage, from peritonitis caused occasionally by perforation, from exhaustion, or after passing through a typhoid state. Sudden death, attributed to heart failure, may occur during convalescence, even when the stools are assuming a natural consistence.

Varieties.—Acute dysentery receives a variety of names according to the assumed cause, and the signs and symptoms that predominate. Malarial, amœbic, bilious, hepatic, typhoidal, scorbutic, arthritic, [pseudo-]gangrenous, fibrinous or pseudo-diphtheritic, the "dysentery of war and famine," and several others, more or less fanciful deductions, serve to show the multiplicity of forms it may take. Most of these names, coined from mere clinical variations, are counterfeit, and but add to the chaos of nomenclature. They [do not] explain themselves for the most part, so there is no need to differentiate their various [applications].

Chronic dysentery.—The acute form of the disease frequently results in a chronic dysentery. After the acute symptoms have subsided, and stools possessing fæculence and some consistency are passed, instead of complete recovery occurring, mucus may persist, pain of a subacute character remains, and the general health of the patient does not improve satisfactorily. As time passes the stools may become fairly well formed or constipated, and yet jelly-like or muco-purulent matter, and occasionally blood, accompany them. This [mucous] fluid material, as a rule, precedes the stool, showing that the seat of the trouble is just within the anus. Hæmorrhoids, and painful ulcer of the rectum, fare frequently associated with or mistaken for dysentery, and it is at times difficult to ascertain the origin of the trouble. Pressure in the left iliac fossa over the sigmoid flexure, and sometimes in the right iliac fossa over the cæcum, elicits pain; and the sigmoid flexure may be felt to be indurated, enlarged, and tender. The stools are irregular as to the time of their being passed as well as in the character of their consistence. Exposure, fatigue and inadvertence in diet may induce a semi-acute attack, causing an aggravation of the diseased state. This may continue until a true chronicity is set up, the bowel being so altered that the ulcerated surfaces become incapable of healing, or, should they do so, pronounced cicatrices and narrowing of the gut ensue. In chronic dysentery the tongue may voracious, and at others in atrophic; the stools retain many of their disgreeable odour, and in some cases are of unusual bulk, and seemingly fermented. The patient's health suffers; he becomes sallow, emaciated, cachectic, and in the gravest cases hectic appears, attended by pyrexia and sweatings; a fatal issue is then at hand, and death results either by gradual exhaustion, or some concomitant ailment, and dropsy, pneumonia or cardiac failure, carries the patient off.

Dysentery and liver abscess.—The relation between dysentery and liver abscess is an important one clinically and pathologically. Many observers believe that, in almost all, if not in all cases of liver abscess, a previous history of dysentery can be elicited; whilst, on the other hand, a few attempt to disassociate the ailments. Analogy, however, favours the conclusion that the two are associated, as in most ulcerative and inflammatory lesions of the intestine, other than dysenteric, there is a marked tendency to the deposit of infective and purulent matter in the liver substance. Clinical experience shows that in 21 per cent of autopsies on dysentery, liver abscesses were actually found by Woodward; and in as many as 60 per cent of cases of liver abscess a history of dysentery was elicited by Kartulis in Egypt. Many facts, however, pronounce against the conclusion that dysentery is an invariable antecedent of dysentery. None more so perhaps than the fact that although dysentery is very prevalent amongst natives, abscess of the liver is rarely met with. The whole question, however, turns upon the question whether there are not several varieties of liver abscess. In the majority of intra-hepatic abscesses no doubt dysentery is the primary factor, but in those abscesses which form not *in*, but *upon* the liver, and most frequently between the layers of the broad ligament of the liver, it is difficult to explain a positive connection. In

ABNETT.

The following account has been written for three reasons—firstly, to place on record a condition which, if I have ever met with it previously, I have passed by unnoticed; secondly, to stimulate investigation by others who may be likely to come across similar cases, with a view to the elucidation of what may be a hitherto undescribed affection; and thirdly, to obtain refutation if the condition is merely an old one under an unusual guise.

The affection is, apparently, a very definite one, and, moreover, one which I do not think would be overlooked if attention happened to be called to it; and although I can find no description in the text-books at my disposal, nevertheless the condition is probably not rare, since I have met with three cases during a period of about five weeks.

Without further preface, I will proceed to relate the histories of the three cases, and the circumstances under which the associated organism was detected.

(I) R. A., female, aged 34.—On August 27, 1911, a small tube of her blood was sent to the laboratory from the other end of the island in order that her serum might be tested by Widal's reaction for typhoid fever. She was said to have been ill with fever for about ten days to a fortnight before admission to the local hospital (August 22). The medical man in charge of the patient (Dr. Thomson, of Montego Bay) added a note to the usual short statement sent with specimens for examination: "Symptoms appear to me more those of a *Streptococcal* septicæmia than true enteric."

When the preparations for the agglutination tests were placed under the microscope, I noticed amongst the typhoid bacilli two or three large square-ended rods, distinctly motile, but moving in a more stately, slower manner than the typhoid bacilli in the field, reminding one rather of a man-of-war amongst torpedo boats. The motility was quite obvious, the bacilli passing right across the field, thwarting the smaller typhoses wide in their course. None such had been seen in the control typhoid bacillary emulsion, so, thinking that possibly some contamination had occurred, I asked Dr. Thomson to send another specimen, taking it with the most careful antiseptic precautions. As this would take a couple of days to arrive, I meanwhile dropped the remainder of the blood in the tube into nutrient broth, and placed it in the 37° C. incubator. There was a very fair growth by the following day. A description of it will be given later. The serum had given negative results with the agglutination tests with both typhosus and paratyphosus.

Two days later (August 29) the fresh specimen arrived, and on plating the contents of the tube in nutrient broth a similar growth occurred within twenty-four hours. I then wrote asking for a detailed history of the case, and the medical attendant kindly sent the following reply:—

"The patient had always been in good health until two weeks before she came to hospital" (that would be about August 16), "when she felt a burning in the skin of the right thigh profusely. She is accustomed to ride on a pack-saddle on a donkey, and had been doing so a couple of days previously. The burning increased, and the part became swollen and hard, with great pain and fever.

"On admission she had a temperature of 102° F., and there was a hard brawny swelling in the skin of the thigh, reaching from the buttocks to the lower third of the thigh behind; she complained of great pain, and could not sleep. Deep incisions were made, but no pus found. Temperature, 101.4° F. in the mornings, rising to 102° F. in the evenings. This continued for a week, when another incision was made down to the bone, and a large deep-seated abscess of slate-coloured pus—no odour—was evacuated, containing not less than a quart of pus. Temperature has remained normal since. There was no abrasion of the skin when she was admitted, and no discoloration, and she says that she could find none before coming to hospital."

Unfortunately none of the pus was saved for examination.

In response to my further inquiries for other details of the history, Dr. Thomson wrote on September 21: "I have tried to get a fuller history, but to no purpose. She says she was perfectly well until the fortnight before coming up to hospital; that about two or three days after the ride on the donkey she felt a 'burning' in the skin of the thigh. The burning increased to severe pain and prevented her sleeping, and was accompanied by fever.

"She has made a rapid recovery, and has left the hospital, the wound being quite healed. Examination of the skin when she was admitted showed no abrasion nor marks of a bruise, the skin and underlying cellular tissue being hard and brawny like leather; pain increased by handling. Incision going down to muscle showed no pus, only thin serum (this was done on the 24th). Later (29th) she was chloroformed, and incisions were made down to the bone, opening into large abscess (? beneath the periosteum); there was no fluctuation at any time. I enclose a chart of her temperature while in hospital."

(II) L. D., male, aged 34 years.—This patient was very ill on admission, and the history obtainable was somewhat meagre. As far as could be made out, the patient had not been well for two months, and during that time, or at least the last four or five weeks of it, his right thigh had been painful and swollen; no history of any trauma. He was admitted to hospital (September 18) very ill, and, apart from the very low general state, there were no symptoms except local ones. On September 20 a tube of his blood was sent up, and the serum was tested for agglutination of *B. typhosus* and *B. paratyphosus*. A marked positive reaction was given; 1—80 in 20 minutes, 1—50 in 15 minutes, 1—100 in 25 minutes with the former organism. While watching for the reaction to take place, again a few of those same bacilli were noticed in the serum moving about among the typhoid organisms; some blood taken aseptically from the finger was inoculated into nutrient broth and placed in the thermostat at 37° C. By the following day a good growth had taken place. The positive Widal reaction was puzzling, as the patient denied having suffered from any illness of a febrile nature. As the thigh swelling had increased and was very painful, deep incisions were made down to bone, but revealed no pus; the shaft of the femur was explored, and the overlying mass of tissue was freely cut, considered by the surgeon to be of the nature of a granulomatous infiltration. The patient went rapidly down hill and became unconscious, death being expected every minute, but he lingered on for another forty-eight hours, dying at 2 p.m. on Saturday, September 23.

Post mortem at 3 p.m. the same day, i.e., one hour after death. Body emaciated, right thigh much swelled, measuring 21½ in. in circumference, while the left at the same level was only 19½ in. Except for the incision made at the operation, there was no external sign of injury. There were old, tough adhesions of the left pleura, no fluid, and a thickened pericardium, and within the latter about 4 oz. of a straw-coloured fluid. The heart itself appeared small and contracted, but there was no valvular mischief. Lungs showed nothing abnormal. *Spleen* was large, and weighed 11 oz., was congested and perhaps a little more friable than normal, but showed no other apparent abnormality. *Liver* small, weight 57 oz. *Kidneys*: Left weighed 6 oz.; right, 3½ oz.; capsule easily stripped. In the small intestine, 2 to 3½ ft. from the ileo-cæcal valve, were five typhoid ulcers, three partially healed and two in an earlier stage; no signs of any hæmorrhage or perforation.

The right thigh showed an incision extending down to roughened bone, the overlying tissue being very friable; no pus found.

Blood was taken by aseptic puncture from the heart, samples from the spleen, pulp, lungs, liver and contents of gall bladder; cultures in broth were set going of each, and smears were also made from each organ. Tissues were taken for section of the spleen, liver, kidneys, thigh tumour, bone-marrow of the affected thigh.

With regard to the cultures made from the heart blood, spleen pulp, liver, gall bladder, &c., of this case: No growth was obtained from the first named; then from the spleen pulp a mixture of typhosus and the bacillus described, the former being separated by subculture on Parietti medium, and the latter by heating a subculture in broth to 60° C. for ten minutes, and so leaving the spore organisms which grew readily afterwards in pure culture. From the gall bladder the *B. typhosus* was obtained, but not the other, while from the marrow of the right femur a very good growth resulted.

(III). The history of the third case is as follows:—

T. F., aged 32 years, male; admitted to hospital September 13, 1911, with a very painful left thigh. This part was swollen, and movement or palpation caused increase of the pain. The swelling was situated at the middle third of the anterior aspect and was hearsy in nature. The pain was worse at night. He had a "chancre" five years ago. The pain and swelling began, as far as the patient is aware, about the same time, four weeks previous to admission, and had gradually increased without any remission. The case was diagnosed as gumma of the thigh, and patient was given potassium iodide. After eleven days of the three was no improvement at all; the temperature kept up, the pain increased, patient could not turn in bed unaided, and any attempt at movement caused him to cry out with acute pain, and he was unable to get any sleep.

A specimen of his blood was sent up, more as a matter of curiosity, on account of the resemblance between his symptoms (continued fever and a swollen painful thigh) and those of the cases cited above, and within twenty-four hours of inoculating nutrient broth, a good growth occurred, as described below. Another specimen, taken a week later, yielded similar results. During the ensuing week he left hospital at his own request, as he stated that he was feeling no better, and inquiries made at his home address given on entering hospital were unanswered. I found later that he had shortly afterwards gone to the Poor House Infirmary. On October 11 I went to see him there with Dr. Edwards, the Medical Officer to that Institution. His condition had become aggravated; the pain was incessant, unless stayed by morphia, he could not raise himself in bed, nor turn, nor get any relief in sleep. The swelling had increased, affecting the anterior and adjacent part of the internal aspects of the thigh from the junction of the upper and middle thirds to the knee. Temperature varying from 98.6° (rarely) to 101° F. I took another specimen of his blood and inoculated it into nutrient broth. By the following day there was a good growth of the bacillus in pure culture.

I again saw the patient on October 14; the leg was swollen to the foot, but the thigh was the only part causing pain, though there it was very acute. Deep incisions were made and carried down to the bone, but only blood-stained serum was obtained, as in the first case; some of this was collected and examined, and some put in broth for culture. The bacillus was found to be present in pure culture in this as in the blood obtained by puncture of the finger. "Subsequent to the operation the temperature was each evening to between 100° and 102° F., and fell to normal, or nearly so, in the morning. For the first three days, till October 17, the pain had been a little easier; it then again returned and was agonising from the 18th to the 22nd, when the patient died, a week after the operation. During this time there was abundant oozing of thin, blood-stained serum, but no pus until the last twenty-four hours." I could not obtain a more detailed account than the above. As in the first case, therefore, pus appeared to form some five to six days after the first incision, the discharge in the interval, which was abundant, consisting merely of thin thin watery sanguinous fluid.

By kind permission of Dr. Edwards, I was present at the post mortem on October 23. On exploration of the wound in the leg, a large abscess was opened containing ichorlus "claret-coloured" pus, as in the first case; the quantity evacuated was estimated to be between ½ to ¾ pint; none of it was collected. The abscess extended to roughened bone as in the others. Other differences between the conditions found in this case and those in the second were: The spleen was very slightly enlarged, if at all; the lungs and pleurae were quite healthy; and the intestine was normal. There was some straw-coloured fluid in the pericardium (3 to ½ oz.); heart, liver, kidneys, and other organs all apparently normal.

Smears were made of the heart blood, spleen, pulp, marrow, &c., as in the former case, and of the pus, and cultures of the blood drawn aseptically by pipette from the heart cavities (the blood was quite fluid even so long as this after death), of the spleen pulp, of the pericardial fluid, of the marrow, of the gall-bladder contents, and of the pus were made.

Whereas in the former case the culture from the heart blood remained sterile, from that of this last case a growth was obtained of the new bacillus together with a few streptococci and staphylococci. Similar growth resulted with the spleen and marrow. From the pus the organism was readily cultivated, though, as would be expected, the contamination by staphylococci and streptococci was greater. From the serous fluid only the bacillus described was obtained, no pyogenic organisms; while, lastly, from the contents of the gall-bladder no growth was obtained.

I am told by a medical man practising in the island that he had a very similar case some time ago in which the humerus was affected, that is, there was a painful swelling with fever, and on incising mostly serous fluid was evacuated until five or six days later when chocolate-coloured pus appeared to form; but as the condition was not verified by bacteriological examination there is no proof but it was the same.

The following is a description of the bacillus so far as I have been able to study it up to the present —

Morphology.—Bacillus, 1.5—3.5 microns long, 0.6—0.8 microns broad, straight or occasionally very slightly curved, square ends in fresh culture, but after four days involution forms occur in which one end may be larger and swollen. May be swollen or in chains. Aërobic and Facultative Anaërobic. Spores central, or slightly nearer one end than the other, of less width than the bacillus, so that no bulging is produced; sporing takes place only under aërobic conditions.

Motility.—Markedly motile in vegetative form, but motility lost as soon as sporing takes place; thus, in a hanging-drop from a broth culture taken near the surface, motile vegetative forms and non-motile spored forms may be seen. Motility is present when single or in short chains of two or three and perhaps four, but apparently not in longer chains. On staining by the method of Stephens, the bacillus shows numerous flagella, peritrichial, but the terminal ones are larger than the lateral.

Staining.—Gram positive.

Temperature.—Grows well at 22° C., but more luxuriantly at 37° C.

Cultures.—*Gelatine*: Stab.—Film formation, whitish grey, with funnel-shaped liquefaction in 48—72 hours, becoming saccate. As the liquefaction progresses the film sinks and a fresh one forms. Spored bacilli seen in the film and upper part of the liquefied medium, motile non-spored ones below.

Slope.—Gutter of liquefaction, if take kept sloped.

Stroke.—Translucent film at surface, commencing liquefaction in twenty-four hours; small hazy cornices throughout medium.

Plate.—Round, clear colonies, pitting from liquefaction beginning in twenty-four hours; when grown to larger size resemble small balls of cotton-wool.

Agar: Stab.—Grey-white thin pellicle, and growth all along the line of the stab, not far from growth, but evenly spread out.

Slope.—Abundant growth in twenty-four hours, white, shining, moist-looking, "tallow-candle"-like, but slightly more translucent. Viewed from behind, shows dense centre, with edges like teased cotton-wool. After twenty-four hours very many have spored, and after forty-eight hours hardly any non-spored bacilli are seen, and there are very many free spores.

Plate.—Colonies white, denser in the centre, like cotton-wool with teased edges. Impression colony shows long wavy chains under ⅙ in. objective, and "Medusa head" edges under low temperature (4).

Bouillon: Grows well; thin pellicle forms in twenty-four—forty-six hours, very easily detached on moving the tube, when another film forms, so that after three days there is a thickish deposit at the bottom, the broth remaining clear. Sporing occurs at the surface, so that if a loopful be taken from the depth of the culture, as stated above, motile non-spored and non-motile spored organisms are seen in a hanging drop.

Potato.—Copious, white, shiny growth.

Litmus Milk.—No change for twenty-four hours, then there is a separation into flakes or small clots in four days, with acidity.

Peptone Water.—Marked production of Indol in three days.

Neutral Red is unchanged.

Sugars.—There is a marked acid change in glucose, less but still marked in saccharose; very faint reddening of tinges in lactose, mannite, raffinose, and galactose; no change in dulcite. In none of the sugars was there any signs of gas production.

Inoculation into the peritoneal cavity of a guinea-pig was not fatal unless large amounts were used of a broth culture (some 6—8 c.c.); and even then nothing particularly characteristic was seen post-mortem; spleen was not enlarged. Further inoculation experiments are to be undertaken.

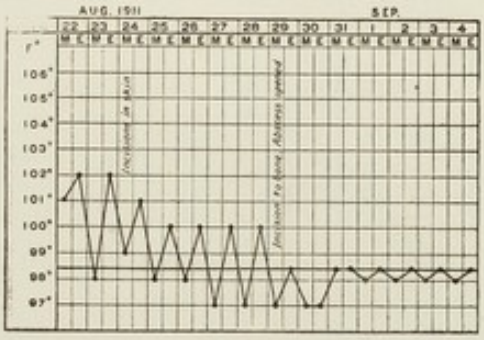
So much for the description of the bacillus. The only one which resembles it at all closely is, I think, *Bacillus myroides*; but there are distinct differences between the two. Thus *Myroides* does not give rise to acidity in milk, renders broth turbid, does not produce indol, and, so far as I am aware, is not pathogenic. These three points are all reversed with the bacillus described. I am not acquainted with the sugar reactions of *B. myroides*; they are not given in the ordinary text-books on Bacteriology, and there are no means of access to larger works of reference for those living so far from home.

One is not justified in drawing any inference from so few cases, but it would seem that the condition is one of bacteræmia with serous locality of the organism at least in part in the menses of one of the longer bones, and formation of pus when opportunity for secondary contamination occurs; that happened in five to six days in the first and third cases; the second died, probably from the associated enteric fever, too soon after the incision for pus to form.

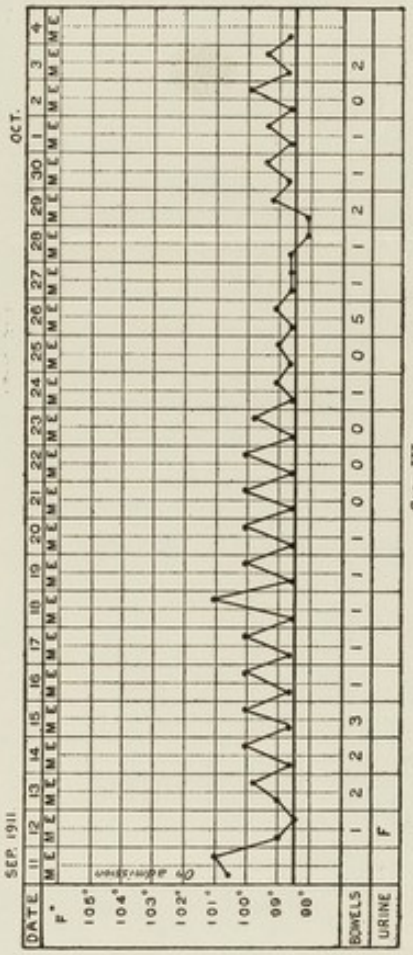
Since the most striking feature of each of the cases (part from the presence of the bacillus in the blood-stream) was the swelling set up apparently by the enormous quantity of thin serous fluid, if the organism has not been previously described and christened, I suggest tentatively for it the name *Bacillus serofluus*.

The condition having come to my notice accidentally, as it were, through the prolonged fever calling for a Widal reaction, and since it is probably not very rare, as I have met with three cases within a comparatively short time, I have ventured to make the matter known, in order that other medical men working in the Tropics may be on the look out for similar cases, and by further investigations throw more light upon a subject which, however interesting from the point of view of the pathologist, is a tedious and distressing one from that of the patient and the medical practitioner.

Trop. Med. Harold Scott's Article



Case I.



Case III.

very different places. I have never thought, as Dr. Sambon (1909) chooses to insinuate, of asking, either of him or of any other colleague, that he should "abandon his independence of judgment, or his right to give expression to his views" if these differ from mine; I only demand that, when any one finds it necessary to propound such views publicly, he also makes some earnest personal effort to support them by evidence equivalent to that which I have brought forward in defence of my views. This is what as yet still remains to be done by Dr. Sambon, in the present case as well as in others.

Finally, as to the so-called "young stages encysted in the submucosa" (Sambon, reason (5). These were first observed by Bilharz (1852), who wrote concerning them: "Sometimes the mucous membrane of the intestine shows flattened elevations of the size of a lentil and of a livid reddish brown colour; these contain a cavity situated in the connective tissue between the tunica mucosa and muscularis, and curled up within the cavity a living worm (sometimes a male, sometimes a female) filled with the blood it has sucked." Bilharz, and later Griesinger (1854), explain this phenomenon by the assumption that the fully-developed worms bite deeper than usual into the mucous membrane. In opposition to these writers, Leuckart (1876), having himself on the study of the life-history of certain schizostomes of the horse, expresses the conjecture that the young individuals encysted in the submucosa possibly represent a normal phase in the development of the ankylostoma. Similar "cysts" were subsequently observed in one case by Grassi (1879), they were comparatively small in number and contained worms from 3.6 to 6 mm. in length. As to the way in which they should be interpreted, Grassi adopts Leuckart's views, but mentions at the same time that he also observed the same young worms in greater numbers living free on the mucous membrane of the intestine.

Subsequently to Grassi's observation I believe ankylostomes were not again observed in cysts of the intestinal wall. Leichtenstern (1887), who devoted special attention to the significance of these encysted stages, describes his observations as follows: "I am familiar with the behaviour and the changes which ankylostoma larvæ administered through the mouth present on the fourth, seventh and eleventh day, and also in the fourth, fifth and sixth week, after the administration. Besides the various developmental stages of the worms which occur upon the mucous membrane of the intestine, I have never at these times found larvæ or further developed ankylostomes in or beneath the mucous membrane, either encysted or in any other form." Moreover, since Leichtenstern's successful experiments in infecting men through the mouth furnished no support to Leuckart's conjecture he rejects the view that the "young stages encysted in the submucosa" are a necessary or regular phase in the life-history of the ankylostoma, and re-adopts the older interpretation of Bilharz and Griesinger, viz., that they are "worms accidentally strayed," which have bitten deeper from the lumen of the intestine into the mucous membrane.

The question as to the significance of these encysted stages now requires consideration. At the beginning of my researches on the dermal infection I started from the working hypothesis that the larvæ, after penetrating the skin, reached the lumen of the intestine directly by traversing the body cavity and the intestinal wall. On this path they would perforce have to bore through the wall of the intestine and therefore it seemed a likely conjecture that the young ankylostomes "encysted in the submucosa" were simply larvæ which had accidentally remained within the wall. When studying a case of *Uncinaria peruviana* which in its host (*Felis tigris*) seems to live regularly in submucosa cysts filled with blood, Cohn showed (1909) that my interpretation was not correct, and was not even necessary, for the cysts of *U. peruviana* all possess an opening communicating with the lumen of the intestine; which proves that the worms enter the mucous membrane from the lumen. These objections are undoubtedly correct, and were fully corroborated by the later investigations of my own which showed that the larvæ on their way to the intestine do not bore through its wall at all. Thus my earlier attempt at explanation is finally proved to be wrong, while on the other hand the interpretation of Bilharz, Griesinger and Leichtenstern gains fresh support from the recognition of the fact that the ankylostoma worms, from the moment when they assume their definitive form, feed on the elements of the mucous membrane and eat their way, so to speak, into it. This behaviour gives, I think, clear evidence as to the way in which the cysts arise and, in addition, suggests the view that they are mere chance phenomena. As a matter of fact these stages "encysted in the submucosa" do not seem to have often been met with; at least, I find no data in the literature to the effect that they were again observed since the time of Grassi. Personally, I never observed them either in my experimental animals or in post-mortem examinations, although I frequently and carefully looked for them, especially in cases of severe infection. It was only about six years back that I once succeeded in finding a fairly adult specimen of the worm, which was lodged with about the fore half of its body in a cavity of the intestinal wall, about the size of a lentil, and filled with blood, while the hinder half projected freely into the lumen of the intestine.

More recently Goldman (1908) has again tried to establish a connection between the "young stages encysted in the submucosa" and the normal development of the ankylostoma. In describing the life-history of the parasite he writes: "The larvæ reach the intestine by the blood and lymph passages and seem to attain maturity in its submucosa. Then the adult parasites break through the mucosa and establish themselves in the intestine." It will be clear from what has been said above that these views have no foundation in fact.

In disagreement with all I can find in the literature on the subject, Sambon states that "immature forms" (viz., of the ankylostoma) "have been found again and again in blood-filled spaces beneath the intestinal mucosa by Bilharz, Griesinger, Sonsino, Grassi, and many other competent investigators." It would interest me very much to learn who these "many competent investigators" are who found the cysts, and where they were found.

ENGLISH TRANSLATION OF QUESTIONS ASKED BY GENERAL PAIVA LEAL, ADMINISTRATOR OF SAN SALVADOR DO CONGO, OF DR. GAMBLE re SLEEPING SICKNESS.

(1) *From which districts have come the majority of those affected by sleeping sickness?*

The patients who have been proved by the microscope to have sleeping sickness have come from thirty-seven districts (senzas), at distances varying from the neighbourhood of San Salvador to three days' journey away. These districts are: Mayanda, Nbopo, Nsanda, Wete, Kwanda, Nkazi, Lunga, Lembi, Mbidisi, Pelo, Nkenda, Ntaba, Lukiti, Mpango, Ezango, Vwala, Lungai, Sundikila, Nemo, Kinsau, Kiolo, Ngavila, Malonga, Nkama, Mpeso, Evemba, Kwimba, Ebolo, Nkoso, Nkondo, Kinfwalo, Mbwela, Mbanza-Mputo, Kindinga, Lusuza, Ekongo, Kiolundwa. But this list does not include the cases from the districts of Zombo and Mabaya.

It is also necessary to note that the number of cases which come from any district depends rather upon the confidence of the inhabitants in us than upon the actual number of persons who may be affected by the disease.

(2) *What number of cases have been treated?*

The following statistics show the number of cases actually under treatment in the particular periods mentioned:—

December, 1908	2	November, 1910	36
April, 1909	10	February, 1911	42
July, 1909	16	May, 1911	45
Furlough from August, 1910		July, 1911	39
		November, 1911	48

From January till November, 1911, there have been 3,398 administrations of medicine.

(3) *What have been the number of deaths and* (4) *the number of cured cases?*

Recent statistics on these points, especially concerning supposed cures, are not of great value, but these are the facts:—

Period, December, 1908, till August, 1909.—(a) Of twenty-one patients who received a course of treatment of from four to six months, six have died of sleeping sickness, two have died from other causes, one still has sleeping sickness, and twelve have apparently completely recovered.

(b) Of twenty-three patients who received a course of treatment of from one to four months, twelve are dead and eleven have apparently completely recovered. One patient has now completed his third year under observation, and others will have completed it in January or February, 1912.

Period, October, 1910, till November, 1911.—The results during this period encourage us to persevere. Of nine patients who were treated from November, 1910, till February, 1911, eight are still alive. Two of the men are employed with us in full work. But the most remarkable case is of a woman who in October, 1910, was treated for (proved) sleeping sickness, but who on September 11, 1911, gave birth to a child.

(5) *What number of these improved (the lettered cases)?*

A great number have been benefited, so much so that the natives bring their relatives. And even as to some of those who died, there is no evidence that it was from sleeping sickness; and concerning those who really did die of this disease, some were benefited during many months, to such an extent that the natives speak of the death as resulting from a return of the disease, and not as a fatal termination of the original sickness.

(6) *What is the cause of the disease—Glossina palpalis?*

Yes, Glossina palpalis (in Ki-Kongo "Evekwa") is probably the cause. I found this blood-sucker (a) on the road to San Salvador from the north, and at San Salvador; (b) on the road south-west to Mabaya, and at Mabaya; (c) on the east road to Kibokolo do Zombo, and at Zombo. These facts, together with information from the natives, convince me that probably all the region is infected by this pest.

(7) *Are there other transmitters?*

The following blood-suckers occur, and may be accidental transmitters of sleeping sickness: *Tabanus leptitatus* (Evukwisi), *T. covax* (Evukwisi), *T. conjunctus* (Evukwisi), *T. plebs* (Evukwisi), *T. thoracicus* (Evukwisi), *Tabanus* (?) not identified in Kibokolo do Zombo and Mabaya, *Tabanus* (?) not identified in Kibokolo do Zombo and Mabaya, *Chrysops longicornis*, *Hæmatopota* (?) (Evukwi-dia-mfwila-mfu), *Culicoides grahamii* (Masikasika), *Stomoxys nigra*, *S. calcitrans*, *Larva of Anthomyiaria* (Mamvidi-mazu) on Kibokolo do Zombo and Mabaya, *Ornithodorus* (Kukwenbonda or 'Ata) in Kibokolo do Zombo and Mabaya.

(8) *What treatment was employed?*

The principal treatment is by injection of atoxyl: In 1908-9, a small dose subcutaneously every day; in 1910-11, a larger dose intramuscularly twice a week.

(9) *What do you consider necessary to do in order to combat the disease?*

The whole district is too severely infested to attempt to enforce segregation, but the chiefs might be instructed to build their villages away from water.

Our Committee (of the Baptist Missionary Society, whose headquarters are Baptist Missionary Society, 19, Furnival Street, London, E.C.) have promised us funds for the erection of a very simple lazaretto outside the city, provided the Government will grant us the necessary site, for which we petitioned His Excellency the Governor-General on October 5, 1911.

The sufferers come willingly seeking treatment, but their great difficulty is to obtain food during the long period of treatment. If the Government would provide a daily ration of food, the natives would come still more willingly, and could remain all the time that might be required for proper treatment. I judge that a merely vegetable diet could be obtained for 40 reis (about 2d.) per day.

I find that the difficulty to obtain atoxyl is increasing gradually because of the increase in the number of patients. A bi-monthly grant of twenty bottles, each of 25 gm. atoxyl, would be most valuable and very welcome. Atoxyl is supplied by Vereinigte Chemische Werke Aktiengesellschaft, Charlottenburg, in boxes of twenty bottles of 25 gm. each.

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Grad. London Sch. of Tropical Med.

EXPLANATORY NOTES.
By Dr. M. Gamble.

The San Salvador referred to is in Portuguese Congo, and is the capital of an area bounded by the River Mpozo on the west, the River Mbidizi on the south, the Fukwi on the east, and the Congo-Belge frontier on the north. To cross the district would occupy about eight days from east to west, and about seven from north to south.

The population is estimated at 25,000, of whom 1,000 live here in the capital of the ancient Kingdom of Congo.

Kibokolo do Zombo is nearly 100 miles by native path to the east of San Salvador; and Mabaya is about ninety miles to the south.

	Latitude S.	Longitude E.	Altitude
San Salvador	6° 15′ 45″	14° 57′ 18″	1,941 ft.
Kibokolo	6° 17′ 0″	15° 16′ 30″	3,300 „
Mabaya	7° 3′ 45″	—	2,944 „

The best map of this district is that of the Rev. Thomas Lewis, accompanying his lecture on the "Old Kingdom of Congo," see the *Geographical Journal* for June, 1906.