I hereby certify that this Thesis, which I submit for the degree of Doctor of Medicine, is entirely my own production. And I enter the same Thesis in competition for the Gunning Prize for work done under the superintendence of the Professor of Surgery.

James Murray M.B. C.M.

April 30th, 1888
Observations in Surgical Bacteriology

James Musgrave M.B.C.M.
1888.
Introductory.

In the whole range of Surgical Science, no subject has of recent years attracted more deserved attention than the study of Bacteriology. The wide-spread distribution of micro-organisms, their power of inducing elaborate chemical changes, and their intimate relation to many pathological processes, render their study of the utmost importance to the practical surgeon. Recognising the importance of this subject, I have been led to make observations in this direction upon the cases under the care of Professor Chiene, to whom I am deeply indebted for placing his wards and laboratory unreservedly at my disposal. The cases from which materials have been obtained for examination have naturally been very varied in character, but most of them may be classified under four heads.

1. Acute Inflammation and Suppuration
2. Infective Processes
3. Chronic Suppuration
4. Operation Wounds
In addition to examining the discharges in these cases, I have in many instances made an examination of the blood of the patient in order to ascertain whether the organisms found in the discharge were present there also. And it is in this part of the work that the most interesting observations have been made. For I have succeeded in obtaining from the blood of a patient with acute pyemia, a bacillus which has not hitherto been described; I have demonstrated the presence of a micrococcus in the blood in chronic pyemia before any abscess formation had taken place; I have found the same micrococcus in the pus of abscesses which subse-
guously formed.
Methods of Investigation with description of Apparatus.

It is necessary, at the outset, to give an account of the methods by which the results have been obtained, together with a description of the apparatus employed with such improvements as have from time to time suggested themselves.

In collecting materials for investigation it had to be borne in mind that they were required for two distinct purposes. They were needed, first, for immediate examination, and secondly, for making cultivations in nutrient media.

For Immediate Examination, the method adopted was, to prepare make cover-glass preparations at the bedside of the patient. For this purpose, cover-glasses of medium thickness were selected, thoroughly cleansed with hydrochloric acid and absolute alcohol. The cover-glasses thus prepared were smeared by bringing one of them directly in contact with the material, pus or blood, to be examined; then by pressing this smeared coverglass against another clean one, I separating the two,
a thin film was obtained on each. (It is to be observed that, no matter how thick the liquid was, no water was used to dilute it; lest fallacies might be introduced by so doing.) The film on the coverglass was then fixed by heating over the flame of a spirit-lamp. The two cover-glasses with their smeared surfaces, now dry, in contact, were wrapped in a thin layer of wool, labelled, put into the pocket-case for transference to the laboratory, where they were stained with the various aniline compounds, I subjected to microscopic examination, first under a power of 670 diameters, then with Zeiss's oil immersion lens of two millimetres focal length. Drawings were made under one or other of these powers, accurate measurements taken of all microorganisms present, using always, for the latter purpose, the oil immersion lens. Unless expressly stated otherwise the drawings must be taken as showing what was seen in one single field of the microscope. For the purpose of making cultivations of organisms present in discharges & blood, the "capillary tube method" was adopted. For a knowledge of this
method I for many valuable hints on staining
cultivation, I express my thanks to Dr. Edmon-
ton. Capillary glass tubes having a calibre of
one millimetre (Fig. 20) varying in length from 6
to 7 centimetres were employed. After being
sterilized by keeping in the hot-air chamber
for an hour at a temperature of 160° Centi-
grade, they were allowed to cool in the
chamber, then sealed at both ends with
the flame of a Bunsen's burner. For convenience
I designed a pocket-case provided with a
series of grooves to receive these tubes (Fig. 22)
oppoiste each groove a writing space for the
name of the patient I date. In addition, com-
partments were provided for cover-glasses, forceps
and lanced-shaped needles for puncturing the skin
to obtain blood for examination. Before use
in the hospital these tubes were purified ex-
ternally with weak 1-20 carbolic lotion, the
sealed ends were broken off after being enveloped
in corrosive sublimate wool, in order to
prevent contamination by the fingers. The
aseptic precautions taken in the hospital
were of the most stringent kind. If an ab-
used required opening, the part was first
thoroughly purified with one to twenty carbolic lotion, then enveloped in layers of loose lint soaked in the lotion, the whole covered with gutta-percha tissue. In this condition, it was allowed to remain for an hour before the incision was made. The carbolic spray was then turned on the cut made with a perfectly clean knife. One of the ends of the capillary tube, broken off as already described, was inserted into the abscess, after the escape of the first few drops of pus and blood, it allowed to fill by capillarity. The ends having been re-sealed in the flame, the tube was put into its place in the pocket-case. The name of the patient was written opposite to it.

When it was desired to make an examination of the blood of a patient, the finger was selected in preference to lobe of the ear, which is recommended. My reason for this was that I found it impossible to carry out the antiseptic precautions in that region satisfactorily. The finger, usually the ring-finger was thoroughly purified with one to twenty carbolic lotion, then, as in the
case of abscesses, enclosed in layers of brai
lit soaked in one-to-twenty laur, covered
with gutta-percha tissue. After remaining
in this condition for an hour, the capillary
glass tube was purified externally. The finger
was punctured with a purified needle. The
first drop of blood was neglected, as it was
mixed with the antiseptic, and after the
escape of this, the end of the capillary tube,
broken off under conscious subtlety, was ap-
piled. The blood allowed to rise. As in the
case of pus, the tube was then sealed again
placed in the pocket-case. The whole time
occupied by this operation, from taking off
the lit from the finger to re-sealing
the tube was not more than five seconds
so that the risk of contamination from the
air may practically be left out of account
in considering the result. (Cousigny pre-
parations were made stained as already describ-
ed.) This completed the part of the work car-
ried out at the hospital. In the laboratory
the contents of the capillary tubes, whether fur
or blood, were transferred to suitable nutrient-
media for cultivation. Of these media, the
one usually employed in the first instance was sterilized gelatine, prepared according to Stock's formula, containing six per cent. of gelatine, made slightly alkaline. To transfer the liquid to a test-tube of this gelatine, the outside of the capillary tube was purified again with one-to-twenty carbolic solution. The ends of the tube were cut off with a pair of scissors previously sterilized in a Bunsen's flame. One end was then attached to a small ejecting syringe (always kept in ice not in use, in one-to-twenty carbolic solution). The other end passed into the gelatine tube by the side of the cotton plug. The contents were then ejected into the gelatine, which, it should be mentioned, had been previously melted to allow the pus or blood to be disseminated throughout the medium.

The progress of the tube cultures was watched from day to day. I fresh cultivations made from time to time in gelatine, agar-agar, and other materials. Photographs of these growths were taken, but the immense difficulty in photographing glass vessels prevented in some cases satisfactory results being obtained.
In criticising this capillary-tube method after seven months' experience with it, the only objection that I can urge against it is that it involves too much the use of antiseptics. In more than one instance where negative results have been obtained, I have had reason to believe the presence of carbolic acid prevented the growth of the organisms. But, an error in this direction is not to be regretted.
Acute Inflammation & Suppuration.

Having stated generally the nature of the cases under observation, I described the methods & apparatus employed. I purpose now to describe in detail the cases of Acute Inflammation & Suppuration. Of these, as of all other cases, I shall give the clinical history only at such length as to indicate the nature of the morbid process & its intensity. 

Thomas M'Cree, aged 21 years attended the hospital for treatment of an acute inflammation of the left thumb. He was swollen incompletely, I appeared to be, as he himself described it, thoroughly out of sorts. A week before admission, he had accidentally run a splinter of wood under the thumb-nail. This splinter, he at once withdrew, but inflammation of the nail matrix followed in a few days, leading to suppuration with no outlet for the pus. On examination, pus could be seen under the nail. The adjacent soft part presented a red inflamed appearance.

It was proposed to examine the pus which was under the thumb-nail, & for the sake
of comparison, to obtain blood from the opposite limb. Accordingly, the suppuring thumb of the left hand, the apparently healthy middle finger of the right hand, were thoroughly washed with one-to-twenty carbolic lotion, I wrapped up in folds of loose lint soaked in more lotion, gutta percha tissue being tied over all to prevent evaporation. At the end of an hour, the antiseptic lint was removed, I the fur under the left thumb nail was evacuated after incision with a perfectly clean knife. Sterilized capillary tubes were filled for cultivation purposes, I cover-glasses smeared for immediate examination. The lint was then removed from the right. The finger punctured for the escape of blood. Sterilized capillary tubes were filled I cover-glass preparations made. In the pus, after staining by Gram's method, there was seen a variety of organisms. Bacteria, measuring one micro-millimetre in length I 0.6 micro-millimetre in breadth, were present, micrococci, isolated, tetrads, filaments, with a diameter from 0.5 to 0.9 μ. Reproduct
from this pus, was obtained a nutrient gelatin after several days incubation at 35°C. It consisted entirely, as far as cover-glass preparations were concerned, of a micrococci from 0.7 to 0.9 μ in diameter, arranged in chains and clusters (Fig. 11). This was the only organism of which cultivations were obtained from this pus. A photograph of the growth in the nutrient gelatin is shown in Plate III fig. 3. This was a culture six generations removed from the original pure culture. The photograph was taken on the twelfth day after inoculation, the tube being kept at a temperature of 16°C. Centigrade during this time. The surface growth had assumed the form of an irregularly circular area, two millimetres in diameter, the irregularity being due to the fact that the margin, like the rest of the surface, was made up of minute dots. The surface was slightly deep concave. It had a moist appearance. The colour of this surface growth was yellowish-white. Along the needle-track was a continuous growth, composed of very minute spores, giving the periphery a finely dotted appearance. At the upper part, the colour was
yellowish-white, like the surface-growth, but two or three millimetres below this, there was visible a brown tinge, which at the lower part of the needle-track was much more pronounced. The surrounding gelatin was entirely free from liquefaction.

On agar-agar, at a temperature of 35° Centigrade, the organism grew more rapidly. A photograph taken on the twelfth day after inoculation is shown in Plate III Figure 4. At this time the growth consisted of a moist streak two millimetres in breadth, composed of a delicate, semi-translucent, slightly iridescent film, with an irregularly crenated margin.

By the twentieth day, the thicker parts had assumed a buff colour and became opaque. So far as I have been able to determine, this organism is identical with the Staphylococcus indicis found in the blood of patients suffering from Scarlet Fever.

In comparing the blood from the right hand with the jeeves from the left, it was found that under the microscope there could be seen here three isolated microcoeci, measuring .75 μ in diameter. In the drawing
(Fig. 3) Two such organisms are shown, one inside a white corpuscle. These micrococci were, by no means, numerous, but they multiplied with rapidity. The blood was introduced into nutrient gelatine and incubated at 35° centigrade. These cultures of the organism were carried on through several generations. Cover-glass preparations were, from time to time examined, with always the same appearance—a micrococcus in chains (Fig. 3), the individual segments measuring from 0.6 μ to 1.1 μ in diameter. A photograph of the growth in gelatine kept at 16° C is shown in Plate III fig. 1.

As seen on the fourteenth day after inoculation, it bore a striking resemblance to a caterpillar. There was a central opaque axis passing through a body formed by a series of short, less opaque, segmental segments. The surface of the gelatine corresponding to the upper end of the growth was slightly concave. The medium immediately around this area was less firm than elsewhere, though no actual liquefaction could be said to be present. The light brownish yellow colour...
of the growth was not more than might have been imparted to it by being viewed through the gelatine. On agar it grew rapidly, especially when kept at a temperature of 35°C. Even at much lower temperatures the organism seemed to proliferate rapidly. Figure 2: Plate III represents a growth of thirty days at 18°C. The streak, which varied in width from two millimetres at the upper part to six millimetres at the lower, was found of white, waxy-looking material, resembling drops of paraffin which had re-solidified, but having a more glistening surface. This material was found to be very tough and difficult to break up with the needle. From the appearances of the cultivation of this organism, I have come to the conclusion that it is what has been described as Staphylococcus Cereus Albus.

No further opportunity of examining the patient's blood occurred; for as I afterwards learnt, he improved so rapidly after the pus was let out, (both locally and in general health) that he did not return to the hospital.
With this first-mentioned case, it is interesting to compare an acute abscess in which the sinus was less freely exposed to contamination with organisms from without. The patient, James C., also twenty-one years of age, was suffering from an acute abscess along the lower border of the inferior maxillary bone. No cause could be given for the swelling, except the presence of a decayed molar tooth. During the formation of the abscess, which had commenced a fortnight before admission, considerable pain had been experienced, but any constitutional disturbance that might have been present had passed off before the patient sought advice.

After the part had been thoroughly purified with one to twenty carbolic lotion, an external incision was made. The pus let out by Dr. Thor, the house-surgeon. (I may here take the opportunity of thanking Dr. Thor for his great kindness and assistance. Without his co-operation, such a work as the present could not have been carried on.) In the cover-glass preparations of the pus, scarcely any micro-organisms were present.
A few micrococci, from .5 to .6 micrometer in diameter, were all that could be found in the field from which this drawing was made (Fig. XIV) was made contains seven cocci, but such a field was quite exceptional. This scarcity of organisms is quite a contrast to what generally pertains in acute suppuration; I, as will be more fully brought out in describing abscesses near the rectum, it is all the more remarkable when we consider its close proximity to the mouth, where many dreaded organisms are found.

As regards the attempts to make cultures of this cocci in nutrient gelatine, they were futile, although carried on at a temperature of 35 centigrade for two months. It is impossible, therefore, to identify the organism.

Following this case, there came under observation also, Mrs. Thompson, four years old, with an inflammatory swelling behind the left angle of the lower jaw. Without any apparent cause the swelling first appeared fourteen days before admission to the hospital, I gradually in-
creased in size, with comparatively little
pain or febrile disturbance. But probably
the cause was to be found in an eczematous
condition of the left side of the scalp, this
was a glandular abscess. The abscess was o-
opened on November 11th with the usual anti-
septic precautions. The pus, after being stain-
ed with phenol, had the appearance shown
in Figures III and IV. A streptococcus was found
at all parts of the preparation, but no other
organisms were to be seen. The individual
bacilli measured from 0.5 to 0.8 μ in diameter.
The organism was with difficulty
grown in nutrient gelatine, but the first
cultivation was a pure growth of chain
formes of cocci giving the same measure-
ments as in the pus (Fig. IV). It refused
to grow unless kept in the incubator at 35° C.
Even then, all that could be seen at the
end of a month was a collection of small
white spots at the bottom of the tube, the
gelatine re-solidifying when allowed to
cool to 15° centigrade.
At first the wound was dressed daily, then
every second day. The case progressed fo-
Records of Temperature, Pulse, Respiration and Stools, from 11th Day of November

| Day of Month | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 31 | 32 |
|-------------|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|
| Day of Disease |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |

- Temperature
- Pulse
- Respiration
- Stools

In the case of

Olive Thompson
Aged 45
Occupation [Blank]
sually, the patient was able to leave the ward on the fifteenth day after admission (see chart to face page 19). But opportunity was taken of examining the single drop of pus that escaped when the wound was last dressed. This examination was made in consequence of the statement that in an acute abscess discharging pus, the micrococci diminish in number day by day. The result was contrary to expectation, for in every field micrococci were present in even larger numbers than in the first specimens, but the chain-like arrangement had given place to tetrads (Fig. 4 P. 11). Possibly, however, this was a different organism, which had entered from the skin. In the following day the wound was healed and further discharge took place. At first, I was inclined to think that the organism found in the pus when the abscess was opened, was the Streptococcus viridans, but the extreme difficulty of obtaining cultivations in gelatin I agar, though doubt upon this, I all that I feel warranted at present in saying is that the
organism is a Streptococcus of very slow growth, which does not liquefy gelatine.

John M., age 25 years was under treatment in Ward X for a chronic sinus of the leg, probably the result of tubercular disease. He was far advanced in pulmonary phthisis, & a few weeks before death, an intestinal abscess formed. It was small in size, not very deeply placed, situated about an inch from the anus. After making an incision, two drachms of yellow tenacious pus were squeezed out. In the preparation of this pus, the tubercle bacillus could not be found; but in addition to a micrococcus 0.5μ in diameter, a bacillus was present in small amount but not the tubercle bacillus. This bacillus was readily cultivated in nutrient gelatine, 9 Fig. 2 Plate V represents a micrograph preparation stained with fuchsin. The rods, which were rounded at the ends, varied in length from 7.5μ to 2μ, in breadth from 0.3μ to 0.7μ. A micrograph of the growth in gelatine, taken on
the seventeenth day is here shown (Figs.)
The surface growth consisted of a concave, 
semi-transparent gray film, irregularly 
circular in form, measuring one centi-
metre in diameter. At the peripheral part, 
there was slight evidence of radial stri-
ation, the striae corresponding to the 
intervals between the irregular bulges 
which formed the margin. The growth 
along the needle track continued with 
the surface of film, formed a pencil 
two millimetres in diameter, having, 
when viewed through the gelatine, a 
slightly buff colour. From this growth, 
very small processes were seen pro-
jecting into the surrounding gelatine. 
This pencil readily broke up when the 
gelatine was liquefied by heat. 
The organism itself did not produce 
dissolution of the gelatine, but a 
short fatty odour was given off during 
the growth.
In agar, this bacillus grew very readily 
even at a temperature of 18°C. A photograph 
was taken of a forty-eight-hours' growth at
35° centigrade (77°F). It consisted of a thin grey film varying in width from two millimetres at the upper part to six millimetres at the lower. This mucous film, when viewed by transmitted light, showed slight iridescence. The margins were at times slightly wavy.

It is to be observed that a bacillus has previously been found in abscesses near the rectum, has been called Bacillus Pyogenes Falsidus. Possibly this may be the same organism. This bacillus is not, as I shall afterwards show, present in all abscesses near the rectum; although abscesses in this region are, so far as my observations lead me, characterised by the presence of bacilli as well as micrococci. And this is, after all, only an explanation of a clinical fact which has long been recognised in the works on Surgery, for as far back as the last century we find it recorded that “the pus from abscesses in this region (recto-uterine) often has a fatal
odour. That acute abscesses in this region should differ as regards their microorganisms from those found elsewhere, can only be explained by supposing that the bacteria have found their way thence from the rectum, although there may be no apparent communication with the gut. It might have been expected that a similar exception would have been found at the other extremity of the alimentary tract; but in the abscess of the jaw already described, in other cases of pus near the mouth, to be mentioned hereafter, only micrococci have been found.

Mammary Abscess. In hospital practice, it rarely happens that cases of acute abscess are seen sufficiently early to test the condition of the blood. Before the formation of pus has actually occurred, it is uncertain whether the organisms, subsequently found in the pus, are at that stage circulating throughout the body, only at a later period settle down in certain areas favourable to the formation of pus.
Hence, one was glad to have the opportunity of examining the blood of a patient threatened with a mammary abscess, but whose pulse could not be felt. This patient was an anemic woman, twenty years of age, admitted a month after confinement, in consequence of an inflamed condition of the left mamma. When first seen, no fluctuation could be felt in the breast. The blood, removed with the usual precautions, from the right ring-finger, was subjected to examination. Cultivation in nutrient-gelatine attempted. On examining the cover-glass preparations of blood, not a single micrococci could be found (Fig. 11). The cultivation experiments carried on at a temperature of 35°C for eight weeks, yielded only negative results. With this apparently healthy condition of the blood, would this inflammation go on to the formation of pus? An abscess did form, 9 days after the blood had been examined, required an incision. In the pus, after being stained
by Gram's method, there were seen many micrococci, isolated, in clusters, occasionally in the form of tetrads, the cocci measuring from .5 to .8 μ in diameter (Fig 2 Pl. VI). The organism was readily grown in gelatine. A cover-glass preparation, stained with methylene blue, is shown in Figure 3 Pl. VI. The measurements of the cocci here were .6μ to .8μ.

Twenty-one days after inoculation the gelatine (Fig 1 Pl. VII) which had been kept at 16°C showed a cup of liquefied gelatine one centimetre in diameter with an opaque mass of growth along the needle track. The surface was slightly concave, the liquefied gelatine at the upper part was clear, but lost its transparency as the heaped orange granular deposit was reached at the bottom of the cup. The growth along the needle-track, proceeding from the deposit was made up of yellowish-buff coloured grains, isolated only at the lower part.

On agar, kept at 35°C for twenty-four hours, the growth consisted of a white semi-
translucent streak, three millimetres in width, resembling a layer of thin gypseous-white, the growth at this stage not having assumed an orange tint (Fig. 7iv) which it subsequently did. On peat at 10°C for six days, a moist orange-coloured layer covering an area eight millimetres in diameter was formed (Fig. 8vii). On the surface of gelatin at 10°C, it formed a finely granular layer, liquefying the medium sinking to the bottom as a granular orange deposit. From the above character, this organism will be recognised as Staphylococcus dysgenes Aureus.

On December the sixteenth, eighteen days after this abscess was opened, 9 during the formation of pus in the opposite mamma, the blood from the finger was again examined, but the results, as on the previous occasion, were negative as regards the presence of this organism.

In this case there is unfortunately one fallacy which prevents my draw-
From any conclusions from it with regard to the condition of the blood prior to abscess formation. The fallacy lies in the difficulty of deciding when the formation of pus actually took place owing to the depth at which suppuration occurred. But apart altogether from this, the case is interesting in another respect; for it bears out the observation made some time ago, that in many abscesses arising deeply, a Staphylococcus is found, while in those whose origin is superficial, the organism is a Streptococcus.

Whitlow

The drawing in Plate I (fig. 4) represents pus from a whitlow caused by a wound with a bread-knife fourteen days previously. The wound healed readily, but ten days afterwards a whitlow formed. A requiem incision. The pus which escaped contained micrococci only. In the drawing, near the centre of the field some are seen to occupy the interior of a pus cell.
In such a case as the mammalian abscess just recorded, little difficulty was experienced in keeping the wound part in an aseptic condition, and consequently in examining the pus at intervals, no organisms but microscopic were found. But in the Abscess of the Wrist, next to be described, where the subject was an out-patient constantly using the arm and doubt displacing the dressing, the result was very different. The history of the case is somewhat obscure, but the facts, as given by the patient, are that six years ago she received a wound of the little finger, which ulcerated, that during the healing process a swelling appeared on the anterior aspect of the wrist. This remained stationary until October 1887, when it became red and painful. Such is the history given, but considering that during that period of six years, the patient had two been and, it cannot be relieved upon. On opening the abscess in November, pus was obtained with the usual precautions.
prevent contamination. Between Fin-
side the pus cells (Fig. VIII) chains of mi-
crococeci were seen, the organisms being
a diameter of from 0.6 to 0.8 µ. When
cultivated in gelatine at 35°C for a
month, the growth was so that
it consisted only of yellowish-white points
one millimetre in diameter. The gelatine
was not liquefied by the growth. These
points were found to consist of a step-
tococcus measuring from 0.5 to 0.75 µ in
diameter. In subsequent, make fur-
ther cultivations, I found that this
organism was Streptococcus Pyogenes.
Five weeks after incision, the abscess
was found to be still discharging.
I again examined the pus. The
case had during the whole of this time
been dressed antiseptically. In addi-
tion to many micrococci (0.75 µ indiam-
eter) in point 9 chains, rod-shaped or-
ganisms 0.75 µ long and 0.5 µ broad
were seen (Fig. VIII). Usually two were
found together, end to end. Again on
December 13th the pus was examined.
If these rod-shaped bodies were still present (Fig. 8 viii)

Abscesses. I have already drawn attention to the peculiar feature presented by abscesses near the rectum, namely, the presence of bacilli as well as micrococci. The second of these cases was a small abscess containing two draehms of pus, situated between the coccyx and the skin. It had been in existence for only five days. No cause could be assigned. In the pus from this abscess, many bacilli were seen, some inside the pus cells. These bacilli were, on an average, 0.75 µ long and 0.4 µ broad, but the length was sometimes 0.9 µ. Micrococci 0.6 µ in diameter were also frequent, mostly in pairs, but the bacilli formed the most prominent feature (Fig. 8 ix).

It might be urged that these bacilli had not been derived from the rectum, but had come from a sweat duct in which the abscess had origi-
rated. That bacilli might be derived from such a source cannot be denied.

Preference to the drawing of pus from an acne spot shows that very clearly.

Here (Fig. 8, No. 8) bacilli may be seen as well as micrococci. But in the case of
this abscess over the coccyx, this, I submit, was not the origin of the
bacilli, for the abscess was too deep-
ly placed to be reached by a dust
from the skin.

In abscesses of the serotum, I have been
unable to find any other organisms
than those micrococci which usually
accompany acute suppuration. In
Figure 1, Plate X is shown pus from an
acute abscess in this region. Of its cause
nothing could be learned; but there
was no evidence of its being gonoro-
chia in origin. Micrococci measure-
ing .5 millimeters in diameter were present
in the form of short chains. Diplococci
also were found but not in part
from which the drawing was made.
Protothorax. In the adjacent sketch (Fig. 1) is seen blood taken from an inflamed area in the parotid region, which formed thirteen days after plugging the posterior nares for severe epistaxis. Cocci were found scattered throughout the blood. In the field from which the sketch was made, there were seen a tetrad of diplococci to a single microorganism. On the following day pus formed in this region, contained many micrococci.

Gonorrheal Ophthalmia. It might have been expected that pus in ophthalmia would be contaminated with a variety of organisms derived from without, but in the one case which I investigated only a microorganism was found. An adult male W.G. accidentally inoculated his left eye with pus from acute gonorrhea of which he was the subject at the time. The ophthalmia had been in progress for three days when the pus was examined. The thick pus mixed with tears was smeared upon cover-glasses for examination. 9 gelatin
tubes were inoculated for cultivation. In the cover-glass preparation of few, few cellular elements could be seen (248 X). The whole field was occupied by fibrin
ous, fatty, granular material, among which a few, very few, micrococci were seen, measuring from .6μ to .85μ in diameter, arranged in pairs. The
growth of this organism in gelatine was rapid. Fig 4. X shows a coverglass preparation of the growth, Fig 1. X is a photograph taken on the twentieth day. The upper portion of gelatine had been liquefied by the organism, presented a cloudy
opacity which subsequently settled down as an orange deposit with a granular appearance. The growth along the needle track was made up of orange coloured
granules of various sizes.
On agar at a temperature of 35°C, a streak three four millimetres wide had formed in twenty-four hours (242 X). This streak had a moist white, semi-translucent appearance. The margin was slightly
irregular. This growth became opaque coloured.
Records of Temperature, Pulse, Respiration and Stools, from 25th Day of November

In the case of Helen Ewing, Aged 13 yrs. Occupation

<table>
<thead>
<tr>
<th>Day of Month</th>
<th>25 16 17 18 19 20 21 22 23 24 25</th>
</tr>
</thead>
<tbody>
<tr>
<td>Day of Illness</td>
<td>1 2 3 4 5 6</td>
</tr>
</tbody>
</table>

Pulse: 86 85 87 88 89 90 91 92 93 94 95

Respirations: 28 29 30 31 32 33 34 35 36 37 38

Stools: 1 2 3 4 5 6 7 8 9 10 11
Orobolus (Fig. 3 Rxi) a moist growth formed which by the tenth day had covered an area five millimeters in diameter, had become of an orange colour. This organism was Staphylococcus pyogenes Aureus, the same organism that I found in the mammary abscess.

Observe Arm. In the case next to be described, the cause of acute suppuration is somewhat doubtful. A healthy girl, fifteen years of age cut the palmar aspect of her finger with dyed worsted which she was winding. This healed but was followed ten days later by a swelling over the tendon of the finger. Had this inflammation been due to the wound of the finger, it might have been expected that it would have occurred along the course of the lymphatics leading from the palm, not on the posterior aspect of the limb. When admitted on November 25th the temperature was 100.2° F as is shown in the chart.
There were other symptoms of febrile disturbance, due to a small collection of pus in the cellular tissue over the lower end of the triceps muscle. Before this abscess was open, I purified the finger of the opposite limb. I allowed it to remain in lint (steeped in one-to-twenty carbolic lotion) for an hour, then I picked the finger and obtained the blood for examination for cultivation. In the blood no micro-organisms could be found (Fig. 32 viii). The inoculated gelatine tubes remained sterile although incubated for six weeks. That same day an incision was opened on the same day that the abscess was opened and the pus was the only material seen. They measured .75 mm. in diameter. No chains could be found. When cultivated these cocci varied in size from .6 mm. to 1 mm., and were found to be Staphylococcus Pyogenes Albus. A photograph of the growth in gelatine is shown in Plate VIII Fig. 4. It there is seen a cup of liquefied gelatine with a gram
For white deposit, I a piece of very fine gravis leading down into the solid gelatine.

On agar I plated, the organism grew readily but its development of pigment took place, thus differing from the staphylococcus pyogenes aureus.

While engaged in making these observations on microorganisms, I was compelled to suspend laboratory work in consequence of an attack of Acute Nasal Catarrh. In some respects this was fortunate, for it gave me the opportunity of comparing with some of the foregoing cases, persisent discharge freely exposed to contamination from the air. The first preparation (7/8x11) was made from discharge taken when the catarrh was most severe. Composed of cells showing active nuclear proliferation, the discharge contained only one or two bacilli micrococci. Thus in the field from which the sketch was made, only one micrococci two bacilli are seen. This discharge
had been taken at mid-day. On the following day, the nasal discharge was taken early in the morning and presented an entirely different appearance. Surrounding the corpuscles, I amid the sheaths of mucous, were many micrococci and bacilli. And this difference between the discharge obtained in the morning that emitted during the day was observed on several occasions. Thus, on the sixth day, in the afternoon, I could detect many few microorganisms in the secretion, but the discharge collected early in the morning on the seventh day was loaded with them. Such appearances as represented in Fig 2 Pl. XIX were by no means rare. Here may be seen micrococci in chains, clusters, single; bacteria, bacilli including a comma-shaped bacillus, Diplos. These were found both around and inside the cell. A drawing of the original impure cultivation of these organisms is shown (Fig 3 Pl. XIX), but no attempt was made to separate the different varieties.
All the preparations of the nasal discharge seemed to suggest that, in acute catarrh at least, the discharge during the day is not allowed to remain sufficiently long in the nose for the multiplication of organisms to go on to any considerable extent, that it is only during the night, when the medium remains comparatively rest and at a suitable temperature, that active proliferation takes place.

Anyone who has suffered from acute nasal catarrh must have felt that the condition was something more than a mere local one. And in my own case, I examined the blood of the finger in order to ascertain whether any organisms were present in the general blood stream. I found at one point of the stained preparation, a tetraecoccus, of which the segments measured .35 μ in diameter (Fig 4, Oxiii). Other duties prevented me making any cultivations of this organism, but it would be interesting to know its significance.
Infective Processes.

Hitherto, I have directed attention to cases of simple acute suppuration, unaccompanied, except in the case of Oxychlea, by any evidence of constitutional infection. Of these cases, some have been acute abscesses for situation not exposed to contamination from without, containing micrococci only; two have occurred near the rectum, and in these bacilli as well as micrococci have been found; and others have been found situated equally near the buccal cavity, but in these no bacilli have been present. Others, again, as Oxychlea, nasal catarrh, &c., have been cases in which there was a free source of contamination, for these a variety of organisms have been present.

And now I propose to describe cases which from their nature are usually classed under the head of infective processes. The first of these was a case of spreading Syphilidialitis of the arm in a boy, fifteen years of age. This boy had
neglected a small lacerated wound of the right thumb; it was a result, although the wound healed, an inflammatory swelling appeared at the root of the thumb six days after the injury. When admitted to the hospital, the hand was swollen and very painful, and irregular red lines were seen coursing towards the internal condyle up the front of the arm, evidently the inflamed lymphatics. The gland above the internal condyle, and the axillary lymphatic glands were swollen painful.

After humidifying the hand with one to twenty carbolic lotion for an hour, a puncture was made in the inflamed iliac anacrinence, and blood was obtained for examination; (for suppuration had not yet taken place.) The blood was found to contain isolated micrococci measuring from .4 to .5 mm in diameter. At one place a shot chain of three was observed (Fig. XXIV). Two days later pus formed in this inflamed region, the Staphylococcus Pyogenes was cultivated from
it (Figs 2/3 Plate XIV)

An examination was also made of the blood from another part of the body. The finger of the left (uninflamed) hand was selected for the purpose, I purified in the usual manner. In this blood, an organism was absent, but not the same as that obtained from the right hand. It was present in very small amount (Fig 2/4 Plate XIV), but was cultivated without difficulty. Figs 1 (Plate XV) is a cover-glass preparation for a growth of it in gelatine. It was composed of cocci varying from .75 µ to 1.25 µ in diameter, arranged in chains, without any sarcoma-like arrangement. This organism differed materially from the streptococcus in mode of growth. It made eye appearance. Its growth, unlike the streptococcus, was rapid even at 16° Centigrade. Figure 2 Plate XV shows a growth of nine days in gelatine at 18°. On the surface, there was a rounded elevation four millimeters in diameter, with a smooth most surface of a bright lemon yellow colour. The margin of the growth was well-defined, slightly lobed, & level with the
surface of the gelatine. The deep growth, which formed a pencil one to half millimeter in diameter, was composed of a fine central stem to which were attached small spherical buds varying in size up to 1/4 of a millimeter. This growth along the needle-track had a lemon-yellow colour, with a buff tint when viewed through the gelatine. This organism did not liquefy gelatine.

An equally luxuriant growth was obtained on agar. Fig. 3 Plate XXV is a coloured photograph taken on the twelfth day. The cultivation was carried on at 18°C, and the streaks were made on the surface of the agar. This growth had the same characters as the surface growth in the gelatine tube. It formed a beautiful moist lemon-yellow streak, three millimeters wide, with no tendency to become terraced like yellow Tortula, but preserving a uniform glistening surface.
Records of Temperature, Pulse, Respiration and Stools, from 10th Day of December 1888

In the case of Charles Tipton
Age: 3 Occupation

| Day of Month | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 31 | 32 | 33 | 34 | 35 | 36 | 37 | 38 | 39 | 40 | 41 |
|-------------|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|
| Temperature | 98.6| 98.5| 98.4| 98.3| 98.2| 98.1| 98.0| 97.9| 97.8| 97.7| 97.6| 97.5| 97.4| 97.3| 97.2| 97.1| 97.0| 96.9| 96.8| 96.7| 96.6| 96.5| 96.4| 96.3| 96.2| 96.1| 96.0| 95.9| 95.8| 95.7|
| Pulse       | 88  | 89  | 90  | 91  | 92  | 93  | 94  | 95  | 96  | 97  | 98  | 99  | 100 | 101 | 102 | 103 | 104 | 105 | 106 | 107 | 108 | 109 | 110 | 111 | 112 | 113 | 114 | 115 |
| Resp.       | 80  | 81  | 82  | 83  | 84  | 85  | 86  | 87  | 88  | 89  | 90  | 91  | 92  | 93  | 94  | 95  | 96  | 97  | 98  | 99  | 100 | 101 | 102 | 103 | 104 | 105 | 106 | 107 | 108 |
| Stools      |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |

Records of Temperature, Pulse, Respiration and Stools, from Day of 18

In the case of Charles Tipton
Age: 3 Occupation

| Day of Month | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 31 | 32 | 33 | 34 | 35 | 36 | 37 | 38 | 39 | 40 | 41 |
|-------------|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|
| Temperature | 98.6| 98.5| 98.4| 98.3| 98.2| 98.1| 98.0| 97.9| 97.8| 97.7| 97.6| 97.5| 97.4| 97.3| 97.2| 97.1| 97.0| 96.9| 96.8| 96.7| 96.6| 96.5| 96.4| 96.3| 96.2| 96.1| 96.0| 95.9| 95.8| 95.7|
| Pulse       | 88  | 89  | 90  | 91  | 92  | 93  | 94  | 95  | 96  | 97  | 98  | 99  | 100 | 101 | 102 | 103 | 104 | 105 | 106 | 107 | 108 | 109 | 110 | 111 | 112 | 113 | 114 | 115 |
| Resp.       | 80  | 81  | 82  | 83  | 84  | 85  | 86  | 87  | 88  | 89  | 90  | 91  | 92  | 93  | 94  | 95  | 96  | 97  | 98  | 99  | 100 | 101 | 102 | 103 | 104 | 105 | 106 | 107 | 108 |
| Stools      |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
Charles Telford, aged six years, was admitted to hospital suffering from severe pain in the left inguinal region. It was stated accompanied by seborrhoea febrile symptoms. It was stated that, five days before admission, he had been kicked in this region by a schoolmate. This occurred at mid-day. He was able to walk back to school, but on his way home, three hours after the injury, he felt cold. His teeth chattered. He was inclined to vomit. But it transpired on further questioning that the boy had not been in quite his usual health for some days before. When the patient came to hospital on December 19th, there was considerable febrile disturbance (Note chart opposite). Abdomen was found to be a localized peritonitis above the left inguinal region, but no external evidence of the alleged kick. On the following day, the patient's condition was aggravated by an attack of bronchitis. Fluctuation of an abscess in the lower part of the left tendon towards the anterior aspect, a circumscissed inflammatory swelling in front
of the knee-joint. At this time the blood, taken from the finger, was examined in order to find, if possible, some cause for these various conditions; for it was quite evident that they were due to some common cause, rather than to a mere local cause. The first impression gathered from the preparations was that there were no organisms present in the blood, but further examination under the oil immersion lens revealed a diplococcus, here and there, each coccus having a diameter of .7 microns (Fig. 1, P.XVI). Although this could be seen with coverglass preparations, it could not be cultivated in nutrient gelatine.

On the following day the swelling near the ankle was opened by T. Caird, Jin the pus there were many micrococci (Fig. 2, P.XVI) varying in size from .6 to .7μ, arranged in chains. In nutrient gelatine, even at a temperature of 16°C growth rapidly took place. The appearances of the gelatin tube, ten days after inoculation from the original culture are represented in figure 3, P.XVII.
The following is the description of the growth on the tenth day after inoculation. The gelatin is liquefied in the form of a cup, seven millimetres in diameter. On the surface of this liquefied gelatin there is a thin grey-brownish film (but no pellicle) below this the liquid is comparatively clear; but at the bottom of the cup, there is a thickened up orange deposit. Looking down from this, there is a fine buff-coloured pencil composed of very minute dots, without any tendency to branch out into the surrounding solid gelatin. Under the microscope, this growth was seen to be composed of cocci, 0.5 to 1.5 μ in diameter, in clusters lying (Fig. 4, Exvi)

On agar at 35° centigrade a continuous streak five millimetres wide, formed in twenty-four hours (Fig. p. Exvi). This resembled a growth of Staphylococcus Pyogenes Albus, but, by the tenth day, the oldest part has become orange colored, on potato a similar orange colored layer was formed.
From the above characters, it is evident that the organism was Staphylococcus Pyogenes Aureus, the same that was found in the Mammary Abscess (Page 25) but differing from that found in the simple Abscess of the Arm (Page 34). The swelling at the knee subsided, but on December 20th, an abscess formed in the lower part of the serotum, requiring incision. The pus contained a microcosm identical in appearance and measurements with that last described, but cultures were not made. These abscesses ceased to discharge, the patient left the hospital well. The exact nature of this case, it is difficult to decide, but it is highly probable that these various conditions in the peritoneum, bronchial muscles, membrane, knee, leg, were all due to the same cause. Whether the diplococcus in the blood, of which I could not obtain cultures, was the cause cannot be decided. If these changes were due to the Staphylococcus Pyogenes Aureus alone, it is difficult to ex-
plain why so little constitutional disturbance should have been associated with its presence in the mammary abscess & others where it has been found. In the mammary abscess, the constitutional disturbance was simply what one expects to find in simple acute suppuration & gave rise to no anxiety whatever. But so severe were the general symptoms in this boy's case, that-for several days his life was dejected of. It might be argued that in the case of the boy, the organism had found its way into the circulation, whereas in the other case, it was confined to the mammary in which suppuration took place. But, against this explanation, there is the important fact that while the mammary abscess was still discharging another abscess formed in the affected breast. That this could account for the patient could account for this difference in the effect of the organism, so disposed by observing that quite young children may have acute abscesses containing Staphylo-
coccal Diphtheria occurs, without any very severe constitutional disturbance. I am afraid the old explanation of 'some difference in the vitality of the tissues' must for the present be accepted; though I believe that in many cases it simply means that tissues with much vitality or resistance are those in which chemical substances are produced which are unfavourable to the growth of organisms. In other words, I think that it is simply a chemical problem.

The next three cases, though differing much in progress termination, present features which entitle them to be classed together. The first was a case of Acute Otitis with some symptoms of Pyaemia, but in which the diagnosis was very difficult. I was not dissuaded simplified by the excellent recovery of the patient. The second is a case of Cancer of the Rectum accompanied by Chronic Pyaemia. And the third is a case of Perforating Ulcer in which an attack of Acute Pyaemia rapidly
**Records of Temperature, Pulse, Respiration and Stools, from 30th Day of October 1899**

*In the case of Sydney Bell, Aged 17 years. Occupation [Blank]*

| Day of Month | 30 | 31 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 31 | 32 | 33 |
| Pulse        |    |    |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| Respiration  |    |    |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| Stools       |    |    |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
Sydney Bell, aged 18 years, had, as a result of a cold, suffered from an attack of acute otitis of the middle ear, leading to rupture of the tympanic membrane. The discharge of purulent fluid. When a child, he had scarlet fever, but no ear symptoms manifested themselves at that time. And he had never suffered from chronic suppuration of the middle ear, a point of considerable importance in considering the subsequent progress of the case.

In consequence of pain in the left side of the head, headache, disturbance, he came to the hospital fourteen days after the rupture of the tympanic membrane. This was on October 30th. The ear at that time was freely discharging very fetid pus. The patient was irritable, had a shock pulse. The temperature on being taken was found to be 103.8°F (indicate on first page). A careful examination was made for signs of cerebral abscess, but it was not thought that the symptoms warranted any operative interference.
The purulent discharge, as I have said, was very frothy, and, after being stained with methyl-violet, was found to contain micrococci and rod-shaped organisms in very large numbers (Fig. XX). This examination of the discharge was made when the patient came into hospital. Before any local antiseptic means had been adopted.

At the same time the patient's blood was examined. The coverglass preparation showed a chain of four micrococci (Fig. XX) measuring 0.5 to 0.6 μ in diameter. The growth of this organism was very slow given at 35°C. At the end of two months it consisted merely of a slight white deposit at the bottom of the test tube, with no permanent liquefaction of the gelatine. The deposit was found to be composed of a streptococcus, of which the individual cocci measured from 0.5 to 0.7 μ in diameter, resembling the organisms described on pages

as occurring in an acute abscess of the neck. Here again, the difficulty of obtaining cultivations made it
impossible to decide whether it was Streptococcus pyogenes or not. In the first few days after admission, progress of the case was not satisfactory. The pain in the head became more severe. The patient sank into a listless condition, taking little heed of what was going on around. But on November 6th, seven days after coming to the hospital, the senses became less dull. A new symptom then manifested itself; for the patient complained of severe pain in the left shoulder-joint which was aggravated by the slightest movement. On examination, there was found to be some distension of the joint itself; during the next few days, the muscle around the joint, especially the deltoïd, underwent acute atrophy; during the recovery the joint became partially ankylosed.

During this time, the ear was syringed three times a day with a saturated solution of boric acid. The effect of the antiseptic upon the microorganisms in
the discharge was now manifest. The
faecal odour had disappeared. The number
of organisms became considerably dimin-
ished. The difference between the discharge
before and after treatment is well brought
out on reference to Figures 192, Plate XVIII. Fig.
represents the discharge when the patient
entered the hospital; Fig. 2 shows the pus
after two days' treatment with boracic
acid. In the latter, the organisms are few
in number, a condition which prevailed
also in all the specimens examined.
The organisms which did still remain
in the discharge were mostly cocci.
Though the temperature was, on more
than one occasion, 104.7, the patient
had no distinct pyæmic region. After
the eighth day the general condition steadily improved, the temperature gradually
falling (see chart to face page 49). But, about
three weeks later, when the patient was
convalescent, he complained of severe
pain in the region of the left mastoid
process - the side where the abscess had
been. This bone was trapped by P. L.
Less Chine, and a few drops of thick pus escaped from the mastoid cells. After this, the patient made an excellent recovery.

The condition of the shoulder joint and the rapid atrophy of the surrounding muscles are very difficult to explain upon any other theory than that this was a mild case of Pyæmia; though the absence of pyæmia rigors and the recovery of the patient are exceptional.

Chronic Pyæmia.

The second case is that of Walter, little aged 50 years, who, for ten weeks previous to admission to the hospital, had suffered from cancer of the rectum, which subsequent examination showed to be a columnar epithelium. When first seen, on October 10th 1887, the patient presented features of cancerous cachexia, but expressed himself as enjoying good health. Before this time there had been an occasional discharge of blood from the anus. On examination, the tumor was found to have extended too far forward into the anterior
part of the pelvis to admit of its entire removal. Consequently, at the operation on October 14th, only the part involving the rectum could be removed. After the operation, iodiform was freely applied to the cut-surface and this was repeated twice a day until healed.

On the evening after the operation, the temperature rose to 101°F (see chart) with only a slight fall next morning. In October 21st, seven days after the operation, a slight attack of orchitis set in on the left side, but passed off during the next few days.

Still the temperature remained high, I on October 27th, I made an examination of the blood in order to find, if possible, some cause for this. The blood was removed from the finger as usual, I in it there were to be seen a few isolated micrococci. On making cultures in nutrient gelatine I on agar, I found that to be Staphylococcus Pyogenes Aureus (Figs. 293 & 219). Photographs of growth in gelatine or agar are also shown (Figs. 292 & 220, Plate xxia).
Here we had a patient with a micrococcus of pus present in the blood, although there was no evidence of abscess formation in any part of the body. On November 24, six days after the organism had been demonstrated in the blood, a small abscess formed in the left glutal region, was opened on November 25. The pus from this glutal abscess contained chains of micrococci measuring from .5 μ to 1.7 μ in diameter (Fig. Plate XIX). In making cultivation on nutrient gelatin, the growth of this organism took place more slowly, did not produce liquefaction so readily as the micrococcus obtained from the blood. Thus after the cultivation had been carried on through several generations, the two organisms were quite indistinguishable. They were both Staphylococcus pyogenes aureus (Fig. Plate XX).

On Nov. 12, an abscess formed in the left side of the axilla Dragoon mechanic. And the pus contained the same micrococcus (Fig. Plate XX).

Two days later, a small ulcer formed
over the outer malleolus of the left foot, the pus which formed under the antisepic dressing contained only micrococci, measuring from 1.6 to 1.75 μ (Fig. 3, Plate XXX) but as no cultivation was made, I cannot say whether it was Staphylococcus epidermis or not.

Although on November 20th I failed to find any organisms in the blood, I made cultivations of the staphylococcus from the blood again on November 22nd (Fig. XXX). The patient became gradually more anaemic, the temperature showed still the evening rise, but as yet, no pyæmic rigors occurred.

On November 25th, a small pustule formed in the skin of the buttock. In even here, where contamination with skin organisms such as were seen in Acne might have been expected, only a micrococci could be found (Fig. D, XXI). It was present in considerable amount, in clastic form, the measurements were from 5 μ to 8 μ.

Again on the following day, another
abscess required to be opened. A drawing of the pus is shown in Plate xxix (fig. 2). At once, the eye observes a complete change in the character of the organisms present. In the field here depicted, only two micrococci from one chain of four are seen; all the rest are rod-shaped organisms. And the first culture in gelatine (fig. xxxi) was seen to differ materially from any cultures obtained in this case. Not in this sudden change in the character of the organisms difficult to explain. For this was an abscess in the rectal fossa. And I have already pointed out that the characteristic feature of pus from this region is the presence of organisms other than clostridial. What the exact organisms in this case actually were, I am not yet in a position to say, but this much I may safely commit myself to, that *Bacterium Tenebrisc* is not present, nor the Bacillus which I isolated from the first case of echino-
rectal abscess which I described (page 20).
In speaking of these abscesses in this region I brought out as the most probable ex-
planation of the presence of these bacilli that they were derived from the gut in some way. And in this particular case, there was a striking resemblance between the pus from the abscess and that discharged from the granulating wound of the rectum made during operation, although (Fig. 41 XXI) although in the clinical sense of the word, there was not the slightest communication between these two areas.

The patient's condition became gradually worse, but it was not until January 21st, that any new symptom showed itself. On that day at 10 A.M. a well-marked pyramidal rigor occurred, lasted thirty minutes. In consequence of the hour at which this occurred it is not shown except in dotted lines in the temperature chart on page 54.

A few days later the patient was removed from the hospital to his home in the country. At that time rapidly
sinking from the combined effects of cancer and chronic pyaemia; and he then ceased to be under my observation.

Of the features of this case, undoubtedly the most interesting and important is the discovery of a microcoscus in the blood before abscess formation had taken place in any part of the body, and the subsequent discovery of what came to be known as the first abscess which formed. Another feature of no small importance is the recurrence of microcoscus in every abscess until the ischionecetate fossil is reached, where bacilli make their appearance in the pus.

Acute Pyaemia. While the last case was still under observation, time was brought to the hospital a man, Henry Smith, 44 years of age, suffering from Locoenteritis. He had anesthenia of the lower limbs, abolition of the deep reflexes, & passed feces in urine involuntarily. The diagnosis of locoenteritis was fully confirmed by post-mortem examination of the spinal
cord. But it was not in consequence of these symptoms that he was admitted for the condition which compelled him to seek admission was a foul suppurating wound on the outer aspect of the ankle, the extent of which may be judged by reference to the photograph taken after amputation in which the bare end of the fibula can be seen projecting. This suppurating cavity - for the wound which had been made to allow the escape of pus was comparatively small - had evidently resulted from a severe acute inflammation of the astragalus, so severe indeed that while being dressed the entire bone in a necrosed condition dropped out of the cavity formed by the walls of which even formed hip bones all more or less necrosed. Whether this suppuration had been secondary to a perforating ulcer which had existed, is a point which does not at present concern us, for there was quite sufficient in itself alone to indicate a course of pyemia...
Records of Temperature, Pulse, Respiration and Stools, from 12th Day of November.

In the case of Henry Smith, Aged 44, Occupation.

Day of Month: 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 1, 2, 3.

Day of Disease: [Legend for temperature fluctuations present, but not transcribed here.]

Temperature: [Graph showing temperature fluctuations over time.]

Pulse: [Legend for pulse rate present, but not transcribed here.]

Respiration: [Legend for respiration rate present, but not transcribed here.]

Stools: [Legend for stools present, but not transcribed here.]
infection.

After admission, the patient frequently had severe pyrexia, rigors (fever, chills, etc.). There were evidently two things which it was important to examine: the pus from the ankle, and blood from the general circulation. Accordingly, I made an examination of the pus on November 18th. I found in it micrococci Bacilli, (Fig. Rxxii), but owing to an accident I did not make cultivation on this day.

Blood from the finger was examined and gelatine tubes inoculated in the usual manner. In the cover-glass preparation, these were to be seen single micrococci, and occasionally a diplococcus, but the most interesting organism was a bacillus of which only one was seen. This measured 2 micromillimeters long and 0.7 of a micromillimeter broad. The cocci measured 0.6 of a micromillimeter in diameter. In the gelatine tubes, however, neither of these organisms grew. The pus from the wound was sent...
examined on November 20th, it contained a streptococcus, & a bacillus, the average measurements of which were: length 19 μ, breadth 7.5 μ (Fig. 22). On this occasion the bacillus was readily cultivated, & after some time, separated in a pure condition. Measurements of a number of the bacilli gave the following dimensions:

Length 1.514 μ,
Breadth 0.547 μ.

This bacillus was cultivated through many generations & always presented the same character (Fig. 22 & Fig. 23). It is a motile bacillus, with rounded ends, & producing spores. Two rods may often be seen end to end, but the most prominent feature is a parallel arrangement of a series of rods (as though resulting from longitudinal division). These at an angle to another series of rods. In nutrient gelatine an abundant growth is obtained in a few days at 16° centigrade; at 35° the growth is very rapid. This bacillus grows more rapidly than Staphylococcus pyogenes, but does not liquefy gelatine.
live anything like so quickly as Bac-

erium Terrae." I have inserted a photograph
of the growth in gelatine on the ninth day
at-16° C (Fig. Plate xxvi), of which the following was
a description. "On the surface there is no pelletite.
The gelatine is liquefied in the form of a cup,
while liquid is oozing from the presence of
minute grey particles. The growth presents
no iridescence or green tinge. There is a ome-
ground-white flocculent deposit. From this
there is prolonged down into the solid gelatine
a continuous pencil composed of disks
varying in size, the largest being half a
millimetre in diameter. A fishy fishy odour
was given off from the gelatine."

On agar kept at 30° C a streak four milli-
metres wide was obtained in twenty-four
hours (Fig. Plate xxvii). It was composed of a per-
fectly white moist film, resembling a twenty-
four-hour growth of Staphylococcus
Enogenes Aureus or Albus. The margin was
slightly wavy. I in the liquid at the bottom
of the surface there was a slight, white
flocculent deposit. The same fishy odour
was observed here also. In the further growth
this streak always retained its white appearance.

On potato at 18°C there formed a perfectly white film which in five days measured a centimetre in diameter. The change of this film was very abrupt (243 R.XIV).

I have hitherto been unable to identify this organism with any of those previously described; but until I have had further opportunities of studying its pathogenic properties, I shall simply call it a Bacillus from finger (see appendix page 109).

From the blood of the finger, as I have already said, I was unable to obtain cultivation of any organism, although a bacillus was seen at one part of the preparation. But on November 20th, I again examined the blood I attempted to make cultivations, this time with success. In the cow-glass preparations, there were one or two bacilli measuring 1.2 μ in length and 0.3 μ in breadth. Not more than three were seen in the specimens examined, but a growth rapidly took place in nutrient gelatin incubated at 35°C. In twenty-four hours
a thin pellicle had formed on the surface, I thus I found to be formed of bacilli resembling in non shape the organisms which I obtained from the fecal pus at the amble (Fig xix). But, much as this bacillus obtained from the blood resembled that from the pus, I found on making fur the cultivation that its naked-eye characters were entirely different. It differed from that bacillus in the following respect: it formed a distinct pellicle on the surface of gelatine; the liquefied gelatine remained perfectly clear; so long as the pellicle was not destroyed no deposit formed in the tube and lastly, its growth did not give rise to the fetid odour which the Bacillus from wound did.

On agar at 35° centigrade this bacillus from the blood formed in twenty-four hours a a dull grey skin which covered the whole surface of the medium which was a centimetre in a half wide, but no fetid odour was detect evoked. (Plate xxvii). See Appendix foot of page 109.
Two days later the pus was again examined, I found it to contain micrococcii as a few large bacilli (Fig. 22 Xxiv), and cultivation were made in gelatine. The bacilli isolated from this pus was the same as that which had previously been obtained from the ankle. A colorless preparation is shown in Figure 2 Plate Xxiv.

On November 20th, amputation was performed at the junction of the middle third of the leg, in order to stop the absorption of septic material. A scraping from the cartilaginous surface of the tibia, which was much eroded, was obtained immediately after the operation, 1 in. in length 1.6 mm. breadth (Fig. 3 Xxiv), but no cultivation were attempted.

On the following day, December 1st, the stump was dressed. The serous discharge which escaped was preserved for examination. It is interesting to observe that in this discharge, no bacilli were present, but only a micrococcus. It was a streptococcus forming very long chain measuring from 1.6 to 1.8 mm in diameter.
A cover-glass preparation is shown in Figure Xxv. Its growth did not produce liquefaction of the medium.

In December 14th, four days after amputation, the patient died from exhaustion &. At the post-mortem examination, the lungs and other viscera were searched for pyemic abscesses & no trace of abscess formation could be found in any of the viscera. The valves of the heart showed no evidence of endocarditis. In fact, there was no indication of the disease from which the patient had died, until the psoas muscle was reached. Here there was found a large, evidently acute, abscess infiltrating the muscle extending into the pelvis. I made cover-glass preparations of this pur, & found pieces of the muscle into alcohol for the purpose of making sections. The number of micrococci in the pus was quite extraordinary. In many places, more than half the field was occupied by the organisms. It was a streptococcus forming very long chains (Fig. Xxv). The
individual cocci measuring from .5 to .8 μ in diameter. The sections of the muscle showed (what was apparent at the post-mortem examination) that the abscess was of recent origin; for the muscle was in a state of acute inflammation (Fig. 2). Until a more complete examination of the pathogenic properties of these bacilli from the blood has been made, it is impossible to decide what importance should be attached to their presence in acute dysentery; but it may be claimed I believe, that this is the first instance in which a bacillus has been found in the blood of a patient suffering from dysentery.
Gangrene.

Although during the past year, I have not had the opportunity of examining any case of gangrene, I have in my possession the notes of preparations microscopical preparations which I made from a case four years ago (June 1884); and, as the observations then made have never been published, I insert them in this thesis.

It was a case of Senile Gangrene in a man seventy-six years old. It had commenced as a small black spot on the great toe seven months before admission to the hospital. It had only within the last three weeks assumed the active inflammatory character which it presented when I saw the case. It presented the features of a typical case of inflammatory Senile Gangrene, in which the bones of the foot were freely exposed (Fig. 2xxvii).

No examination was made of the discharge from the foot, but attention was confined to the condition of the blood. The arm was thoroughly purified with corrosive sublimate, I an incision made...
into the median basilic vein. Cover glasses were smeared with the blood that escaped, stained with methyl violet, and mounted in balsam. In every part of
the conjunctiva, diplococci were to be seen. Fine micrococci. The measurements of
the organisms were: from 0.6 to 0.75 μ in diameter. Some were inside the white
blood corpuscles (Fig. xxxviii). This perfumed specimen, having been kept from the light,
had not deteriorated in the least since it was prepared four years ago. Unfortu-
nately I did not at that time recognize the importance of making cultures of this
organism, neglected to do this.

The interest of this observation upon the condition of the blood in gangrene lies
in the fact that a "micrococci of gangrene" has been described as occurring in tissues undergoing modi-
fication. But it has not, so far as I am aware, ever been demonstrated
in the blood of the patient except in this case.
Before proceeding to record the cases of chyle
suppuration which have been in the sad
intended to describe together four cases
three of which are Blister, 1 one a case of
Bursitis.

The first was an ordinary blister pro-
donced by the application of liquid es-
trichis over the left mastoid region. It
was employed to promote absorption
of inflammatory products in the middle
tear in a patient otherwise healthy.
The vesicle was allowed to rise for sev-
teeen hours, then the part was purified
by the application of boracic lotion for
an hour. At the end of that time, eighteen
hours after the blistering agent had been ap-
plied, the vesicle was wiped with a
plain of purified sponges. After the escape
of the first few drops of fluid, a sterilized
capillary tube was inserted & allowed to
fill from the bottom of the vesicle. This
fluid was afterwards transferred to
nutrient gelatin & incubated. Cover-
glass preparations of the fluid were also
made I stained in the usual way. Though this fluid seemed to the naked eye quite clear, the microscope revealed a few bodies like masses of protoplasm about the size of a large leukocyte, but no nuclei could be seen in them. With the exception of these bodies, nothing could be seen in the field (Fig. 1).

No microorganisms of any kind could be seen. And the tubercles of gelatin inoculated with the fluid remained sterile although incubated at 35°C for three months. Of course, this negative result in the cultivation experiments might be accounted for on the supposition that the cantharidin absorbed through the cuticle acted as a germicide to the organisms in the serous fluid. But, taken in conjunction with the gross examination of the coverglass preparations where no organisms could be seen, this explanation would scarcely be necessary. (I have no authority for saying that cantharidin is a germicide, but merely suggest that as an objection...
that might be urged.

Now then, we have an inflammatory condition in which the product is serious, associated with it. There are no organisms. There are no cells — no organisms.

A month later, leucor eustacticus was again applied, this time over the opposite mastoid process. The blisters were allowed to remain quiet the same length of time as in the previous case, specified in the same way. The only difference that could be observed in the second case was the presence of a many-nucleated leucocyte here there in the specimen. The number, however, was quite inconsiderable. No organism could be seen. The gelatin tuffs produced no growth.

The third example of a blister differed very much from the two preceding both as regards its cause. The nature of the fluid. It was caused by a severe crush of the limb which produced a compound fracture of the bone. The blister formed on
the front of the leg where the skin was unbroken. The leg was wrapped in corrosive sublimate wool. The blister was not touched until six days after the injury. When the blister was snipped, about half a drachm of purulent fluid escaped. It was collected in sterilized capillary tubes for subsequent examination. An importance difference from the last two cases was manifest in the microscopic specimen. For pus cells were present in large numbers (7g 3PXXIX), I with the cells were many organisms. The organisms were all of one kind, a micrococcus principally in chain form, the growth was very soft in gelatin at -16°C. I have added a coverslip preparation (7g 3PXXIX), but no being quite sure from the plate cultivation that it is a pure growth, I am compelled to postpone a fuller description of it. It is, however, a coccius usually found in pus.

Bunblis.

The case of Bunblis, which may be most conveniently described here, presents some
features of interest from a clinical and pathological point of view. The patient was a man 35 years of age, engaged in unloading railway wagons as an occupation which entailed a good deal of kneeling, thus causing him to have Patellar Bursitis. When he came to the hospital, there was great distention of the bursa, but the part was free from redness, it was painless. In fact, it was only the inconvenience of it that prompted the patient to seek advice.

The method of treatment adopted was incision and drainage.

Before the incision was made, the part was thoroughly cleansed. Then wrapped in lint soaked in one-to-twenty carbolic acid solution for an hour. A small incision was made, and after the first few drops of fluid had escaped, a sterilized soft glass tube was passed well into the bursa. I allowed to fill with the fluid by capillarity. It was a dark purple-coloured fluid, in which under the microscope, only a few threads
Records of Temperature, Pulse, Respiration and Stools, from 26th Day of January 1888

In the case of William Thompson

Aged 37  Occupation  Railway Porter

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<th>Day of Month</th>
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Young's Portland Hospital, Brooklyn.
of fibrous material could be seen (Fig. XXX).
There were no cellular elements. No microorganisms could be seen. No growth took place in the gelatin inoculated with the fluid.
The cat gut drain, which had been put in after the incision was removed on the sixth day. On the following day the patient left the hospital cured.

Although these four cases have been too few to draw any decided conclusions from, they seem, as far as they go, to suggest, that serous fluid may be thrown out even so rapidly without the presence of micrococci; and when microorganisms appear, these cells are also found.
Chronic Suppuration.

Cases of acute suppuration in which antiseptic precautions can be taken to abolish the risk of contamination from without, are of common occurrence; but in chronic suppuration they are very rare. Most of the cases of chronic suppuration which enter the hospital, are those of long-standing abscesses in which antiseptic precautions, if ever adopted, have long since been abandoned. Occasionally, however, it does happen that a chronic abscess requires opening under conditions favorable for observation. Such an opportunity was presented in the following case.

Abscess of Thigh

Margaret D., four years of age, had for eighteen months been troubled with an abscess in the upper part of the anterior aspect of the thigh, possibly connected with the hip-joint. With strict rest in bed, this abscess was kept from pointing; but in December 1887 it became evident that the pus would require to be let out. Under strict antiseptic precautions, the abscess was opened, and I obtained some
of the thick curdy pus for examination. A preparation of the pus stained with carmine is here represented (7 x 2). This specimen was composed of masses of granular fatty material, in which very few cells could be defined. There was also present in the front from which the sketch was made, a chain of four micrococci. This one chain was the only indication of microorganisms in any of the specimens, and even these took on the stain in such an irregular manner (not well shown in the drawing) as to suggest that they were not healthy micrococci.

The attempts to make cultivations in nutrient media failed, as might have been anticipated from the examination of the cover-glass preparations.

I was fortunate in having about the same time another case equally favourable for examination of the pus. This was an abscess over the upper end of the ulna on the anterior aspect, in a boy seven years old. He had got a kick
in this region two months before, I an abscess gradually formed. Though unaccompanied
by any pain, fluctuation could be distinctly
felt. The abscess was opened with anti-
septic precautions, there being no pus es-
caping.
In the pus, after staining with fuchsin there
were seen single micrococci, 0.75 μm in diameter.
At one part, a chain of four, but this was
quite exceptional (Fig. 2). Gelatin tubes were inoculated with pus, I
placed in the incubator. As no growth
seemed to be taking place, after eight-
weeks incubation the gelatin tubes were
withdrawn, I allowed to cool to 38°C. And
then I noticed that the gelatin did not
re-solidify. The reason for this change I
am quite unable to give, as I could not
find any micro-organisms either in the
offered four portions of the gelatine, al-
though I most carefully examined speci-
mens from both these regions in order to
find some cause for the liquefaction
of the gelatine.
Isabella H., age 60 yrs was sent to the ward from the medical house for treatment of an obscure swelling in the loin, which it was thought might be an abscess which had originated in connection with the kidney. Its history dated back sixteen weeks, during which time I up to the day of operation, there had been severe paroxysms of pain, such as might not have been expected in a chronic abscess.

When an incision was made through the abdominal wall in the lumbar region a large quantity of thick yellowish green pus was reached. Owing to the circumstances under which the operation was performed it was impossible to observe the precautions usually taken in collecting the material for cultivation, I consequently I contented myself with making cover-glass preparations. There were granular fatty cells in the pus, but no micro-organisms could be seen at any part of the preparations except one, then the appearance was quite
remarkable; for in a single field (fig. XXXI) there were no less than thirteen chains of micrococci. Whether these were in an active condition, I what the organism was it is impossible to say.

Dr. [Handwritten name]

I have called this next case an abscess, but it is doubtful whether it should not more correctly be called a cyst of catarhal origin. It was situated in the right tonsil of a middle-aged man. It could give no cause for it, and thought that it had been in existence for many months. When the thin wall which separated it from the pharynx was cut, about twenty drops of yellowish-white fluid escaped. A drawing of the fluid is given (fig. XXXI). It contained fatty cells and crystals of cholesterol, but no micro-organisms of any kind were present.

The entire absence of micro-organisms in the last case forms a striking contrast to what was found in the next.
Fever from pain in the humerus for many years, three weeks before coming to the hospital, there had become much more severe. To relieve this severe pain, an incision was made, a hole was bored through the shaft of the humerus into the medullary cavity at the junction of the middle and third thirds of the bone. Here a very small collection of pus was met with, but sufficient was obtained to make microscopic specimens. There were large numbers of micrococci arranged mainly as diplococci in tetrad measuring from 0.5 to 1 μ in diameter. The presence of these micrococci is difficult to explain if this were a chronic abscess. Perhaps it was an acute suppuration in a part of the bone which had previously been in a state of chronic inflammation.

These few cases comprise the only examples of chronic suppuration which have come under my notice, where there was not a possibility of the entrance of organisms from without. And I now...
pass on to a series of cases of suppuration
vexation of the urinary tract
The first case is one of gonorrhea which
had reached the chronic stage. The dis-
charge was mucous in character and contained
very few cells. The organism was present
in the glisting discharge, thus I found on
cultivation to be Bacterium ureae of
which a drawing is given (Fig. 4 XXXI)

Cystitis. James R., a healthy looking man, 36 years of
age was admitted to the hospital in con-
sequence of pain, frequency, and micturition.
Six years before, he had suffered from an
acute attack of cystitis, the result of gon-
orrea. He improved very soon, but
ten months ago it returned. It became
chronic. Catheters were passed ten months
ago. The patient asserts that the urine
always remained 'thick' after that. His
healthy and bright appearance was not sug-

gestive of a man who had suffered
from chronic cystitis, requiring him to
rise every hour during the night to mictu-
rinate, but the subsequent progress
of the case dispelled any doubt that they might have been on that point. For purposes of examination, the urine was drawn off with a catheter, thoroughly thinned in one-to-twenty carbolic solution. It was received into a sterilised plugged glass vessel. When examined, after staining, it was found to contain many pus cells, inside of which were many organisms, rods, chains, I isolated cocci (Fig. XXXII). Varied as seemed these organisms under the microscope, they proved, on making cultures, to be nearly different forms of the same species. It was Bacterium ureae.

After the urine had been thus examined, the bladder was thoroughly washed out with warm boracic lotion (one of boracic acid to forty of water). The bladder was filled again from mix with this solution, and this was repeated every second day for ten days. An interval of four days was then allowed to elapse. The urine was again examined, taking the same precautions in its removal as on the pre-
vious occasion. A decided change was noticeable in the character of the urine when seen with the microscope. Organisms were still present, but their number was comparatively small. They were nearly all in coccus form (Fig. 21). When cultivated they were found to be Bac-
terium Uræae.
Although this method of washing out the bladder proved beneficial to the patient, it did not effect a cure. Two weeks later, perineal section was performed. In exploring the bladder from the perineum, there was found on the floor of the bladder near the right ure-
ter a soft polyoid mass, the removal of which caused considerable hemorrhage. On making a microscopic examination of this tissue, I found it to consist of what resembled an old partially or-
ganized blood-clot, undergoing dis-
integration. Infiltrating this pulsy substance were many microorganisms in clusters 9 chains, resembling those previously found in the urine, I all in coccus
form.

The bladder was drained for twenty-four days by a tube in the perineum. Then the tube was removed, the urine allowed to flow by the urethra. The urine which was now coming from the urethra was examined; but the first few times it was passed this way, it was neglected, so that the urethra which had not been used for twenty-four days might be washed out. In the urine coming by the urethra there were still as many microorganisms as before (24800x11), but as far as the patient's condition was concerned there was a decided improvement. The pain on micturition had entirely disappeared, & he was able to retain his urine much longer than he could before the perineal section was performed.

The point of especial interest in this case is the presence of organisms in the fatty tissue removed from the floor of the bladder. It shows how hopeless it would be in such a case to attempt to remove all the organisms from the bladder, by simply a mechanical process of washing; and that it would
cally be impossible for any of the ordinary antiseptic solutions to penetrate by diffusion into the centre into the centre of the mass in the time during which it retained germicidal properties; for any antiseptic solution must in such a case soon be diluted by the excreted urine. I thus rendered inert.

**Enlarged Prostate.** Before passing on to the next case of chronic suppuration, I may perhaps be pardoned for making a digression, in order to compare with the last case, the urine of patient with seminal prostatic enlargement. The urine had frequently been drawn off, but never with any but antiseptic catheters. It was perfectly clear in the coarse glass preparations. In the three microscopic examinations, no microbe could be found except in one field, where three micrococci were seen. No growth could be obtained in nutrient gelatin inoculated with the urine.

**Prostatic Obstruction.** In returning to the subject of chronic suppurition, one case in connection with the urinary tract still remains to be described.
It was a chronic abscess of the prostate which for eight months had given rise to frequent discharges of pus in the urine. The cause of suppuration could not be ascertained, but it had originated in an acute attack. Otherwise the urinary tract showed no evidence of disease.

To obtain the pus from the abscess mixed with urine I first contaminated large organisms from the urethra near the meatus, the foreskin purified with concave sublimed bichromate (one to a thousand) covered for an hour with lead-streapd in this solution. At the end of that time a catheter, which had been thoroughly purified, was passed along the urethra until the prostate was reached. Then it was withdrawn, & the eye of the catheter was filled with pus.

In the specimens of the pus stained with methyl-violet, cells of various shapes were seen (figs 3 & 33), & a few rod-shaped organisms. In the drawings, two are seen placed end to end. No micrococci were present. The tubes of Koch's gelatin inoculated with the pus fermented at 38°C, and grew soon
contained a copious growth of the organism, of which a stained specimen is represented in Plate xxxiii (Figure 4). The length of the organism was from one to two and a half micromillimeters, its breadth from 4 to 6 microns. I found on making other cultures that this organism was *Bacterium trachea*, that no other organisms were present.

This completes the cases connected with the urinary tract, in which the *Bacterium trachea* alone has been found. The remainder of this chapter is devoted to cases of chronic suppuration too familiar in every hospital where the suppuring area had long been exposed to the entrance of organisms from without.

A typical example of such cases was a patient with *Otorrhoea*, a man nineteen years old, associated with syphilitic disease of the bones of the middle ear. Beyond the use ofassic lotion at irregular intervals, no local treatment had been adopted, when I obtained the discharge for examination. The discharge had been in existence for many months. The discharge had a very fetid odour.
The micro-organisms present were many. Acetabular (fig. Rxxxiv). There were bacilli measuring from 1.5 to 2 μ in length and 0.6 μ in breadth. Many micrococci from 0.6 μ to 0.75 μ in diameter. There was also present an exceedingly delicate spirillum.

I did not attempt in this case, as in many other examples of chronic discharge, to isolate the different microorganisms present, as that would have required an enormous amount of time. I apparatus beyond my command. But I made coverglass preparations in order merely to compare them with the appearance of acute suppuration.

Epithelomatous Ulcer

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The first figure in Plate xxxiv is a sketch of pus from an epithelomatous ulcer of the lips. Bacteria and micrococci were present in this instance. Occasionally a spirillum might be seen.

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The next two drawings (figs. Rxxxiv) show how different may be the contaminations in these ulcers treated in the same way but occurring at different parts of the body.
The patient in whom these occurred was a girl thirteen years of age who had suffered from Acute Rheumatism 27) seventeen months before admission to the hospital, which was followed by the formation of an abscess of the left tibia, one of the right femur in the region of the great trochanter. From both these abscesses, a sinus was left which never ceased to discharge pus during these seventeen months, & the dressing which had been applied to both places, for some months before I saw the case, was ordinary non-antiseptic lint.

I examined the discharge from both these sinuses & found that the pus from the right thigh contained many bacteria & bacilli together with some micrococci (Fig XXXIV); but the pus from the sinus leading to the left tibia contained micrococci only (Fig XXXIV). After an incision had been made across the sinus, in order to remove the portions of necrosed tibia which were keeping up the discharge, I obtained the discharge three days after the operation. I found only micrococci on that occasion only (Fig XXXIV).
In describing the recto-rectal abscess on page 20, I mentioned the fact that the patient was under treatment for a long-standing sinus of the leg. What he was far advanced in pulmonary tuberculosis, but I delayed speaking of the pus from the leg, as that came under the head of chronic suppuration. Although this sinus had existed for many months, the exact time I cannot say, it had always been treated with antiseptic preparations and dressed with carbolic gauze protective.

Some preparations of the pus from this sinus were stained with methyl violet, and others were stained by the Shibasaka method for tubercle bacilli. In the latter, no tubercle bacilli could be found. In the methyl violet specimen the only organisms that could be seen were micrococci from 0.5 to 1.0 in diameter, which were present everywhere in the field of pus (241, XXXV). These I found to be Streptococcus Pyogenes which in gelatin produced white firm, head points without liquefaction of the gelatin. A colonization specimen is represented in Plate XXXV (24).
Sprint of Elbow  
The two succeeding drawings (Fig. 374. A XXXV) were
made from preparations of pus in a case of a
stomuous abscess near the elbow of a child
thirteen months old. The dressing which was
on at the time I took the pus had only been
on two days, and consisted of a small piece
of protective, two layers of boracic lint, four
lays, corrosive sublimate wool. And the speci-
men of pus show how inefficient this dress-
ing was compared with the carbolic gauge
with which the last case was dressed. Coci-
nae Bacterii are present in great number, I
a spirillum may be seen on one specimen. Every
field was crowded with these organisms.

Tubercular Glands  
The only case of Tubercular Disease of Gynastic
 glands which occurred in the wards was one in
which the site was unusual. It was the
glands in the groin that were affected. The
patient William M., who was eleven years of
age, had suffered from a 'soe' on the foot.
None time afterwards the glands over
the femoral artery at the upper part of
the thigh began to enlarge. I eventually
the skin ulcerated. The pus from the broken
down glands came away. As the discharge still continued, I as there was enlargement of glands above Scapula ligament, the patient came to the hospital. An operation was performed. The operation consisted in excising the enlarged glands, but it was found that these glands were tubercular, that could be no doubt. I have inserted a facsimile photograph (Fig. XXXVI) which shows very well the appearance of a section of the entire gland after injection with carmine gelatin. The non-vascular tubercular masses are seen to form a large part of the specimen. And the microscopic section showed tubule follicles with giant-cells and tubule bacilli.

While the patient was in hospital after the operation, I tried to make coverslip preparations of the discharge, but they were not satisfactory enough for observation. But after the patient had returned home, I obtained pus which gave better results. The wound was entirely healed, except at one point...
where there was a passage leading to other glands which evidently casing. The dressing which the mother of the patient had put on herself three days before, consisted of a piece of protective tissue made long 9 one-half wide. Over this a piece of boric acid lint about half the size. With such a dressing, it is not surprising that the pus should contain a variety of organisms (q2 d xxxvi). But numerous as they were, only two of them in another specimen, were tubercular bacilli (q3 d xxxiv). The preparation from which this drawing was made was stained by Ehrlich-Koch method, consequently only the Bacillus Tuberculosis is stained.

This concludes the series of cases of chronic suppuration. I may give to the last chapter which is devoted to wounds in which an examination has been made of the discharge, in some cases, the blood.
Records of Temperature, Pulse, Respiration and Stools, from 1st Day of November 1887

In the case of

Mills

Age 18

Occupation

Day of Month
4  5  6  7  8  9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24

Day of Disease

Temperature

Pulse

Respiration

Stools

YOUNG J. MURRAY, PUBLISHER, EDINBURGH.
Wounds.

Although time did not permit a systematic enquiry into the presence of micro-organisms in discharges from operation wounds, I made an examination of the discharges in six cases. I found in one of them a very large bubble, which had not been previously met with.

Wound Journ. The first case was an operation for the removal of a cancellous exostosis from the condyle of the femur. The patient was a robust young man, eighteen years of age. The operation was conducted antiseptically. The knee-joint required to be opened before the bony tumour could be removed. The operation was performed on Nov. 9th, and the wound was dressed on the following day. I examined the discharge, and as the temperature was 100°, I made an examination of the blood of the patient also. In the pus there were micrococci present in very great numbers, arranged usually in tubes. Four days (Fig. Axxxvii), a culture in gelatin was obtained (Fig. Axxxvii). But the blood contained no organisms (Fig. Axxxvii).
visible under the microscope, the inoculated gelatin gave negative results.

I examined the blood of the patient to see whether the micrococci in the pus had entered the blood. I was giving rise to the high temperature. But the negative results pointed to some absorption of chlorine products from the wound as the cause. This rise in temperature soon passed off the wound healed well, but somewhat slowly.

Wound of Neck

The fourth drawing in Plate xxxvii shows the appearance of pus from a small wound on the neck. The patient had been operated on for epithelioma requiring the removal of one half of the tongue. At the same time an enlarged lymphatic gland in the submaxillary region was also removed. By a small external incision, it was from this wound that the specimen was obtained. The saliva from the mouth had oozed over the skin. It reached the wound. Hence the presence of a large number of variously shaped organisms such as are shown in the drawing. In spite of this
condition of the discharge three days after the operation, the wound was healed within a week.

The next case afforded an opportunity of studying the absorption of catgut sutures, the relation of microorganisms to them. The patient was a forty-five year old man, sent to the hospital with what was supposed to be a strangulated femoral hernia. Although the symptoms of strangulation were not conclusive, it was thought safer to make an incision to see what the nature of the swelling was. It was found after making the cut, but there was merely a hernia sac filled with a cyst containing thin fluid, that the parts were entirely free from inflammation. The sac was removed, the edges of the skin wound were brought in contact by catgut sutures of medium thickness. We had here then, an example of a simple incised wound in which tissue, free from inflammation, could catgut heal.
been used as a culture. The case progressed very favourably; by the seventh day the wound was entirely healed. The catgut sutures were cut I withdrawn, I was at once transferred to methylated spirit, in order to fix the elements. The catgut was kept there for one day, washed, I put into methylate then cut with the freezing microtome. The sections were cut from three different parts of the Section, which have been marked A B 9 C in the diagram.

Sections were first stained with perin and logwood. Sections A are represented in figure 193 P xxxviii. In these the gut was made up of many strands of finely fibrillated material which readily took on the perin acid, but were not touched by the logwood. No trace of cellular elements could be discerned. This I found was the normal appearance of catgut.

Sections B are shown in figure 2 97 P xxxviii.
but I regret that my burst has failed to convey anything like any adequate idea of the beauty of these specimens. Under the low power (Fig 2) there was seen a basis of catgut strands, stained yellow by the picric acid, and a great many dots which had taken on the hagwood stain. These dots were seen throughout the section, but were most numerous towards the surface. Everywhere, they were arranged more or less in linear columns corresponding to the long axes of the catgut; I apparently between the fibers. Under a higher power (Fig 3) these dots were found to be cells between the fibers. Very few of the cells were round. Most of them were elongated. Some were distinctly spindle shaped. In this specimen it was impossible to define the nucleus of the cells, but in another section less deeply stained (Fig A xxx/1x) it was easy to see that the cells were distorted lancerocytes. One point I would especially draw attention to is, that no sculpturing corresponding to the bowshaped fossae formed when an osteoclast absorbs bone, was
seen near any of the leucocytes. The leucocytes seemed merely to be acting the part of a wedge in splitting up the calyx into many fine stands.

Sections showed the transition between A when no cells were present & B where the leucocytes abounded.

Other sections were stained for micro-organisms by Gram's method. Among the leucocytes at the surface of the calyx a mycetoma was occasionally met with, but there was no trace of organisms in any other part of the section.

In the last case, the wound was acute, & it would have been interesting to have had for comparison, calyx from a septic wound, but the only other case in which I had the opportunity of obtaining calyx was a wound which was also septic free from sepsis.

Wound of ballot was a case of removal of a small cancellous excoriation from the vertebr al border of the scapula in a boy eleven years of age. Calyx was used as a su-
true in stitching the skin, I was wary of the operation, it was removed in consequence of tension in the wound. I made coarse glass preparations of the pus, I hardened the catgut in alcohol previous to cutting section of it.
The pus contained many micrococci, single I in pairs, but no other organisms. The catgut sections presented, as regards cell elements the same appearances as in the previous case, but as regards microorganisms there was a difference; for at one point of the section, I saw short chains of micrococci among the fibres of the catgut, quite away from any leucocytes. Now they had reached that point, it is difficult to say.

Wound of Arm

On November 2nd, 1897 an operation was performed from which convalescence continued. The end of the divided muscular and spinal nerve. The division of the nerve had been caused by a cut from a piece of glass ten weeks before admission. The patient was a fair-faced woman, aged 29 yrs who fell through
a wound while cleaning it, I inflicted a wound of the upper arm, which severed the nerve. The wound healed slowly, but it was quite closed when the operation was undertaken. The operation was performed antiseptically. The wound was not dressed until the 6th of November, three days after the operation, when it was observed that although the wound was healing, there was an appearance about the wound which suggested that the usual change was not taking place in the blood extravasated into the tissues near the wound. And it was suggested that the discharge should be examined. Dr. Edington kindly made the preparation in my absence. If I have drawn the appearance of the pus in Fig. 1 (p. 74). At once there were seen a number of large bacilli or cocci. These, however, turned out to be different forms of one organism. Having found this bacillus in the pus, I examined the patient's blood, but nothing of the sort was met with there. And then, with a view of ascertaining whether the or-
gangrenous had been in the tissues before the operation. I made sections of a piece of fibrous tissue which the surgeon had removed from the end of the nerve; but the bacilli was not found there (Fig. 8 x 11). It is interesting to observe that the presence of this large bacillus in considerable amount in the wound, did not give rise to any constitutional disturbance. The temperature remained normal (note chart), the patient's health was unimpaired.

On November 15th, the wound was not quite healed & I again examined the pus discharged from it, but the bacillus was no longer present (Fig. 8 x 11).

Having cultivated this bacillus through many generations, in various media, I had had full opportunity of studying its characters. It is a large non-motile organism measuring,

Length 2 to 6 micromillimeters
Width 0.6 to 0.9 "

And when it assumes the coccic form it measures

0.5 to 1.2 micromillimeters (Fig. 8 x 11)

The chains of bacilli do not reach a very great length (Fig. 8 x 11)
Its most important character, however, is its power of producing spores. I have met with any bacillus in which the spores could be so easily defined as in this one. And the large size of the organism and facility with which it takes up the strong reagents lends it admirably adapted for demonstrating the life history of a bacillus.

It grows readily in gelatine, agar, 

\[ 7 \times 10^{-2} \text{cc.} \]

even at \(-10^\circ\), 9 at \(-35^\circ\) its growth is very rapid.

In gelatine at \(-10^\circ\), the medium is liquefied clear \((792 \times 10^{-2})\). A greyish-white flaky deposit is formed. The liquefaction gradually extends down the tube gelatine, reaching the depth of one inch in six weeks in a tube three centimeters in diameter. No odor is developed during the liquefaction.

In gelatine-plate cultures, the bacillus appears in the form of minute grey points which become white. These opaque as they increase in size. These liquid points soon coalesce on agar streaked with the bacillus kept at \(-10^\circ\), a greyish-white most lagenus is formed.
which by the end of forty-eight hours, has become a centimetre 1 two half wide, with a wavy margin (37.8 37.8). This layer can be removed off, it resembles in water moist tissue paper, but it is easily broken up.

But the most characteristic growth is on potato. If the surface be inoculated at one point in the center, the growth spreads out towards the margin, forming a thick layer which in eight days at 16°C measured two centimeters in diameter. This layer has a white granular appearance. The margin, which is very well defined, is made up of rounded dots (37.8 37.8).

It has been ascertained for me that this bacillus is non-pathogenic, in the rabbit at least. Injection of the liquefied gelatin containing the bacillus under the skin of a rabbit was not followed by any constitutional disturbance, except a slight rise of temperature on the same evening. On the following day, the animal was as well as usual. The bacillus could not be found in the blood. And in the human subject we have seen that
Records of Temperature, Pulse, Respiration and Stools, from 1st Day of November 1848

In the case of
Margaret Forbes
Aged 26
Occupation

<table>
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Temperature:
1st - 2nd
3rd - 4th
5th - 6th
7th - 8th
9th - 10th
11th - 12th
13th - 14th
15th - 16th
17th - 18th
19th - 20th
21st - 22nd
23rd - 24th
25th - 26th
27th - 28th
29th - 30th

Pulse:
97, 97, 98, 98, 99, 99, 98, 97, 96, 97, 98, 99, 98, 97, 96

Respirations:

Stools:

Source: J. Maclean M.D., Edinburgh.
it did not produce any constitutional disturbance.

Considering the character of thisbacillus, I have given it the name:

_Bacillus Magnus Immotus._

_The last case which I have to record is one which would be of great importance if the evidence were complete. The patient was a healthy female 36 years of age with a simple Parotid Tumour which she desired to have removed although it was free from pain I was not in any way injuring her health. Before the operation was performed, I obtained her blood for examination, although there was nothing to suggest any pathological condition. And I found that a microorganism was present in very small amount as shown in Xxii(75). And I afterwards succeeded in making cultivation of it in nutrient gelatine. Ty 2 Xxii is from a cow's glass preparation. The growth in gelatine at 16°C was not rapid; furthermore it was accompanied by the formation of a yellowish grey coherent deposit._
Three days after the operation the wound was looking well, and I examined the small amount of pus on the dressing. I found in it a microbe resembling a very large amount resemble in size the one which I subsequently cultivated. The weak point in evidence is that I have no cultivation of this organism to compare with the one which I obtained from the blood, but we know how different two organisms under the microscope appear the same. Nevertheless, the case is instructive, suggesting a wide field for research - the examination of the blood before an operation, in order to ascertain whether organisms in the discharge of wounds are derived from within, not through the neglect of antisepptic precautions.
Appendix

Bacillus from pus in Pyemia. Since writing the description of the bacillus cultivated from pus in acute pyemia, the following result has been obtained after inoculating a rabbit with the organism. Two or four days after subcutaneous injection of liquefied gelatine containing the bacillus (six drops being used) the rabbit suffered from febrile disturbance, but nothing appeared at the seat of inoculation. In a week the animal was regaining strength and by the end of a fortnight it seemed as well as usual. But, exactly a month after inoculation a large abscess formed at the point where the inoculation was made. The animal died in a few days. At the post-mortem examination which Dr. Ewing kindly made in my absence, no other abscesses were found in any other part of the body. No organisms of any kind could be found in the pus at the seat of inoculation.

Bacillus from blood in Pyemia. Unfortunately I am unable to give a complete report of
The experiments with the Bacillus from the Blood of a Guinea. A rabbit, inoculated with six drops of liquefied gelatin containing the bacillus. This was followed by feverishness and a desire to take food, which still continued nine days after inoculation. But no change has been observed around the spot where the needle was inserted, except a slight redness and swelling, which lasted only two days.
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Fig. 1. Satchel-case containing sterilised tubes
From glasses for collecting blood discharges

Fig. 2. Sterilised tube
A. Tube containing live
B. Tube containing blood

Fig. 3. Method of depositing contents of infallable tube into nutrient medium for cultivation
PLATE II

Fig 1. Pus from under thumb nail, stained with gentian-violet. X 1000

Fig 2. Stained culture from pus (Fig 1). Bacilli. X 1000

Fig 3. Blood of patient suffering from onychia. Methylene-violet. X 1000

Fig 4. Blood and globules from blood (Fig 3). Bacilli. X 1000
Fig. 1. Staphylococcus aureus Albuns from blood of patient with Pneumonia. Gelatin. 14th day.

Fig. 2. Staphylococcus aureus Albuns from blood of patient with Pneumonia. Agar. 36th day at 30°C.

Fig. 3. Micrococcus from pus of Pneumonia. (Micrococcus pyogenes). Gelatin. 72nd hour at 16°C.

Fig. 4. Micrococcus from pus of Pneumonia. (Micrococcus pyogenes). Agar. 72nd hour. 35°C.
Fig. 1. pus stained with haematoxylin
For microscope x 600

Fig. 2. Microorganisms from cultures from pus.
For microscope x 670

Fig. 3. Pus from abscess of teeth on 9th day of incision.
Microorganisms
For microscope x 1000

Fig. 4. Pus from same abscess removed at last dressing,
15 days after incision.
Microorganisms in short chains,
For microscope x 1000.
PLATE VI.

MAMMARY ABSCESS. Blad

Fig. Blood in which no organisms were found.  

x 670

MAMMARY ABSCESS

Fig. 2. Pur removed on day of incision. 

x 670

MAMMARY ABSCESS

Fig. 3. Clusters of microorganisms cultivated in gelatin from figure (Fig. 2). 

Methylene blue

x 670

WHITLOW

Fig. 4. Sus from Whitlow. 

Methylene blue only.  

x 670
PLATE. VIII.

Abscess of Wrist

Fig. 1. Staphylococcus between Princesse and pus cells, Day Fraser. Gram's Method x 670

Fig. 2. Cultivation of Staphylococcus (Fig) in nutrient gelatin (Staphylococcus Pyogenes) Unstained x 670

Abscess of Wrist

Fig. 3. Abscess from same abscess, six weeks after incision. Core with bacteria. Gram's Method x 670

Fig. 4. Abscess from same abscess seven weeks after incision. Core with bacteria. Gram's Method x 670
Figs. 1. *Staphylococcus epidermidis* from abscess of milk, consisting of minute points.

Figs. 2. Smear from acute abscess over canopy. Bacilli present along with micrococci. 

Figs. 3. Contents of an Acne Pustule. Bacilli present along with micrococci. Gram's method x 1000.
SCROTAL ABSCESS

Fig. 1. Acute abscess of Scrotum
Pre-stained with Methylene
Short chain of cocci seen
$\times 670$

PAROTID ABSCESS

Fig. 2. Blood from inflamed
areas in parotid region pre-
view of abscess formation
Thick, fragile, single-coccus
seen in one field.
Methylene Blue $\times 670$

GONORRHEAL OPHTHALMIA

Fig. 3. Discharge composed of fibrinous
Fatty material
One distinctive Gram stain
seen
Methyl violet
$\times 670$

GONORRHEAL OPHTHALMIA

Fig. 4. Cell cultivated from dis-
charge (Fig. 3)
Staphylococcus Pyogena
Pneumonia
Fuchsine
$\times 670$
Fig. 1.pus from acute abscess of arm. 
Microscope. Bichrome x 1000.

Fig. 2. Microorganisms from pus of abscess of arm. Staphylococcus Pyogenes Albus. 
Bichrome. X 1000.

Fig. 3. Blood of patient with abscess of forearm. No microorganisms. 
Bichrome. X 670.

Fig. 4. Microorganisms (Staphylococcus Pyog. Albus) from pus of abscess of arm. 
Gelatin, 12th day. X 1000.
Fig. 1. Discharge from nose, 3rd day—morn.
A single cocci & film & sediment
Methyl violet x 670

Fig. 2. Discharge from nose, 7th day—morning
Micrococcus
Bacilli—excluding common Bacillus
Barbieri was found?
Graevel's method x 670

Fig. 3. Original culture: cultivation on nutrient gelatine from discharge (Fig. 2)
Methyl violet x 670

Fig. 4. Blood of patient suffering from acute nasal catarrh
Micrococcus in form of blood
Methylblue blue x 670
LYMPHANGITIS

Fig. 1. Blood from the inflamed area (right hand) before the formation of pus.
X1000

LYMPHANGITIS

Fig. 2. Blood from same region two days later. Two chains of caseous granules.
X1000

LYMPHANGITIS

Fig. 3. Cultivation from pus (left).
Mycobacterium Tuberculosis
X1000

LYMPHANGITIS

Dick's blood from the apparently healthy hand (left). No microscopic findings.
X1000
Plate XVI

Fig. 1. Blood of patient suffering from multiple abscesses of leg - figure 2.
Cluster of bacteria, x 670.

Fig. 2. Abscess of leg - figure 3.
Cluster of bacteria, x 670.

Fig. 3. Another abscess of leg - figure 4.
Clusters of bacteria, x 670.

Fig. 4. Abscess of leg - figure 5.
Clusters of bacteria, x 670.
PLATE XVIII

ACUTE OTITIS

Fig. 3. Discharge from ear in acute otitis media. Many pus cells, bacteria.

ACUTE OTITIS

Fig. 5. Discharge from ear after heat treatment. Few organisms.

PYÆMIA? BLOOD

Fig. 3. Blood of patient suffering from pyæmia. Numerous bacteria.

PYÆMIA? BLOOD

Fig. 4. Staphylococcus pyæmæae; cells cultured from blood. (Fig. 3)
PLATE XIX

PYÆMIA-BLOOD

Fig. 1: Blood of patient with pyæmia. Microscopic view. Microscope镜头. X 1000

PYÆMIA-BLOOD

Fig. 2: Microcosm cultured from blood (Fig. 1). Microscope view. Microscope镜头. X 1000

PYÆMIA BLOOD

Fig. 3: Same as Fig. 1. Microscope镜头. X 1000

PYÆMIC ABSCESS

Fig. 4: Lesion from abscess. Microscope view. Microscope镜头. X 1000
PLATE XX

PYÆMIC ABSCESS

Fig. 1. Microscope cultivated from one of glandular abscesses (Fig. 2).

Haem. x 435

PYÆMIC ABSCESS

Fig. 2. Serous abscess in same patient. This shows the small clumps of masses seen shown. Gram's method x 1000

PYÆMIC ULCER

Fig. 3. Ulcer over malleolar in same patient. Staphylococci only.

Gram's Method x 1000

PYÆMIA

Fig. 4. Microscope cultivated from the blood of the second time in the same patient.

x 670
PLATE XXI

PYÉMIC PUSTULE

Fig. 1. Contents of small pustule from hand of same patient.
Microscope, Peckin. x 670

PYÉMIC ABSCESS

Fig. 2. Abscess in subcutaneous tissue of same patient. Microscope, Peckin. x 670.

PYÉMIC ABSCESS

Fig. 3. Surface culture of organisms from pus of subcutaneous abscess (50y).
Specimen. x 670

WOUND OF RECTUM

Fig. 4. Surface wound of rectum, same patient. Gram's Method. x 670.
Fig. 1: *Staphylococcus Aureus* aureus. Chronic *Staphylococcus* [Blood].

Fig. 2: *Staphylococcus Aureus* aureus. 24 hours' growth on agar. Chronic *Staphylococcus* [Blood].
PLATE XXII

Pyæmia. Wound

Fig. 1. Scrapings from suppurating cavity of wound in dog. Microscope, oil immersion. Gram's method. x 670.

Pyæmia. Blood

Fig. 2. Blood of patient suffering from septicemia in which Bacillus pyæmatis has been seen. Trypan blue. madder alizarin. x 1000.

Pyæmia. Wound

Fig. 3. Scrapings from suppurating cavity at ankle-joint. Microscope, oil immersion. Gram's method. x 670.

Fig. 4. Cultures from furs (figs. Bacillus only. Methyline blue. x 6000.
Fig. 1. Culture of organisms suspected as causing Pus. (Isolated from eye discharge.)
Bacilli. Photomicrograph x 1000.

Fig. 2. Blood of patient with acute pyæmia. (Microscopic examination.)
Bacilli. Photomicrograph x 400.

Fig. 3. Blood of patient with acute pyæmia. (Extracted from blood (200 c.c.) of patient with acute pyæmia.)
Bacilli. Photomicrograph x 1000.
PYÄMIA: WOUND

Fig. 1. Bacilli from crusted purple surface of
abscess (Porter), after 8 weeks. 

Porter x 1000.

PYÄMIA: WOUND

Fig. 2. bacilli cultivated from pus (Porter)

Porter x 1000.

PYÄMIA: WOUND

Fig. 3. Necrosis of tissue stained with
red. X 1000.

PYÄMIA: WOUND

Fig. 4. Serum of animal infected with
pyaemia in which bacilli were seen

Porter x 1000.
Fig. 1. Bacillus Sporadic Abscess involving muscle. Myelocentesis in large amount. Pus tissue x 670.

Fig. 2. Muscles around a large acute pyogenic abscess. Acute inflammation - Hemosiderin. Gram's Method x 670.
Fig. 1. Suppurating cavity at ankle, probably the site of pyogenic infection.

Fig. 2. Six days' growth of Bacillus from Spanish fly. Webs gelatinized at 18°C.

Fig. 3. Six days' growth of Bacillus from dissected fly. Petri dish 18°C.
Bacteria from blood in Pyrexia
24 hrs growth on Agar at 37°C
CANGRENE. BLOOD

Blood from arm of man of
Inflammatory Staphylococcus of that
Microscope
Methyl violet × 670

Foot showing gangrene
(Case from which the above mentioned blood
was taken)
Fig. 1. Fluid from serial eighteen hours after application of benzole. A single pleomorphic amoeba in suspension. X 670.

Fig. 2. Fluid from serial eighteen hours after application of benzole. Two multinucleated cells. The organism is blue. X 670.

Fig. 3. Blister produced by severe injury. Enlarged, numerous cocci. X 670.

Fig. 4. Microorganisms-multiplied from four of blisters (Fig. 3). X 670.
ACUTE BURSITIS

Fig. 1. Fluid from inflamed bursa.
No cells. No microorganisms.

time x 1000

CHRONIC ABSCESS

Fig. 2. Granular fatty pus from chronic abscess of thigh.
Chain of free dead 3 microorganisms.

	time x 670

CHRONIC ABSCESS

Fig. 3. Pur from chronic abscess of arm.
Isolated microorganisms.

	time x 670
ABSCESSES OF LOIN
Fig. 1. Exudate from Abscess of loin. Many chains of micrococci. (Each an exceptional field.) Gram's method. x 670

TONSILLAR ABSCESSES
Fig. 2. Chronic abscess of tonsillar. Cells & cholesterol. No micro-organisms. 

ABSCESSES OF HUMERUS
Fig. 3. Medullary abscess of bone. Chains? Many micrococci.

GONORRHOEA
Fig. 4. Bacteria seen from discharge per urethrae in glottis. Meth. Reduced x 670
Fig. 1. Urine of patient who had been catheterized with ureteral catheters.
Fig. 2. Papiloma from ureteral catheter in renal cell carcinoma.
Fig. 3. Smear from chronic abscess of prostate.
Fig. 4. Staphylococcus aureus grown from pus (Fig. 3).

UBINE

OTORRHOEA

PROSTATIC ABSCESSE

PROSTATIC ABSCESSE
PLATE XXXIV

1. Epitheliomatous Ulcer
   - Fig. 1: Les from Epitheliomatous ulcer of lip. Bacteria, Macerated. Magnified 870x

2. Sinus of Thigh
   - Fig. 2: Les from sinus of thigh. Macerated, Bacteria. Magnified 870x

3. Sinus of Leg
   - Fig. 3: Les from sinus of leg. Macerated. Magnified 870x

4. Wound of Leg
   - Fig. 4: Discharge from same lesion after excision. Macerated. Magnified 870x
**Sinus of Leg**

Fig. 3. Cells from sinus in a healing abscess in front of upper tibia. Prepared in 10 per cent. alcohol. Gram's method. x4000

Fig. 4. Cultures of Staphylococcus pyogenes from pus (Fig. 3). Methyl violet x670

**Sinus of Elbow**

Fig. 3. Cells from chronic abscess above elbow. Prepared in 10 per cent. alcohol. Gram's method. x100

Fig. 4. Cells from same case as Fig. 3. Gram's method x670
Fig. Tubercular gland from brisk, showing granules either tuberculoid or caseous infection.

Fig. 2a. Periappendageal granules of gland (Fig. i); other glands showing Gram's method X 1000.

Fig. 2b. Periappendageal granules of gland (Fig. i); other glands showing Gram's method X 1000.

Fig. 3a. Tubercular gland with caseous necrosis.
Fig 1. Discharge from wound, day after removal of an enucleus.
Micro-scale in great numbers.
Methyline Blue x 670.

Fig 2. Microscope cultivated from discharge (Fig 1).
Methyline Blue x 670.

Fig 3. Blood of patient from whom the discharge (Fig 1) was obtained.
Methyline Blue x 670.

Fig 4. Fix from wound of neck for removal of epithelialization found contaminated from S. alba.
Methylamine x 670.
Catgut
Normal
Fig. Catgut outside the tissue. No cellular elements. 100x

Fig. Catgut inside the tissue. Tissue arranged in columns, many vacuoles near the surface. 100x

Catgut
Fig. Catgut outside the tissue. No cellular elements. 435x

Fig. Catgut inside the tissue. Many vacuoles, which have assumed various shapes. 435x
PLATE XXXIX

**Fig. 1.** Catgut which had been in the bladder seven days. Mesenchymal. *X* 670.

**Fig. 2.** Periosteum of a case of sarcoma of the bone. Necrosis isolated. *X* 670.

**Fig. 3.** Section of a catgut suture used in the above case (Fig. 2). Been removed 24 days. Some elements of necrosis now from a hysteresis. *X* 670.
Fig. 1. *Bacillus Magneus Immotae*
Found in wound after operation.
Lochdo 31st Aug at 16°C

Fig. 2. *Bacillus Magneus Immotae*
Gelatine

Fig. 3. *Bacillus Magneus Immotae*
Agar 48hrs at 35°C
PLATE XLII

PAROTID TUMOUR

Laet. Muscervus cultivated from blood of patient before operation. 
Microscope x 670

PAROTID TUMOUR

Laet. Muscervus cultivated from blood of patient after operation. 
Microscope x 670

PAROTID TUMOUR

Fig. 3. Oedema in wound after the operation. 
Oedema in large amount. 
Microscope x 670

FIBROUS TISSUE

Fig. 4. Section from mass removed at the operation. 
Showing fibrous tissue. 
Glasck Muscervus (Gram) 
Microscope x 670.