THESIS

For the DEGREE of M.D., EDINBURGH UNIVERSITY,

BACTERIURIA in MENTAL DISEASE, its' frequency and possible significance, being AN ANALYSIS of the URINARY FLORA in 50 CASES of mental disease, with a NOTE on the associated clinical condition, and the PATHOLOGICAL CONSTITUENTS of the urine.

BY

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BACTERIURIA in MENTAL DISEASE,
Its FREQUENCY and POSSIBLE SIGNIFICANCE; being an
ANALYSIS of the urinary flora in 50 CASES
of MENTAL DISEASE, with a NOTE on the associated
CLINICAL CONDITION, and the PATHOLOGICAL constit-
tuents of the URINE.

This investigation was carried out on
freshly voided specimens obtained, in 40 Cases of
the series, from patients in the Royal Edinburgh
Mental Hospital, and in the remaining 10 Cases from
patients in similar institutions or in private homes
in and around Edinburgh. Twenty-four of the patients
were female and 26 male. From female patients cathe-
ter specimens were obtained, a catheter having been
passed after a careful preliminary cleansing of the
parts, and the urine drawn off into a sterile glass
tube.

In the case of male patients, the foreskin
was retracted, the glans penis swabbed over with a
mild antiseptic, the first portion of the urine re-
jected, and a mid-stream specimen collected in a
sterile glass tube. This method was deliberately
adopted, for "the anterior urethra cannot be rendered
sterile by previous irrigation, nor does the
passage/
passage of a catheter prevent such contamination".

The work was carried out in the Laboratory of the Scottish Asylums.

KIDD points out how frequently bacteria appear in the urine, that the condition is probably due to an 'intermittent blood invasion', the kidney filtering the organisms out from the blood stream; and that there may be no evidence of renal infection,

(i) in chronic cases, "where active signs of inflammation such as pus cells have been present in the past, but have disappeared, and the kidney has agreed to lie down with the bacteria, to act as a warm nest for breeding purposes and to make no further effort to get rid of them by the formation of pus". - or

(ii) in the early stages of a blood infection, "the kidney acting as a filter and not as a secondary focus of inflammation", - "inflammation in the kidney-filter is usually only induced if some predisposing cause is acting in addition".

He has further pointed out that ascending infections of the kidney except by the gonococcus, are very rare, that organisms are frequently present/
present in the anterior portion of the urethra, especially the first inch, the deeper part of the urethra being usually sterile; that direct invasion of the kidney, and the neighbouring tissues, e.g., the colon, is very rare; and that if bacteria are injected into the blood they are got rid of by at least four channels: they are thrown out -

i. Into all the connective tissues of the body

ii. Into the 'dust-bins' of the body, such as the joints, bones, fasciae, lymphatic glands and spleen.

iii. Through the kidney, acting as a filter, into the urine.

iv. Through the liver, acting as a filter into the bile and bowel.

He compares the body to a bacterial sponge, points out that many of the bacteria present in the body are symbiotic, such as the colon bacillus, staphylococci and streptococci, that these symbiotic bacteria may become the exciting cause of disease if the general or local resistance is lowered, and that in addition, the body is open to attack by organisms which are always parasitic.

PAWSON (ibid) gives the bacterial content of the urine in three series of cases, and I quote his figures, as I propose to use these results as my controls.

I. 100 consecutive males, all of whom had or comparatively/
comparatively recently had had gonorrhoea -
examination was made for the colon bacillus only. In 92% of the cases the colon bacillus was
absent, and in 8% it was present.

II. 100 consecutive in-patients, all suffering from
a variety of conditions, but in none of whom it
was pus or albumin present in the urine.

Sterile 18%
Staphylococcus albus only 52%
Staphylococcus aureus only 3%
Enterococci 10%
Sarcina or B.Subtilis or other contaminations 3%
Organisms of Coli group:-
    Coli 7%
    B. Proteus 6% 14%
    Others 1%

III. 50 Specimens from apparently healthy male
medical students.

Sterile 40%
Staph. albus or S. enterococccus 52%
B. Coli or B. Proteus 8%

PANTON'S technique was as follows:-
2 cc. of urine were inoculated in 10 cc. of broth,
and incubated for from 12-24 hours. One loopful of
the broth culture was inoculated on an agar plate
with/
with a sterile platinum needle, and then on a McCon- 
key plate, without recharging the wire. Both plates 
were incubated for from 12-24 hours. As will be de-
scribed later, the technique I employed in putting 
up aerobic cultures was based on the above. 

ROBERTSON & McRAE record the presence 
of a diphtheroid bacillus in the urine in cases of 
general paralysis of the insane. 

BRUCE states that acute forms of insa-
nity, from the milder types of dementia to acute de-
lirium, are essentially of toxic origin - 

BARTON WHITE records the presence of 
colon bacilli, diphtheroid bacilli, and streptococci 
in the urine in cases of general paralysis of the 
insane. 

EASTERBROOK attaches great importance 
to the nervous constitution, temperament, disposition 
or mental make-up of the individual. 

"This is the common underlying factor in the 
aetiology of insanity, and explains why only a 
relatively small proportion of humanity breaks 
down mentally under the action of the many 
traumata or stresses that daily affect mankind, 
including the infections and toxemias". 

CAULK, GREDITZER & BARNES examined the 
urine in 500 Cases of nervous and mental disease and 
record organismal infection in 32% of the cases, most-
ly /
mostly by members of the B.Coli group. (7)

HENDERSON records the presence of streptococci in the urine in cases of influenza (8)

HOREN states that the type of mental disease lighted up by infection depends on individual predisposition and the physical state of the moment, that there is no specificity with regard to the symptom - complex induced. (9)

SAMLSON examined catheter specimens of the urine of a series of healthy female infants under 2 years of age and records the presence of bacteria, mainly of the coli group, in 90%. (10)

FORD ROBERTSON states that:

"There are few bacteria, if indeed there are any, that can be said to produce insanity as the characteristic result of their pathogenic action. The special relation is dependent essentially upon a peculiar vulnerability of the central nervous system in some persons". (11)

He records the result of a bacteriological investigation in 34 cases of acute insanity. - "In 20 of these aerobic or anaerobic diphtheroid bacilli seemed to be important infective agents determining the mental disorder. Severe infection by pneumococci occurred in 5 of the cases. Streptococcus pyogenes infection appeared to be responsible for the illness in three/
three, the bacillus of influenza also in three, bacillus proteus in two and anaerobic gonococci also in two. In most of the cases there were mixed infections". (12)

Again he records the results of a bacteriological investigation of 32 cases of early dementia praecox. He found that the cases were of 3 main types according to the dominating forces of infection and that the infection was always multiple.

3. MAIN TYPES.

i. Pneumococcus infection 7 Cases

ii. Diphtheroid infection 9 Cases

iii. Anaerobic streptothrix infection 13 Cases.

3 Cases were of other types.
The associated infections were due to:

Streptococcus Pyogenes
Streptococcus Anginosus
B. Friedländer
Staphylococci
B. Influenzae

and anaerobic strains of Micrococcus Catarrhalis.

INDICAN is the potassium salt of indoxyl sulphuric acid, and thus one of the ethereal sulphates, i.e. an ester formed by the union of sulphuric acid with phenols. Indoxyl is formed in the large/
large bowel by the bacterial decomposition of tryptophane, indol-amino - propionic - acid, a product of protein digestion. Indoxyl is poisonous, and unites with sulphuric-acid, probably in the liver, to form the innocuous ethereal sulphate.

"The excretion of indican is of importance as a measure of the amount of putrefaction occurring, generally in the intestine, but sometimes in a large abscess". (13)

BOSCHI states that indicanuria is usually present in mental disease. (14)

BRUCE attributes it to an alteration in the digestive functions, and finds in it evidence of intestinal putrefaction and constipation. (15)

EASTERBROOK states it is common in melancholia, and SEIGE in manic-depressive insanity. (16)

OMOROKOFF states it is frequent in general paralysis, but absent in dementia praecox. (17)

BAUGH points out a relation in epileptics between the production of indoxyl and the frequency of fits. (18)

SCHUYLER states that indicanuria is common in children as a result of wrong diet, and that it is associated with outbursts of temper, fickle appetite/
appetite, rheumatic pains etc.

(21) DOUMER regards it as due to abnormal intestinal putrefaction, and an indication for appropriate treatment.
THE PURPOSE OF MY INVESTIGATION IS TO DETERMINE:

the FOLLOWING POINTS:—

1. Are bacteria present in the urine of patients with mental disease?
2. If so, what is the nature of these bacteria?
3. In what proportion of Cases do they appear?
4. In what types of Cases?
5. In males or females, or both?
6. Are these the same forms of bacteria as appear in the urine of patients without mental disease?
7. And are they found in the same proportion of Cases?
8. Are they associated with acid or alkaline urine, albumin, sugar, indican, pus and epithelial cells, red blood corpuscles, crystals and casts?
9. Is there any relation between the organisms in the urine, and those in the intestinal canal, throat etc.?

It was only possible to make this observation in 10 Cases of my series. The analysis of the flora in the intestinal canal, throat etc. was carried out in the laboratory of the Scottish Asylums by workers other than myself, and I am indebted to Dr. W. Ford Robertson for permission to use the results arrived at.

10./
11.

10. What is the significance of the presence of these organisms in the urine?

Is there any evidence that the organisms found have some bearing on the physical or mental symptoms of the patient? Can any of these organisms be said to be specific, being associated always with the same symptom-complex? Or may they be dismissed as having no bearing whatever on the patient's condition?

THE SYMPTOMS INVESTIGATED WERE:

i. Bodily nourishment.
ii. Anaemia.
iii. Complexion.
iv. Tongue.
v. Appetite.
vi. State of bowels.
vii. Sleep.

The causal relationship of organisms to mental disease is exceedingly difficult of proof.

"The only satisfactory, irrefutable proof would be the experimental production of morbid mental states by the use of toxins, (or bacteria) and that is impossible".

I wish to emphasise the fact that any conclusions/
conclusions I may draw are to be regarded as tentative, and no more than an indication of possibilities. I propose to note the nature of the organisms in the urine, when present, to note any evidence there may be of abnormal intestinal putrefaction, of irritation in or damage to the urinary tract, to note any points of interest presented in the patient's clinical condition, and to suggest inferences that may be drawn from these facts.
LABORATORY TECHNIQUE.

The work can be arranged under three heads:

I. THE PHYSICAL & CHEMICAL CHARACTERS of THE URINE.

Colour. Reaction to litmus paper. The presence or absence of a naked-eye deposit, of albumin, sugar, and indican.

TESTS for ALBUMIN — (22).

(a) Boil an inch or so of clear, acid urine in a test-tube. If a turbidity is produced add a drop of nitric acid. Any turbidity which remains is due to the presence of albumin.

Confirmed by

(b) Heller's Test. Place 4 inch of pure nitric acid in a test-tube. With the aid of a pipette allow some of the clear, acid urine to flow on to its surface. An opaque ring at the junction of the two fluids, after standing for half a minute, indicates the presence of albumin.

TESTS FOR SUGAR. (22)

(a) Fehling's Test.

To 1 inch of freshly prepared Fehling in
a test-tube add 1 inch of urine (freed from albumin). Boil for 2 minutes. A red or yellow precipitate on standing strongly suggests the presence of glucose.

Confirmed by -

(b) BENEDICT'S TEST.

To 5 cc. of the reagent add 8 drops of the urine and boil for 2 minutes. A red, yellow, or green precipitate indicates the presence of glucose.

TEST FOR INDICAN. (18)

JAFFE'S TEST.

Treat 5 cc. of urine with a rather larger volume of concentrated hydrochloric acid and about 2 cc. of chloroform. Add a single drop of 5 per cent potassium chlorate and mix. Allow the chloroform to settle and examine its colour. If it be blue indican is present. If not, not, add another drop of the chlorate and mix again. If no blue colour be found in the chloroform, indican is absent.

In a small number of cases an approximate estimate of the amount of organic sulphates present (22) was made by the following method, Add to the urine an equal volume of alkaline barium chloride solution. Filter. Render the filtrate pretty strongly
strongly acid with hydrochloric acid, and heat almost to boiling. Normally there should merely be a white cloud of organic sulphates. If the precipitate be at all dense, the proportion of organic sulphates is in excess.

II. THE MICROSCOPICAL APPEARANCE of the CENTRIFUGED DEPOSIT.

10-15 cc. of the urine were centrifuged for about 15 minutes, the supernatant fluid poured off, the deposit examined unstained under the low and high powers of the microscope, and the presence or absence of epithelial cells, pus cells, red blood corpuscles, bacteria, casts, crystals or amorphous deposits noted. On occasion a film was dried, fixed and stained with Löffler's methylene blue.

III. NATURE of the BACTERIA, when present.

1. Method of preparing the cultures.

Cultures were put up, both aerobically and anaerobically, on the media ordinarily employed at the Laboratory of the Scottish Asylums.

A. UNDER AEROBIC CONDITIONS.

(1) FANTON'S technique was closely followed in the earlier stages. 2 cc. of urine were inoculated in 10/
10 cc\(^o\) of broth, (Lacto-lactose Peptone Broth, \(+18\) to
\(+20\) Myre's Scale) and incubated for from 13-24
hours. One loopful of the broth culture was inoculat-
ed, without recharging, on a +6 and on a +18 haemo-
globin agar slope, and these tubes were incubated
for from 13-24 hours. The primary culture was then
examined under a lens, and the different types of
colonies recorded. Individual colonies, varying in
number from 2 or 3 of each of the coarser types to
4 or 5 of each of the finer ones, were picked off,
under a lens, with a sterile platinum needle and each in-
oculated by a stroke on a haemoglobin agar slope of
the reaction, +6 or +18, that seemed optimum for the
growth of each type of colony. These tubes were in-
cubated for from 13-24 hours, and the subcultures
thus obtained were identified in the manner to be
described.

B. UNDER ANAEROBIC CONDITIONS.

The partial anaerobic method, in which
oxygen is absorbed by pyrogallic acid & caustic soda,
was used. 3 loopfuls of the centrifuged deposit were
inoculated with a sterile platinum needle on a +6 haem-
oglobbin agar slope and 3 more on a +18, the cotton
wool plugs cut across at the level of the mouth of
each tube and pushed about half an inch down the tube;
3 or 4 drops of a concentrated solution of pyrogallic
acid/
acid were dropped on to the plug with a pipette, and then a further 3 or 4 drops of a 10 per cent solution of caustic soda. Each tube was sealed with a cork dripping with melted paraffin. These tubes were placed in the rack at room temperature for 1 or 2 hours before being transferred to the incubator. They were incubated for from 40–48 hours. The primary culture was then examined under a lens, and the different types of colonies recorded. Individual colonies, 5 or 6 of each type, if possible, were then picked off under a lens, and stroke cultures made on haemoglobin agar slopes of the optimum reaction, +6 or +18. These tubes were again put up anaerobically and incubated for from 40–48 hours. The sub-cultures were identified in the manner to be described.

2. Method of identifying the organisms. (11) & (23)

This was the routine procedure carried out in every case.

The appearance of the colony – size, colour and consistence – was noted. Films were made on a slide from each of the stroke-cultures, fixed with gentle heat, and with a drop or two of a 5% solution of formalin in alcohol. The slide was then stained by the Gram-Neutral Red method:

Carbol/
Carbol-gentian-violet was freshly prepared every day, filtered on to the slide in sufficient quantity to flood it, and left on for 5 minutes. The stain was washed off with water, and Gram's iodine solution poured on and left for 2 minutes. The iodine was washed off with water, and the films treated with alcohol until the colour was no longer discharged. The alcohol was washed off with water, and the films counter-stained with a solution of neutral red for 1 minute. The films were then washed in water, and dried with filter paper; they were mounted if a permanent preparation was required.

a. GRAM-NEGATIVE ORGANISMS.

The motility of the organism was noted and tubes of glucose, lactose, saccharose and mannite - (Hiss's media), of litmus milk, peptone water and glucose peptone water were inoculated. They were incubated for 48-72 hours. The reactions by which the coliform organisms in my series were differentiated are given in TABLE I., page 22.

In one case the growth gave the medium a characteristic greenish colour. It was inoculated in tubes of glucose, lactose, saccharose, mannite, salicin, inulin, and dextrose, and incubated for about 72 hours. The lower portion of the medium in each case was somewhat bleached, while a band of greenish pigment appeared in the upper portion. This organism was/
was identified as the B. Pyocyaneus.

b. GRAM-POSITIVE ORGANISMS.

i. Short-bacillary or cocco-bacillary forms.

Films were made, fixed as before, and stained with Neisser's methylene blue for 3 minutes. The presence of metachromatic granules was regarded as diagnostic of a diphtheroid bacillus. Several different species were seen. The colonies were either an opaque grey or yellow, or translucent, the granules varied from a very few in some cases to a great many in others, the organism presented anything from a delicate to a rather coarse appearance. No method of differentiating the various species was worked out. In actual practice the diagnosis usually lay between a diphtheroid bacillus and a streptococcus.

ii. Cocci arranged in short or long chains.

Tubes of serum broth and mannite were inoculated and incubated for from 48-72 hours.

Films were made of the growth in serum broth and stained with Löffler's methylene blue for 2 minutes. The criteria by which the streptococci in my series were differentiated are given in TABLE II., page 23.

iii. Cocci arranged in small clusters.

Tubes of mannite were inoculated, and incubated/
incubated for from 48-72 hours. The pyogenes group was thus differentiated from that of the mannite-non-fermenters (M.N.F.). Details are shown in Table II., page 23.

iv. Cocci arranged in tetrad.

The appearance of the organism was regarded as diagnostic of the Micrococcus tetragnus or Paratetragenus, but tubes of mannite were inoculated and incubated for from 48-72 hours. Details are shown in Table II., page 23.

v. Filamentous, unsegmented, branching threads, showing also segmented bacillary and coccal forms.

The appearance of the organism was regarded as diagnostic of a streptothrix.

ANAEROBES.

It was not found necessary to employ a special technique for differentiating the anaerobes, as the only organisms that ever appeared under anaerobic conditions alone in any of my cases were diphtheroid bacilli, and, in one case, a streptothrix. Coliform organisms, staphylococci, streptococci and diphtheroids appeared, in some of my cases, both as aerobes and anaerobes, and they were identified exactly as if they had been aerobes only. When an organism appeared both as an aerobe and an anaerobe in the same case, the only difference I could make out between/
between the two growths was that the anaerobe was more delicate, both culturally and morphologically, then the aerobe. And in my analysis, I have shown such organisms as of one species, not two, though this plan may not be quite above criticism with regard to the diphtheroids, which, as I shall show, may appear in certain cases as anaerobes only, and which, therefore, in cases where they appear as both aerobes and anaerobes may possibly belong to two species.
<table>
<thead>
<tr>
<th>BACTERIUM.</th>
<th>MOTILITY</th>
<th>GLUCOSE</th>
<th>LACTOSE</th>
<th>SACCHAROSE</th>
<th>MANNITE</th>
<th>LITMUS MILK</th>
<th>INDOL</th>
<th>VOGES &amp; PROSKAUER</th>
</tr>
</thead>
<tbody>
<tr>
<td>B. Coli Communis</td>
<td>+</td>
<td>A G</td>
<td>A G</td>
<td>-</td>
<td>A G</td>
<td>A C</td>
<td>+</td>
<td>-</td>
</tr>
<tr>
<td>B. Coli Communis, aberrant.</td>
<td>+</td>
<td>A G</td>
<td>A G</td>
<td>A</td>
<td>A G</td>
<td>A C</td>
<td>+</td>
<td>-</td>
</tr>
<tr>
<td>B. Friedländer</td>
<td>-</td>
<td>A G</td>
<td>A G or A</td>
<td>A G</td>
<td>A G</td>
<td>A C</td>
<td>+</td>
<td>-</td>
</tr>
<tr>
<td>B. Proteus Vulgaris</td>
<td>+</td>
<td>A G</td>
<td>-</td>
<td>A G or -</td>
<td></td>
<td>Alk</td>
<td>+</td>
<td>-</td>
</tr>
</tbody>
</table>

In Motility column  
+ = presence of motility.  
- = absence of motility.

In Indol column  
+ = presence of indol.  
- = absence of indol.

In Voges-Proskauer Col.  
- = absence of reaction.

A = Acid production; G = Gas; C = Clot; Alk = development of alkalinity.
<table>
<thead>
<tr>
<th>pH</th>
<th>Osmolarity</th>
<th>Appearance of the Colonies on Mannite Agar</th>
<th>18 Colony on Mannite Agar</th>
<th>Phenomenon of the Chains in Serum Broth</th>
<th>Appearance of the Chains in Serum Broth</th>
<th>Appearance of the Chains in Serum Broth</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>3.5</td>
<td>Large, opaque, white, soft</td>
<td>Large, opaque, white</td>
<td>Small, white, moist</td>
<td>Lemon-yellow</td>
<td>Small, yellow</td>
</tr>
<tr>
<td>B</td>
<td>3.5</td>
<td>Large, opaque, white, soft</td>
<td>Large, opaque, white</td>
<td>Small, white, moist</td>
<td>Lemon-yellow</td>
<td>Small, yellow</td>
</tr>
<tr>
<td>C</td>
<td>3.5</td>
<td>Large, opaque, white, soft</td>
<td>Large, opaque, white</td>
<td>Small, white, moist</td>
<td>Lemon-yellow</td>
<td>Small, yellow</td>
</tr>
<tr>
<td>D</td>
<td>3.5</td>
<td>Large, opaque, white, soft</td>
<td>Large, opaque, white</td>
<td>Small, white, moist</td>
<td>Lemon-yellow</td>
<td>Small, yellow</td>
</tr>
<tr>
<td>E</td>
<td>3.5</td>
<td>Large, opaque, white, soft</td>
<td>Large, opaque, white</td>
<td>Small, white, moist</td>
<td>Lemon-yellow</td>
<td>Small, yellow</td>
</tr>
</tbody>
</table>
URINE.
I. Physical and Chemical Characters.

II. Microscopical appearance of the centrifuged deposit.
Some epithelial debris. One or two epithelial cells, and red blood corpuscles in an occasional field. Several motile and non-motile bacteria.

III. BACTERIA.
A. Under aerobic conditions.
1. Diphtheroid bacillus.
2. Streptococcus Pyogenes.
3. Staphylococcus albus. (M.N.F.)

B. Under anaerobic conditions.
1. Diphtheroid bacillus.

CLINICAL CONDITIONS.

Duration 2 years. Well-nourished. Clear complexion. No constipation. Tongue clean. Patient hears voices, women's mostly. While walking in the grounds the previous day he/
he heard a voice saying; "Faculties must be cultivated". His actions are violent at times, and on one occasion he attempted to poison himself.

CONCLUSIONS.

The presence of a diphtheroid bacillus growing under both aerobic and anaerobic conditions is of interest. The anaerobic diphtheroid is regarded by some observers as being an important factor in the pathogenesis of mental disease. In this case the organisms present do not seem to be causing much irritation in the urinary tract. Is the kidney acting as a filter in an early blood invasion or has it abandoned all defensive effort in a chronic infection? In view of the duration of the disease, 2 years, and the patient's general physical condition, which is good, the latter seems unlikely. Whatever the explanation it seems probable that at present at any rate the organisms found in the urine are not doing the individual much harm.
CASE II.

Mr. C. DEMENTIA PRAECOX.

URINE

I. Physical and Chemical Characters.


II. Microscopical appearance of the centrifuged deposit.

Some epithelial debris. A few pus cells.

III. Bacteria

A. UNDER AEROBIC CONDITIONS.

1. Streptococcus pyogenes.
2. Staphylococcus pyogenes albus.
3. Staphylococcus albus (M.N.F.)

CLINICAL CONDITION.

Patient was certified in June 1917, as a result of shell-shock. He has attempted suicide, is violent at times, and smashes windows. He appears to have delusions but does not communicate their nature. His physical condition is now fairly good, and he eats and sleeps well.

CONCLUSIONS.

The organisms do not seem to be causing much irritation in the urinary tract. Are their toxins in any way, directly or indirectly responsible for/
for the occasional acute out-bursts that are so marked in this case? At present they do not seem to be doing much harm.
CASE III.
Mr. F. DEMENTIA PRAECOX.

URINE.

I. Physical and Chemical Characters.

II. Microscopical appearance of the centrifuged deposit.
A few epithelial cells and debris. A few pus cells. One or two red blood corpuscles in an occasional field. A few non-motile bacteria.

III. Bacteria.

A. UNDER AEROBIC CONDITIONS.
1. Diphtheroid bacillus.
2. B. Friedländer.
3. Staphylococcus albus. (M.N.F.)

B. UNDER ANAEROBIC CONDITIONS.
1. Diphtheroid bacillus.

CLINICAL CONDITION.

Duration 3 years. One sister - dementia praecox. Well nourished - slight dark rings under the eyes. Somewhat constipated, and requires cascara every second night. Mental condition apathetic. Patient is quite irresponsible, and is a desperate runaway. He is occasionally violent and strikes attendants/
attendants; he states that he hears voices telling him to strike people.

CONCLUSIONS.

There are several features of interest in this case. There is definite evidence of irritation in the urinary tract. The presence of a diphtheroid bacillus growing under aerobic and anaerobic conditions is to be noted. Is the organism exercising a pathological influence in this case? It is possible. The presence of the bacillus Friedländer is also to be noted. Is this organism too exercising a pathological influence in the case? It is possible. But with regard to the coliform organism I wish to lay stress on the associated indicanuria and constipation. These three points form a symptom-complex I have met in several cases, not necessarily of mental disease. There is undoubtedly abnormal intestinal putrefaction and stasis, and that must have a profound effect on the patient's mental condition. Occasional fits of violence are to be noted. I suggest they may be due to an accumulation of toxin in the patient, and that, in the explosion which results when the toxin reaches a certain level, a great part of the toxin is burnt up, and that the patient has a period of remission until a further quantity of toxin is developed. Each attack leaves its/
its mark on the brain tissue of the individual till finally considerable mental degeneration is evident. Are the organisms found in the urine responsible for these outbursts? or are they due to toxins produced by abnormal intestinal putrefaction? I do not know, but it seems to me probable that if they are due to toxins at all, both groups of toxins have their share in the pathogenesis of the condition.
CASE IV.

Mr G. DEMENTIA PRÆCOX.

URINE.

I. Physical and Chemical Characters.

Pale straw colour — clear — acid. No further examination was made.

II. Microscopical appearance of the centrifuged deposit.

Large number of Calcium oxalate crystals. A few pus cells. Some epithelial cells and debris. Several motile bacteria.

III. Bacteria.

A. Under aerobic conditions.

1. Streptocooccus Pyogenes.
2. B. Pyocyaneus
3. Staphylocooccus albus. (M.N.P.)

CLINICAL CONDITION.

Patient is a linguistic expert, speaking five languages with great fluency. He lounges about in a chair, is markedly negative, having to be pushed along to his walk and to meals. When spoken to he is apt to reply with a blow or a kick. He takes his food fairly well, and maintains his weight.

CONCLUSIONS.

There is evidence here of irritation in the/
32.

the urinary tract, it is possible that any or all of the organisms may be a factor in the pathogenesis of his condition. The presence of B. Pyocyaneus is of interest. It is the only one I have had in my series, and it was present in fair quantity.
CASE V.

Mr. F.R. DEMENTIA PRAECOX.

URINE.

I. Physical & chemical characters.

Pale straw colour - clear - acid. No albumin. No sugar. No indican.

II. Microscopical appearance of the centrifuged deposit.

A few epithelial cells. A few pus cells. Some epithelial debris. Large numbers of non-motile bacteria.

III. Bacteria.

A. UNDER AEROBIC CONDITIONS.

1. Staphylococcus albus. (M. N. P.)

B. UNDER ANAEROBIC CONDITIONS.

1. Diphtheroid bacillus

CLINICAL CONDITION.

Patient was certified in January 1916, as a result of shell-shock. He has attempted to run away, on several occasions. He has a leering expression. His conversation is disjointed, but fairly coherent. He is thin and somewhat anaemic, has plenty of motor activity, eats and sleeps well.

CONCLUSIONS.

The presence of a diphtheroid bacillus that/
that only grows under anaerobic conditions is of interest. There is some evidence of irritation in the urinary tract, and it is possible that this organism may be exercising a pathological influence in this case. The anaemia and lack of weight are to be noted, - they probably indicate a toxaemia.

CASE VI./
CASE VI.

Mr H. DEMENTIA FRASER.

URINE.

I. Physical & Chemical Characters.
   Straw colour, - clear, - faintly alkaline.
   Albumin +. No sugar. Indican +.

II. Microscopical appearances of the centrifuged deposit.
   A few epithelial cells. Some epithelial debris. Some motile and non-motile bacteria.

III. Bacteria.

A. UNDER AEROBIC CONDITIONS.
   1. Streptococcus Pyogenes.
   2. Streptococcus Pseudalis.

CLINICAL CONDITION.

Patient was certified in June 1916. He is now confined to bed and is in a stuporose condition. He sits up gazing into space and not making a single remark for long periods at a time. He is disoriented and confused. He hears voices, and occasionally is violent. He has to be hand-fed. His physical condition is "satisfactory", he sleeps well. He requires an aperient two or three times a week.

CONCLUSIONS.

The presence of albumin in indicates that there is probably some damage to the kidney. Has that/
that organ been damaged in filtering these organisms out of the blood stream? Or was it an independent process? It is difficult to arrive at any definite conclusion. Are these organisms a factor in the pathogenesis of the patient's condition? Again one has no definite evidence to bring forward.

The presence of indicanuria is to be noted. There is undoubtedly a degree of intestinal putrefaction, probably associated with stasis, and that must react on his mental condition. The case presents some features of similarity to the case of Mr F. (CASE III:), the organisms found in the two cases are different, but there is indicanuria in both, and clinical evidence of a toxic condition.
CASE VII.

Mr N. DEMENTIA PRAECOX.

URINE

I. Physical & Chemical Characters.


II. Microscopical appearance of the centrifuged deposit.

Some epithelial debris. Several pus cells. Several motile and non-motile bacteria.

III. Bacteria.

A. UNDER AEROBIC CONDITIONS.

1. Diphtheroid Bacillus.
2. Streptococcus Pyogenes.
3. Staphylococcus Albus (M.N.F.)

B. UNDER ANAEROBIC CONDITIONS.

1. Diphtheroid Bacillus.

CLINICAL CONDITION.

Patient was certified in June 1908. He is now in the fat stage of dementia praecox, eats and sleeps well. He lounges on the sofa all day, says he hates work and refuses to occupy himself. He has occasional phases of excitement when he is apt to strike out. He handled his mother roughly on/
on her last visit.

CONCLUSIONS.

The presence of a diphtheroid bacillus growing under aerobic and anaerobic conditions is to be noted. Is this organism exercising a pathological influence? It is difficult to say. There is no evidence of irritation in the urinary tract, but the case is one of long standing, and it may be that the urinary tract no longer makes any defensive effort against the organisms passing through. Occasional explosions are still to be noted.
CASE VIII.

MR. W. DEMENTIA PRAECOX.

URINE.

I. Physical & Chemical Characters.


II. Microscopical appearance of the centrifuged deposit.

A few epithelial cells. A few epithelial casts. A few pus cells. One or two red blood corpuscles in an occasional field. A few motile bacteria.

III. Bacteria.

A. UNDER AEROBIC CONDITIONS.

1. Staphylococcus Pyogenes Albus.

2. Staphylococcus Pyogenes Citreus.

B. UNDER ANAEROBIC CONDITIONS.

1. Staphylococcus Pyogenes Albus.

2. Staphylococcus Pyogenes Citreus.

CLINICAL CONDITION.

Patient served in the East during the Great War.
War. He has had malaria, and in 1919 had heat stroke at Tonk, India. Well-nourished and muscular. Tongue coated. Not constipated. Patient is tremendously egocentric. His reaction time is prolonged. He has the delusion that he failed to do his duty in the Army. He spends most of his time gazing into space. He is not a masturbator, but occasionally has spermatorrhoea in the day time.

CONCLUSIONS.

This patient has a comparatively large amount of Staphylococcus Pyogenes Albus and of Staphylococcus Pyogenes Citreus in his urine, and there is definite evidence of irritation in his urinary tract. To what degree are these organisms responsible for his mental condition? It is difficult to say - I can only note their presence and indicate that they seem to be doing some damage in the urinary tract.
CASE IX.

Mr. M.  DEMENTIA PRAECOX.

URINE.

I. Physical and chemical characters.


II. Microscopical appearance of the centrifuged deposit.

1 or 2 epithelial cells in an occasional field. Some epithelial debris.

III. Bacteria.

No growth was obtained.

CLINICAL CONDITION.

Well nourished. Clear complexion. No constipation. Tongue clean. Sleeps well. Good appetite. Patient is addicted to masturbation, states he has "erotic convictions", hears sensuous female voices. He has the typical slim hand and thumb, and exhibits the typical handshake.

CONCLUSION.

Entirely negative.
CASE X.

Mr. M. DEMENTIA PRAECOX.

(? Manic - depressive insanity)

URINE.

I. Physical and Chemical Characters.

Pale straw colour, - clear, - faintly acid.
No albumin. No sugar. No indican.

II. Microscopical appearance of the centrifuged deposit.

Several epithelial cells. A few pus cells. One or two red blood corpuscles in an occasional field. A few motile organisms.

III. Bacteria.

A. UNDER AEROBIC CONDITIONS.

I. Diphtheroid bacillus.

CLINICAL CONDITION.

Patient was invalided out of the army in Oct. 1918 with shell-shock. He was certified insane and was under treatment in various institutions till April 1921 when he was permitted to go to his people on six months' probation. In the early stages of his/
his condition he was profoundly depressed, later he had a long period of mental excitement and irresponsibility. In Oct. 1921 he was certified cured. But early in '22 he again showed signs of mental instability, imagined he was in the running for a Scottish Rugby "Cap", was assiduous in his attentions to certain ladies, and spent money freely, buying two motor cars one morning. I saw him a few days after he had again been received in an institution for treatment. His physical condition was very good, he ate his food well, slept well, and his bowels were regular. He had no conception that his mental state was away from the normal, and spoke and behaved as if he were having a short holiday in a hydro. There was no suspicion of syphilis, no Wassermann was ever done.

CONCLUSION.

There is some evidence of irritation in the urinary tract, possibly caused by the diphtheroid bacillus present. Is this organism a factor in this patient's condition? It is possible, but one has no evidence to offer.
URINE.

I. Physical and chemical characters.

Pale straw colour. Clear - acid.
Albumin, +. No sugar. No indican.

II. Microscopical appearance of the centrifuged deposit.

Several pus cells. Several epithelial cells. A few red blood corpuscles.

III. Bacteria.

A. UNDER AEROBIC CONDITIONS.

I. Strepotococcus pyogenes.

Analysis of the intestinal flora.

B. Coli communis (aberrant)

Strepococcus Pyogenes.

Throat-swab.

Strepococcus Pyogenes.

Micrococcus pseudo - Catarrhalis

Micrococcus Catarrhalis (anaerobe)

CLINICAL CONDITIONS.

Admitted 26.3.20. She is rather thin, has a weak face, and is given to giggling foolishly.
foolishly. She talks somewhat vaguely about herself, says she worked in a shop "under a strain", that one of the girls said "something", then a friend took her out somewhere just before the "mad turn", but she has no recollection of what happened. She takes her food fairly well, has no trouble with her bowels and sleeps fairly well.

CONCLUSIONS.

The presence of the Streptococcus Pyogenes in the faeces, the throat, and the urine is of great interest. There is definite evidence of irritation in the urinary tract, probably due to this organism. It seems clear that it has invaded the blood stream from the throat and the intestinal canal, and whether it is neurotoxic or not it must be exercising considerable influence on the metabolism of the patient. The presence of albumin in the urine is to be noted; the kidney has possibly suffered from the invasion of this organism. There is some evidence now in her clinical picture of damage to her brain.
CASE XII.

Miss D. DEMENTIA PRAECOX.

URINE.

I. Physical and Chemical Characters.
Pale straw colour. Mucous deposit. Acid.
Albumin+. No sugar. No indican.

II. Microscopical appearance of the centrifuged deposit.
Several pus cells. Several epithelial cells.
A few red blood corpuscles.

III. Bacteria.

A. UNDER AEROBIC CONDITIONS.
1. B. Coli communis.

B. UNDER ANAEROBIC CONDITIONS.
1. B. Coli communis.

CLINICAL CONDITION.

No notes were obtained of this case.

CONCLUSIONS.

There is definite evidence of irritation in the urinary tract, and of damage to the kidney. Has it all been caused by the B. Coli communis? And is this organism exercising a neurotoxic influence in/
in this case? I do not know. But it is likely that the organism is affecting the patient's physical condition, and thus, indirectly at least, her mental state.
CASE XIII.

Mr. A. DEMENTIA PRAECOX.

URINE.

I. Physical and chemical characters.

II. Microscopical appearance of the centrifuged deposit.

   A few epithelial cells. One or two pus cells in an occasional field. Some epithelial debris.

III. Bacteria.

   A. UNDER AEROBIC CONDITIONS.

      1. Streptococcus faecalis.

         Analysis of the intestinal flora.

      B. Friedländer.

         Streptococcus faecalis.

         Streptothrix (anaerobae)

CLINICAL CONDITION.

No notes were received of this case.

CONCLUSION.

It is of interest to note that a normal inhabitant of the intestinal canal viz./
viz. streptococcus faecalis, has got into the urine, probably via the blood stream, while an organism like the anaerobic streptothrix has not. And in the absence of clinical evidence it is difficult to estimate the pathogenicity of the streptococcus faecalis in this case.
CASE XIV.

Mr. M. DEMENTIA PRAEcox.

URINE.

I. Physical and Chemical Characters.


II. Microscopical appearance of the centrifuged deposit.

A few epithelial and pus cells. Some epithelial debris.

III. Bacteria.

A. UNDER AEROBIC CONDITIONS.

No growth.

B. UNDER ANAEROBIC CONDITIONS.

1. Diphtheroid bacillus.

ANALYSIS OF THE INTESTINAL FLORA.

1. B. coli. communis (aberrant)

2. Diphtheroid bacillus, (anaerobe)

CLINICAL CONDITION.

Patient served in the army, was discharged in 1921 on account of dementia praecox.

There/
There is no history of shell-shock.

CONCLUSIONS.

The presence of a diphtheroid bacillus, only growing under anaerobic conditions, both in the faeces and in the urine, is of great interest. There is some evidence of irritation in the urinary tract. In the absence of clinical evidence one is precluded from making further observations.
CASE XV.

Miss H. DEMENTIA PRAECOX. Aet 25.

URINE.

I. Physical and Chemical Characters.
Straw colour — clear — acid. No albumin. No sugar. No indican.

II. Microscopical appearance of the centrifuged deposit.
A few epithelial cells. A few motile bacteria.

III. Bacteria

A. UNDER AEROBIC CONDITIONS.
1. B. Proteus Vulgaris.
2. Staphylococcus albus (M.N.F.)

ANALYSIS OF THE INTESTINAL FLORA.
1. E. coli Communis
2. Streptothrix, anaerobe

ANALYSIS OF THE NASAL FLORA.
1. Diphtheroid bacillus.
2. Streptococcus Pyogenes
3. Staphylococcus albus (M.N.F.)
4. Micrococcus Catarrhalis, anaerobe

CLINICAL CONDITION.

The only notes received of this case are that she/
CONCLUSIONS.

The presence of *Proteus Vulgaris* in the urine usually indicates some underlying pathological condition, (KIND, common infections of the kidneys) There is no evidence here of any irritation in the urinary tract. The anaemia is to be noted, it is almost certainly a secondary anaemia, probably due to some toxic agent.
CASE XVI.
Mr. McC. DEMENTIA PRAECOX.

URINE.
I. Physical and Chemical Characters.
II. Microscopical appearance of the centrifuged deposit.
A few pus cells. Some epithelial cells and debris. Several motile organisms.
III. Bacteria.
A. UNDER AEROBIC CONDITIONS.
1. Micrococcus Tetragenus.
B. UNDER ANAEROBIC CONDITIONS.

ANALYSIS OF THE INTESTINAL FLORA.

UNDER AEROBIC CONDITIONS.
1. B. Coli communis, predominating.
2. Streptococcus Faecalis, a few colonies.

UNDER ANAEROBIC CONDITIONS.

CLINICAL/
No notes were received of this case.

CONCLUSIONS.

The presence of a diphtheroid bacillus in the urine identical with that in the faeces is of great interest. It will be noted that the organism is a threading form and grows as an anaerobe only. It is the only organism in the faeces that can be looked upon as pathological and it is possible it may be acting as a toxic agent in this case. It may be directly responsible for the mental condition present, in that its toxin is fixed by the brain cells of the individual, or it may be acting indirectly only by lowering the general resistance of the patient. One notes the evidence of irritation in the urinary tract.
URINE.

I. Physical and chemical characters.

Pale straw colour - clear - acid. No albumin. No sugar. No indican.

II. Microscopical appearances of the centrifuged deposit.

Several pus and epithelial cells. A few red blood corpuscles. Several motile & non-motile bacteria. Large numbers of Ca. Ox. crystals.

III. Bacteria.

A. UNDER AEROBIC CONDITIONS.

1. Streptococcus Pyogenes.

2. Staphylococcus albus. (M.N.E.)

CLINICAL CONDITION.

Patient is silent, sullen, resistive and restless. She takes no interest in anything or anyone. She is apt to get out of bed and wander about aimlessly. She takes her food fairly well, but needs an aperient two or three times a week.

CONCLUSIONS./
CONCLUSIONS.

There is definite evidence of irritation in the urinary tract. Is that irritation caused by the Streptococcus Pyogenes? And is the organism a factor in the patient's condition? Both are possible, the former more definitely than the latter.
CASE XVIII.

Mrs. M. INFECTIVE EXHAUSTIVE CONFUSIONAL INSANITY (Puerperal)

URINE.

I. Physical and Chemical Characters.
Straw colour - Cloudy - mucous deposit - acid.
Albumin- No sugar. Organic sulphates, - No excess. No indican.

II. Microscopical appearances of the centrifuged deposit.
Several pus and epithelial cells. Several red blood corpuscles. No casts. A few motile organisms.

III. Bacteria.

A. UNDER AEROBIC CONDITIONS.
1. B. coli communis.

B. UNDER ANAEROBIC CONDITIONS.
1. B. coli communis

CLINICAL CONDITIONS.

Patient is well nourished, and takes her food well. Her hair is falling out. She has delusions regarding her husband, children and near relations. She shouts and sings, is impulsive and noisy. At times she is violent, smashes dishes, and tears her bed clothes.

CONCLUSIONS.
It is of interest to note the presence in the urine of B. coli communis in some quantity, and the fact that there is some damage to the urinary tract. It seems probable that this organism is to some extent responsible for the patient's toxic condition, her general resistance having been lowered, and probably fresh avenues of infection having been opened up during labour.
CASE XII.

Mrs H. INFECTIVE EXHAUSTIVE
CONFUSIONAL INSANITY (Puerperal)

URINE.

I. Physical and Chemical Characters.

Pale colour – clear – acid. No albumin.
No indican.

II. Microscopical appearance of the centrifuged deposit.

A few epithelial cells.

III. Bacteria.

No growth was obtained.

CLINICAL CONDITION.

Patient has a clear complexion, and tongue. Her appetite is returning, she is gaining weight, and sleeps well. Her reaction-time is prolonged, and there is still some confusion of mind. She was out in the grounds this morning.

CONCLUSION.

It is of great interest to note the negative picture that the urine of this patient presents. Clinically she was very different from the other two patients/
patients in this series, showing only the very slightest indication of toxicity when this examination was made. It is clear that the defensive mechanism of her body has been able to overcome whatever toxic infection she had originally suffered from.
CASE XX.

Mr C S • INFECTIVE EXHAUSTIVE CONFUSIONAL INSANITY (Puerperal).

URINE.

I. Physical and Chemical Characters.


II. Microscopical appearance of the centrifuged deposit.

A few pus cells. A few epithelial cells. One or two red blood corpuscles in an occasional field. A few motile organisms.

III. Bacteria.

A. UNDER AEROBIC CONDITIONS.

1. Diphtheroid bacillus.

B. UNDER ANAEROBIC CONDITIONS.

1. Diphtheroid bacillus.

CLINICAL CONDITION.

Patient died of exhaustion three days after the specimen was obtained.

CONCLUSIONS./
CONCLUSIONS.

The presence of a Diphtheroid bacillus growing under aerobic and anaerobic conditions is to be noted. There is definite evidence of irritation in the urinary tract, there is a trace of indican and a trace of sugar in the urine. The patient was apparently overwhelmed by the toxins in her system, and it seems quite possible that this diphtheroid bacillus was a factor in the pathogenesis of her condition.
CASE XXI.

Mr R. GENERAL PARALYSIS OF THE INSANE.

URINE.

I. Physical and Chemical Characters.

Pale coloured urine - clear - acid.
No albumin. No sugar. No indican.

II. Microscopical appearance of the centrifuged deposit.

A few epithelial and pus cells.
Some epithelial debris. A few motile bacteria.

III. Bacteria.

UNDER AEROBIC & ANAEROBIC CONDITIONS.

1. Strepococcus Pyogenes.
2. Diphtheroid bacillus.

CLINICAL CONDITION.

Admitted 11th July, 1921. Wassermann reaction in blood and C.S. fluid. On admission he was very elated, with numerous grandiose delusions. At present he has a remission of symptoms.

CONCLUSIONS/
CONCLUSIONS.

The two organisms are present in some quantity, growing under both aerobic and anaerobic conditions. And there is some evidence of irritation in the urinary tract. But they do not seem to be exercising any pathological influence on the patient's general condition at present.
CASE XXII.

Mr C.  G. P. I.  3rd. STAGE.

URINE.

I. Physical and Chemical Characters.


II. Microscopical appearance of the centrifuged deposit.

A few epithelial cells.  One or two hyaline casts.

III. Bacteria.

No growth was obtained.

CLINICAL CONDITION.

Patient was confined to bed.  He was inclined to obesity, had a clean tongue and a clear complexion.  He was very hard of hearing, said he was feeling all right.

CONCLUSION.

Entirely negative.
CASE XXIII.

Mr. B. G. P. I. 2nd STAGE.

URINE.

I. Physical and Chemical Characters.


II. Microscopical appearance of the centrifuged deposit.

A few pus cells. A few red blood corpuscles. Several epithelial cells. Several motile and non-motile bacteria.

III. Bacteria.

A. UNDER AEROBIC CONDITIONS.

1. Diphtheroid bacillus.
2. Streptococcus Pyogenes.
3. Staphyloccoccus albus (M. N. F.)

CLINICAL CONDITION.

A well-nourished individual with a clean tongue and a clear complexion. He had well-marked delusions of grandeur. He told us that he had been an Admiral in the British Navy and a General in the British Army during the War; that he had been mentioned several times in despatches; that he had been in business in Edinburgh and had made millions of/
of money; that he had been a K.C. at the Scottish Bar with the finest practice in the Kingdom.

CONCLUSIONS.

The presence of these organisms is to be noted, and the evidence of irritation in the urinary tract. The patient was in a very exalted state when I examined him, and it is probable that the defensive mechanism of his body was not sufficient to prevent these organisms causing some aggravation at least of his condition.
CASE XXIV.

Miss H. GENERAL PARALYSIS of the INSANE.

URINE.

I. Physical and Chemical Characters.


II. Microscopical appearance of the centrifuged deposit.

No cells, casts or crystals. Large numbers of motile and non-motile bacteria.

III. Bacteria

A. UNDER AEROBIC CONDITIONS.

1. Diphtheroid bacillus.
2. Staphylococcus albus (M. N. F.)

CLINICAL CONDITION.

Patient is confined to bed. Her complexion is clear. She seems to be in fairly good physical condition. She is spoon-fed, and has incontinence of urine and faeces. She had 16 seizures the day before I saw her, and has had as many as 22 in one night. She is resistive and at times shouts.

CONCLUSIONS.
CONCLUSIONS.

One notes the presence of these two organisms with evidence of irritation in the urinary tract. Whether they are causal of the condition or not it seems likely that they are aggravating the patient's condition.
CASE XXV.

Mr. E. PARAPHERNIA.

URINE.

I. Physical and chemical characters.

Pale straw colour, - clear, - acid. No albumin. No sugar. No indican.

II. Microscopical appearance of the centrifuged deposit.

Several pus cells. A few epithelial cells. Several motile and non-motile bacteria.

III. Bacteria.

A. UNDER AEROBIC CONDITIONS.

1. Diphtheroid bacillus.

2. Streptococcus Faecalis.

CLINICAL CONDITION.

Patient was working in America when war broke out. He joined the Canadian forces. He was certified in October 1916 as a result of shell-shock. He says he hears a woman's voice from the direction of the roof, and admits self-abuse. He has run away on several occasions. He is extremely suspicious, occasionally assaults other people. He has the systematised delusion that he is being kept out of America by a conspiracy. His physical health is good, he eats and sleeps well.

CONCLUSIONS.
CONCLUSIONS.

These organisms are present in some quantity and there is not the slightest evidence of any irritation of the urinary tract. It is to be noted that the case is one of long standing and that the patient is having several fits at intervals. It seems possible, therefore, that she is being attacked by toxins, and that the kidney is making no defensive effort against the organisms it filters out of the blood stream. Is the Diphtheroid bacillus, present in quantity in this urine, a factor in the pathogenesis of this patient's condition? I do not know.
CASE XXVI.

Mr McD. PARAPHRENIA, 2nd STAGE.

URINE.

I. Physical & Chemical Characters.


II. Microscopical appearances of the centrifuged deposit.

Several epithelial cells. Some epithelial debris. A few pus cells. One or two red blood corpuscles in an occasional field. Several motile bacteria.

III. Bacteria.

A. UNDER AEROBIC CONDITIONS.

1. Streptococcus Pyogenes.

B. UNDER ANAEROBIC CONDITIONS.

1. Streptothrix.

CLINICAL CONDITION.

Served in Egypt during the Great War. Well nourished, constipated, tongue coated, throat injected, sleeps badly. He takes his food fairly well, but evinces no interest in it. "There is apparently a/
a definite sexual basis to his condition." In his conversation he shows a tendency to balance one factor against another e.g. he discusses such topics as Capitalism vs Labour, East vs West, Catholic vs Protestant. He is exceedingly suspicious, is afraid of being poisoned, said that if it was proposed to give him a vaccine as the result of my examination he wished to see the Superintendent. An examination was made of a throat-swab in this case, and the following bacteria were isolated.

1. Staphylococcus Pyogenes aureus.
2. Streptococcus Pyogenes.
3. Streptococcus Anginosus.
4. Diphtheroid bacillus.
5. Micrococcus Catarrhalis.

CONCLUSIONS.

There is definite evidence of irritation in the urinary tract. The presence of the Streptococcus Pyogenes both in the throat and in the urine is to be noted. It seems likely that this organism is at least responsible for an aggravation of the patient's condition. The organism to which some observers would attach great importance as a neurotoxic agent is the anaerobic/
anaerobic streptothrix found in the urine. What its influence is in this particular case I do not know - I indicate its presence and the fact that it only occurs, as an anaerobe, in this case in my series.
CASE XXVII.

Mrs H. DELUSIONAL INSANITY.

URINE.

I. Physical and Chemical Characters.


II. Microscopical appearance of the centrifuged deposit.

Several pus and epithelial cells. Several motile and non-motile bacteria.

III. Bacteria.

A. Under aerobic conditions.

1. B. Friedländer.

2. Streptococcus Faecalis.

B. Under Anaerobic conditions.

1. Diphtheroid bacillus.

ANALYSIS of the INTESTINAL FLORA.

1. B. Friedländer.

2. Streptococcus Faecalis.

3. Diphtheroid bacillus, anaerobe.

CLINICAL CONDITION.

"A long-standing case. She has delusions of persecution, and is very dirty in her habits."

CONCLUSIONS/
It is of great interest to note in this case that the findings in the faeces and in the urine are identical. It is probable that the organisms have got into the blood stream from the intestinal canal, and thence into the urine. There is evidence of irritation in the urinary tract, and it seems likely that these organisms are in some measure directly or indirectly responsible for the patient's condition.
CASE XXVIII.

Mr G. McL. CONFUSIONAL INSANITY.

URINE.

I. Physical and Chemical Characters.
Pale colour - clear - acid. No albumin. No sugar. No indican.

II. Microscopical appearance of the Centrifuged deposit.
A few pus cells. A few epithelial cells.

III. Bacteria.
A. Under aerobic conditions.
1. Diphtheroid bacillus.
2. Staphylococcus albus. (M.N.F.)

CLINICAL CONDITION.

Typical case of senile confusion with marked amnesia and aphasia. He takes his food fairly well, sleeps well, requires a purgative 2 or 3 times a week.

CONCLUSIONS.

There is evidence of irritation in the urinary tract, and the presence of a diphtheroid bacillus is to be noted. To what extent, if any, is it responsible for the mental confusion from which this patient suffers? I do not know.
CASE XXIX.

Mrs D. ACUTE MANIA. (Early)

URINE.

I. Physical and Chemical Characters.

II. Microscopical appearance of the Centrifuged deposit.
   Several pus cells, epithelial cells, and motile bacteria. A few red blood corpuscles.

III. Bacteria.
   A. UNDER AEROBIC CONDITIONS.
   1. B. Coli communis.
   2. Streptococcus Pyogenes.
   B. UNDER ANAEROBIC CONDITIONS.
   1. B. Coli communis.

CLINICAL CONDITION.

Patient is confined to bed, emaciated, losing weight, has to be spoon fed. She is constipated, has a brown furred tongue, and has dark rings under her eyes. She is very confused, but is quiet. She is running a temperature of 102° - 103°. She died a fortnight later.

CONCLUSIONS/
CONCLUSIONS.

There are several points of interest in this case – an acid urine, with the B. Coli communis present, and a temperature point to a general invasion of the system by the B. Coli communis. The association of a coliform organism, indicanuria, and constipation is again to be noted (Cf. Case III, Mr. F.). There is evidence of irritation in the urinary tract, and of abnormal intestinal putrefaction associated with stasis. The patient is obviously full of toxins to which she is reacting both physically and mentally. The organisms found are certainly affecting her physical condition and must be reacting, indirectly at least, on her mental condition.
CASE XXXI.

Mrs S.   ACUTE MANIA.

URINE.

I. Physical and Chemical Characters.

No albumin. No sugar. No indican.

II. Microscopical appearance of the Centrifuged deposit.

A few pus cells and epithelial cells.
Several non-motile bacteria.

III. Bacteria.

A. UNDER AEROBIC CONDITIONS.

1. Streptothrix.

CLINICAL CONDITION.

Patient is confined to bed. She takes her food well, her tongue is clean. She needs sleeping draughts. She talks incessantly, has hallucinations of hearing and delusions of persecution.

CONCLUSIONS.

The patient is clearly suffering from constant mental irritation. Is that condition induced or aggravated by the Streptothrix found in her urine?
I can only indicate its presence, the fact that it only occurs in two cases of my series, (Cf. Mrs P. Case XL.), and that there is evidence of irritation in the urinary tract.
CASE XXXI.

Miss D.B. ENCEPHALITIS LETHARGICA.

URINE.

I  Physical and Chemical Characters.


II. Microscopical appearance of the centrifuged deposit.

Several epithelial cells. A few pus cells.

III. Bacteria.

No growth was obtained.

CLINICAL CONDITION.

Patient is lethargic, but her memory is clear, and she answers questions. She is very facile and childish, at times irritable, and she complains about other patients. She wears smoked glasses, and says they give her eyes comfort.

CONCLUSIONS.

Entirely negative.
CASE XXXII.

Mr McM. MELANCHOLIA.

URINE.

I. Physical and Chemical Characters.

Pale, straw colour - clear - alkaline.
No albumin. No sugar. No indican.

II. Microscopical appearance of the centrifuged deposit.

A few pus cells. Some epithelial debris. Some motile and non-motile bacteria.

III. Bacteria.

A. UNDER AEROBIC CONDITIONS.

1. Diphtheroid bacillus.
2. Streptococcus Pyogenes.
3. Staphylococcus Albus (M.N.F.)

CLINICAL CONDITION.

Admitted 20th August, 1920. He has numerous stigmata of degeneration. He is depressed, does a little work, sits in a corner muttering to himself. He is dull and anergic.

CONCLUSIONS./
CONCLUSIONS.

There is evidence of irritation in the urinary tract, and it is possible that the organisms in his urine are, indirectly at least, affecting his mental condition.
CASE XXXIII. Aet. 39.

Mr. I. SEVERE NEURASTHENIA, bordering on MELANCHOLIA.

URINE.

I. Physical and Chemical Characters.

Cloudy urine with a copious deposit of amorphous pink urates. Acid. No albumin. No sugar. No indican.

II. Microscopical appearance of the Centrifuged deposit.

Large number of small granular particles arranged in moss-like clumps. — amorphous urates.

III. Bacteria.

A. UNDER AEROBIC CONDITIONS.

1. Streptococcus Pyogenes.
2. Staphylococcus albus (M.N.F.)

ANALYSIS OF THE INTESTINAL FLORA.

A. UNDER AEROBIC CONDITIONS.

1. E. Friedländer.
2. Streptococcus Pyogenes.
3. Streptococcus Faecalis.

B. UNDER ANAEROBIC CONDITIONS.

1. Streptococcus Pyogenes.
2. Diphtheroid bacillus.

CLINICAL/
CLINICAL CONDITION.

Patient has been ill some years. He has a bad alcoholic history, and suffers from chronic diarrhoea. He has fits of intense depression and at times is violent.

CONCLUSIONS.

The presence of the Streptococcus Pyogenes both in the faeces and in the urine is of interest, though it may be difficult to recognise the role it plays in the pathogenesis of the condition. It is also of interest to note that an anaerobic diphtheroid bacillus appears in the faeces, but not in the urine. His clinical picture makes it clear that he must be full of toxins, alcohol playing an important part. It is a case to which the theory of the accumulation and burning up of toxin is applicable, alcohol damping the flare-up and prolonging the depression phase, and the diarrhoea originating in nature's attempt to get rid of toxins quickly.
CASE XXXIV.

Miss B. SEVERE NEURASTHENIA, BORDERING ON MELANCHOLIA.

URINE.

I. Physical and Chemical Characters.

Straw colour - clear - acid. Albumin +
No sugar. No indican.

II. Microscopical appearance of the centrifuged deposit.

Several pus and epithelial cells. Large number of Calcium oxalate crystals. Several motile and non-motile bacteria.

III. Bacteria.

A. UNDER AEROBIC CONDITIONS.

1. B. coli communis.

B. UNDER ANAEROBIC CONDITIONS.

1. Diphtheroid bacillus.

ANALYSIS OF THE INTESTINAL FLORA.

A. UNDER AEROBIC CONDITIONS.

1. B. coli communis.

2. B. Proteus Vulgaris.

B. UNDER ANAEROBIC CONDITIONS.

1. Diphtheroid bacillus.

2. Micrococcus Catarrhalis.

ANALYSIS OF THE DENTAL FLORA.

A. UNDER AEROBIC CONDITIONS.

1./
1. *Streptococcus Pyogenes*.
2. *Diphtheroid bacillus*.

**B. UNDER ANAEROBIC CONDITIONS.**

1. *Streptococcus Pyogenes*.
2. *Micrococous Catarrhalis*.
3. *Diphtheroid bacillus*.

**CLINICAL CONDITION.**

Patient seems full of phobias. She had her appendix removed in Nov. '21, and her tonsils shortly after. She suffers a good deal from peri-articular and rheumatism. She died in March '22 in a state of acute toxicity.

**CONCLUSIONS.**

There is definite evidence of considerable irritation in the urinary tract and some damage to the kidney. And it is of great interest to note the presence of *B. coli communis* in the urine, and the presence of an anaerobic diphtheroid bacillus in the teeth, the faeces and the urine. Indirectly at least it seems probable that these organisms will react on the patient's mental condition. The attempts made to get rid of toxins into various parts of her body are to be noted.
CASE XXXV.

Mr S. MCM. MELANCHOLIA.

URINE.

I Physical and Chemical Characters.


II Microscopical appearances of the centrifuged deposit.

Several pus cells. One or two red blood corpuscles. Some epithelial cells. Some motile and non-motile bacteria.

III Bacteria.

A UNDER AEROBIC CONDITIONS.

1. Diphtheroid bacillus.

2. Streptococcus Faecalis.

ANALYSIS OF INTESTINAL FLORA

1. E. Coli Communis.

2. Streptococcus Faecalis.

3. Diphtheroid bacillus, aerobe.

4. Diphtheroid bacillus, anaerobe.

5. Staphylococcus albus. (M.N.F.)

CLINICAL CONDITION.
CLINICAL CONDITION.

Patient had clinical evidence of Syphilis and a strongly positive Wassermann. He cannot concentrate his thoughts, and is full of phobias.

CONCLUSIONS.

There is evidence of irritation in the urinary tract. It is of interest to note that the Streptococcus Faecalis occurs in the urine, while its associated coliform organism does not; and that an aerobic diphtheroid bacillus appears both in the urine and the faeces, while an anaerobic diphtheroid bacillus appears in the faeces but not in the urine. Indirectly at least it seems possible that the organisms in the urine have some bearing on the patient's mental condition.
CASE XXXVI.

Mr MCL. STUPOROSE MELANCHOLIA.

URINE.

I. Physical and Chemical Characters.

Pale, straw colour - clear - acid.
No albumin. No sugar. Organic sulphates - no excess. No indican.

II. Microscopical appearance of the centrifuged deposit.

A few pus and epithelial cells. A few red blood corpuscles. Several motile and non-motile bacteria.

III. Bacteria.

A. UNDER AEROBIC CONDITIONS.

1. Diphtheroid bacillus.
2. Streptococcus Pyogenes.
3. Staphylococcus albus. (M.N.F.)

CLINICAL CONDITIONS.

Patient is sunk in apathy, and will not answer questions. He takes his food fairly well, and needs an aperient twice a week.

CONCLUSIONS./
CONCLUSIONS.

There is evidence of considerable irritation in the urinary tract. And the presence of organisms in the urine is to be noted. The patient gave me the impression that he was borne down by a systemic poisoning to which the defensive mechanism of his body could make no effective reaction. But I am not able to judge of the part played by the organisms found in the urine in the production of this toxaemia, though it is perhaps reasonable to conclude that they do play a part in it.
CASE XXXVII

Mr. J. STUPOROSE MELANCHOLIA.

URINE.

I. Physical and Chemical Characters.


II. Microscopical appearance of the centrifuged deposit.

A few pus and epithelial cells.

III. Bacteria.

No growth was obtained.

CLINICAL CONDITION.

Patient is sunk in apathy, and will not answer questions. He takes his food fairly well, and needs an aperient twice a week.

CONCLUSIONS.

It is of great interest to compare this case with the previous one in my series (Mr. McL. Case 36). The clinical picture presented by the two cases is very similar, both suggest toxicity. There is evidence of irritation in the urinary tract in both cases; in Mr. McL.'s case organisms are present/
present in the urine, and in Mr. J's case indican. Does it mean that in the one a bacterial toxin is at work, and in the other an auto-intoxication of a chemical nature? I do not think it is justifiable to draw such a hard and fast dividing line between the two cases. On the present state of my knowledge I can go no further.
CASE XXXVIII.

Mrs A. MELANCHOLIA.

URINE

I. Physical & Chemical Characters.

Mucus, and a heavy deposit of pink urates which disappeared on heating. Acid. Albumin - a trace. No sugar. No indican.

II. Microscopical appearance of the centrifuged deposit.

Large numbers of small granular particles arranged in moss-like clumps - amorphous urates. A few epithelial cells. A few motile bacteria.

III. Bacteria.

A. UNDER AEROBIC CONDITIONS.

1. Streptococcus Faecalis.
2. Staphylococcus Albus (M.N.F.)

CLINICAL CONDITION.

Patient is dull and depressed. She has delusions of persecution and is apt to get excited when conversed with about her delusions. She is suspicious, thinks her food is poisoned. Her Wassermann reaction is +, her physical condition is fairly satisfactory.

CONCLUSIONS.
CONCLUSIONS.

There is some evidence of irritation in the urinary tract, and the presence of organisms in the urine is to be noted. It seems possible that there is a systemic invasion by these organisms which has resulted in some damage to the kidney, and which must react on the patient's mental condition.
CASE XXXIX.

Miss D. MELANCHOLIA.

URINE

I. Physical & Chemical Characters.


II. Microscopical appearance of the centrifuged deposit.

Several pus and epithelial cells. One or two red blood corpuscles in an occasional field. Several non-motile bacteria.

III. Bacteria.

A. UNDER AEROBIC CONDITIONS.

1. Diphtheroid Bacillus.
2. Staphylococcus Albus (M.N.F.)

CLINICAL CONDITION.

Patient is depressed, confused, and incoherent. She has the delusion that her nose is contracted and that she cannot breathe through it. She is hysterical at times. She takes her food fairly well, but needs an aperient two or three times a week, and sleeping draughts.

Conclusions/
CONCLUSIONS.

There is definite evidence of irritation in the urinary tract, the presence of a diphtheroid bacillus in the urine is to be noted. Other symptoms suggest that she is toxic.
CASE XLV.

MRS. P. MELANCHOLIA.

URINE.

I. Physical and Chemical Characters.


II. Microscopical appearance of the centrifuged deposit.

A few pus cells and epithelial cells. A few red blood corpuscles. A few motile and non-motile bacteria.

III. Bacteria.

A. Under aerobic conditions.

1. Streptothrix

2. Diphtheroid bacillus.

CLINICAL CONDITION.

Patient is confined to bed. She is very depressed and agitated, and has fits of weeping. She is subject to hallucinations of hearing, voices tell her that dreadful things are to happen to her, and she has suicidal tendencies. She takes her food fairly well, but requires an aperient twice a week, and does not sleep well.

CONCLUSIONS.

There is definite evidence of irritation in the urinary tract, and it is of interest to note the presence in the urine of a Streptothrix and of a diphtheroid.
diphtheroid bacillus, both growing under aerobic conditions. The patient seems very toxic.
CASE XII.

Miss J. MELANCHOLIA.

URINE.

I. Physical and Chemical Characters.


II. Microscopical appearances of the centrifuged deposit.

One or two red blood corpuscles in a field. A few epithelial cells. A few motile bacteria.

III. Bacteria.

A. UNDER AEROBIC CONDITIONS.

1. Diphtheroid bacillus.

CLINICAL CONDITION.

Patient is confined to bed, she is slightly agitated, very depressed, and has suicidal tendencies. She exhibits minimal tremors of her tongue and hands. Her physical condition is fairly good, she eats and sleeps well.

CONCLUSIONS.
CONCLUSIONS.

There is definite evidence of irritation in the urinary tract, the presence of a diphtheroid bacillus in the urine is to be noted, and her symptoms suggest that she is toxic.
Miss N. MELANCHOLIA. (attempted suicide)

URINE.

I. Physical and Chemical Characters.

II. Microscopical appearance of the centrifuged deposit.
   A few pus cells and epithelial cells. Several motile bacteria.

III. Bacteria.
   A. UNDER AEROBIC CONDITIONS.
      1. Staphylococcus albus. (M.N.F.)
   B. UNDER ANAEROBIC CONDITIONS.
      1. Staphylococcus albus. (M.N.F.)

CLINICAL CONDITIONS.

When I saw the patient, shortly after the specimen was taken, she was well on the road to recovery. She was seated sewing in a ward, had a bright expression, and her short reaction-time in answering questions was marked. She was putting on weight, and looked forward to an early discharge from the Asylum.

CONCLUSIONS./
CONCLUSIONS.

There is a little evidence of irritation in the urinary tract, but from the nature of the organism found in the urine and the patient's clinical condition it seems probable that the signs of irritation are evidence of organismal invasion in the past rather than in the present. It is of great interest to note the urinary picture presented by a case almost completely recovered.
CASE XIII.

Mrs. H. MELANCHOLIA (slight confusion)

URINE.

I. Physical & Chemical Characters.


II. Microscopical appearances of the centrifuged deposit.

A few pus cells and epithelial cells. One or two r.b.c. A few motile organisms.

III. Bacteria.

A. UNDER AEROBIC CONDITIONS.

1. Diphtheroid bacillus.

B. UNDER ANAEROBIC CONDITIONS.

1. Diphtheroid bacillus.
The intestinal flora of this patient were also analysed and found to be,
2. B. Coli communis.

2. Diphtheroid bacillus growing under anaerobic conditions.

CLINICAL CONDITION.

Patient's reaction time is much prolonged. She says she finds great difficulty in making up her mind/
mind to do anything. She wanted to write to a great friend, it was several days before she could make up her mind to do so, and once the letter was written she could not make up her mind to post it. She took a long time to say all this; but when she did speak she spoke coherently and with an appreciation of the disability she was suffering from, and an anxiety to recover normal health.

CONCLUSIONS.

The presence of an anaerobic diphtheroid bacillus both in the faeces and in the urine is of interest. There is definite evidence of irritation in the urinary tract. There seems to be something clogging the machinery of this patient's mental processes. May it not be a toxin? That seems probable. Is that toxin formed by the organisms present in the urine? I do not know.
CASE XLIV.

Miss MacN. HYPOCHONDRIAC MELANCHOLIA.

URINE.

I. Physical and Chemical Characters.


II. Microscopical appearance of the centrifuged deposit.

A few epithelial cells. A few pus cells. A few red blood corpuscles. Several motile and non-motile bacteria.

III. Bacteria.

A. UNDER AEROBIC CONDITIONS.

1. Streptococcus Faecalis

2. Diphtheroid bacillus

3. Staphylococcus pyogenes citreus

4. B. Proteus Vulgaris

CLINICAL CONDITION.

Patient is thin, confined to bed, has to be spoon fed. Hair thin. No teeth. Dark rings under eyes. Tongue coated. Constipated, has cascara every night. Patient has the delusion that she never has a passage of the bowels, and that her throat is choked.

CONCLUSIONS.
CONCLUSIONS.

The presence of *B. Proteus Vulgaris*, according to KIDD, indicates an underlying pathological condition. The presence of other organisms as well in the urine is to be noted, and the fact that there is evidence of irritation in the urinary tract. Are these organisms responsible for the patient's poor physical condition or her delusions or both? It is possible.
CASE XLV.

Miss A. MELANCHOLIA.

URINE.

I. Physical and Chemical Characters.

Pale straw colour - clear. Faintly alkaline.
No albumin. No sugar. No indican.

II. Microscopical appearance of the centrifuged deposit.

One or two pus cells and epithelial cells in a field. Several motile and non-motile bacteria.

III. Bacteria.

A. UNDER AEROBIC CONDITIONS.

1. Diphtheroid bacillus.
2. Streptococcus Pyogenes
3. Staphylococcus Albus (M. N. F.)

CLINICAL CONDITION.

Patient is a school teacher and was certified insane in April 1921. She got very depressed because she could not maintain discipline among the boys in her class, over 16 years of age, and she was afraid of getting into trouble with the headmaster over it. She had never contemplated suicide until a doctor in Dunbar, when examining her, asked her if she had ever wanted to do away with herself. Since then she has always had a morbid dread that she might/
might do so sometime.

On examination, she is depressed, says she can never get well again, that God has abandoned her, that there is no hope for her in this world or the next. Her physical condition is good, she takes her food well, and sleeps well.

CONCLUSIONS.

The presence of organisms in the urine is to be noted, and the fact there is some irritation in the urinary tract. The patient's clinical picture suggests that she is suffering from the effect of some toxin. Has that toxin been produced by the diphtheroid bacillus or the streptococcus pyogenes found in her urine? I do not know.
CASE XLVI.

Mrs. F. MELANCHOLIA. (with confusion)

URINE.

I. Physical and chemical characters.

Pale straw colour - cloudy - acid ♦
Albumin +. No sugar. Organic sulphates - excess. Indican++

II. Microscopical appearances of the centrifuged deposit.

Several pus cells and epithelial cells. A few epithelial casts. Several red blood corpuscles. Several motile bacteria.

III. Bacteria.

A. UNDER AEROBIC CONDITIONS.

1. B. coli communis, aberrant.
2. Diphtheroid bacillus.
3. Staphylococcus albus. (M. N. F.)

CLINICAL CONDITION.

Patient is confined to bed, has no teeth, but takes her food fairly well. She is inclined to be constipated, requires an aperient two or three times a week, has a slightly coated tongue, and has dark rings under her eyes. She weeps readily, has the delusion/
delusion that people are against her, and try to corner her, that she is being blamed for making mischief among the members of her family. She hears voices talking to her about money.

CONCLUSIONS.

The association of indicanuria, constipation, and a coliform organism in the urine is again to be noted. A diphtheroid bacillus is also present in the urine, and there is definite evidence of irritation in the urinary tract. She is clearly being poisoned by the toxins developed in her intestinal canal – there is evidence of stasis and of abnormal putrefaction – and it is possible she is also suffering from a blood infection of the organisms found in her urine.
CASE XLVII.

Miss P. AGITATED MELANCHOLIA.

URINE.

I. Physical and Chemical Characters.
Pale straw colour - mucous deposit - acid.

II. Microscopical appearance of the centrifuged deposit.
Several epithelial cells. A few pus cells.
One or two red blood corpuscles in a field.
Some epithelial debris. A few motile bacteria.

III. Bacteria

A. UNDER AEROBIC CONDITIONS.
1. Diphtheroid bacillus.
2. Streptococcus pyogenes
3. Staphylococcus albus (M.N.F.)

CLINICAL CONDITION

Patient is confined to bed. She became very agitated when I approached the bed-side, put her head under the clothes and shouted out that she did not want to see me unless I could get her home. She then proceeded to shout "Give me back my God, give me back my good name". She sleeps badly, and has suicidal/
suicidal tendencies.

CONCLUSIONS.

There is definite evidence of irritation in the urinary tract, and the presence of organisms in the urine is to be noted. Clinically she appears to be suffering from some mental irritant, but it is not clear what the nature and source of that irritant are.
CASE XLVIII.

Mrs Cu. MELANCHOLIA.

URINE.

I. Physical and Chemical Characters.
   Pale straw colour. Mucous deposit. Acid.
   No albumin. No sugar. Organic sulphates—
   No excess. No indican.

II. Microscopical appearance of the Centrifuged
    deposit.
   A few red blood corpuscles, pus cells, and
   epithelial cells. Several motile and non-
   motile bacteria.

III. Bacteria.

   A. UNDER AEROBIC CONDITIONS.
      1. B. Friedländer.
      2. Diphtheroid bacillus.

   B. UNDER ANAEROBIC CONDITIONS.
      1. B. Friedländer.
      2. Diphtheroid bacillus.

CLINICAL CONDITION.

Patient is confined to bed, her tongue is
coated, and she needs an aperient three or four times
a week. She is depressed, complains of horrible dreams, and is markedly suicidal. She recently attempted to set herself on fire.

CONCLUSIONS.

The presence of a diphtheroid bacillus and of the bacillus Friedländer growing under both aerobic and anaerobic conditions is of interest, especially when associated with signs of irritation in the urinary tract, and the clinical picture the patient presents. Is there a blood infection of the organisms in her urine? That is probable. What effect has that infection on the patient's mental condition? Her clinical picture suggests a toxic infection, and it is probable that the organisms in the urine have an indirect bearing at least on her mental condition.
CASE XLIX.

Mr S. MEFANCHOLIA.

URINE.

I. Physical and Chemical Characters.

Very pale coloured urine - clear. Alkaline.
No albumin. No sugar. No indican.

II. Microscopical appearance of the centrifuged deposit.

A few epithelial cells. Some motile bacteria.

III. Bacteria.

A. UNDER AEROBIC CONDITIONS.

1. Streptococcus Faecalis.

CLINICAL CONDITION.


On admission patient was very nervous and depressed, heard voices in his sleep and had suicidal tendencies. He has now improved a good deal. His general physical condition is good.

CONCLUSIONS.

The patient is apparently living quite happily with the Streptococcus Faecalis in his urine. There is no evidence of irritation in his urinary tract, nor is there anything in his clinical picture to suggest a toxic infection.
CASE L:

Mr. H. MELANCHOLIA.

URINE.

I. Physical and Chemical Characters.

II. Microscopical appearance of the centrifuged deposit.
A few pus cells. Some epithelial debris. A few motile bacteria.

III. Bacteria.

A. UNDER AEROBIC CONDITIONS.
1. Streptococcus pyogenes.
2. Diphtheroid bacillus.
3. Staphylococcus albus. (M.N.F.)

CLINICAL CONDITION.

Admitted 3rd. December 1921. On examination soon after admission patient was pale and pasty looking, and had a marked alcoholic history. He had an old-standing gastric ulcer, and had secondary anaemia. He was very depressed, and suicidal. He died on the 16th Feb. '22 in a state of acute toxic confusion.

CONCLUSIONS./
CONCLUSIONS.

It is of great interest to contrast this case with the last - Case No. 49, Mr S. The clinical picture here is definitely one of a severe toxic infection. The presence in the urine of two organisms claimed by some observers to be neurotoxic is to be noted, and the evidence of irritation in the urinary tract. There was possibly a blood infection of at least the diphtheroid bacillus and the streptococcus pyogenes, and that must have contributed in some measure to the fatal issue to the case. Alcohol and the gastric ulcer must have also played their part, and no small one, in the case.
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<td>i. Staphylococcus. )</td>
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| 30       | XXXII.   | i. Diphtheroid ) NEISSER.  
|          |          | ii. Diphtheroid  ) |
| 31       | XXXIV.   | B. Coli Communis GRAM. |
| 32       | XXXVI.   | Aerobic Diphtheroid NEISSER. |
| 33       | XXXVI.   | Staphylococcus Albus GRAM. |
| 34       | XXXIX.   | Aerobic Diphtheroid NEISSER. |
| 35       | XL.      | Streptothrix. GRAM. |
| 36       | XL.      | Aerobic Diphtheroid NEISSER. |
| 37       | XLI.     | Aerobic Diphtheroid GRAM. |
| 38       | XLIII.   | i. Diphtheroid  ) |
|          |          | ii. Staphylococcus Pyog- 
|          |          | genes. ) GRAM. |
|          |          | iii. Diphtheroid  ) |
|          |          | iv. Staphylococcus Pyog- 
|          |          | genes. ) |
| 39       | XLIV.    | Mixed growth; broth culture,) 
|          |          | of B. Proteus Vulgaris, ) |
|          |          | Diphtheroid, ) GRAM. |
|          |          | Streptococcus & Staphy- 
<p>|          |          | lococcus. ) |</p>
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The findings in the cases are set out in TABLE III, in which the following abbreviations have been used:

M. = Male.
F. = Female.
Diph; = Diphtheroid bacillus.
Strep; = Streptococcus.
Pyog; = Pyogenes.
Faec; = Faecalis.
Staph; = Staphylococcus.
Alb; = Albus.
Cit; = Citreus.
B. Co. Com; = B. Coli Communis.
B. Co. Com (ab) = B. Coli Communis, aberrant.
B. Fried; = B. Friedländer.
B. Prot. V; = B. Proteus Vulgaris.
B. Pyocy; = B. Pyocyaneus.
Mic. Tetr; = Micrococcus Tetragenus.
Mic. Paratetr; = Micrococcus Paratetragenus.
A = Albumin.
I = Indican.
S = Sugar.
Ca. Ox; = Calcium Oxalate.
Phosph; = Phosphates.
Urat; = Urates.
Amorph; = Amorphous.
P = Pus cells.
E = Epithelial Cells.
R = Red blood corpuscles.
Alk. = Alkaline.
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<th>ORGANISMS</th>
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### III.

17 CASES. (13 M. 4 F.)

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### TABLE III.
**INFECTIVE EXHAUSTIVE CONFUSIONAL**

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<td>E. Co. Com;</td>
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### GENERAL PARALYSIS OF THE

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### PARAPHRENIA

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### INSANE, 4 CASES (3 M. 1 F.)

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### 2 CASES (M).

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<td>Nil</td>
<td>Nil</td>
<td>P.E.R.</td>
<td></td>
</tr>
<tr>
<td>Acid</td>
<td>Nil</td>
<td>Nil</td>
<td>P.E.R.</td>
<td></td>
</tr>
<tr>
<td>Acid</td>
<td>I;</td>
<td>Nil</td>
<td>P.E.</td>
<td></td>
</tr>
<tr>
<td>Acid</td>
<td>A;</td>
<td>Amorph. Urat;</td>
<td>E.</td>
<td></td>
</tr>
<tr>
<td>Acid</td>
<td>Nil</td>
<td>Nil</td>
<td>P.E.R.</td>
<td></td>
</tr>
<tr>
<td>Acid</td>
<td>Nil</td>
<td>Nil</td>
<td>P.E.R.</td>
<td></td>
</tr>
<tr>
<td>Acid</td>
<td>Nil</td>
<td>Nil</td>
<td>E.R.</td>
<td></td>
</tr>
<tr>
<td>Alk.</td>
<td>Nil</td>
<td>Phosph;</td>
<td>P.E.</td>
<td></td>
</tr>
<tr>
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<td>Nil</td>
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<td></td>
</tr>
<tr>
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<td>Nil</td>
<td>Nil</td>
<td>P.E.R.</td>
<td></td>
</tr>
<tr>
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<td>Nil</td>
<td>Nil</td>
<td>P.E.</td>
<td></td>
</tr>
<tr>
<td>Acid</td>
<td>A.I.</td>
<td>Nil</td>
<td>P.E.R.</td>
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<tr>
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<td>S.</td>
<td>Nil</td>
<td>P.E.R.</td>
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<td>Nil</td>
<td>Nil</td>
<td>P.E.R.</td>
<td></td>
</tr>
<tr>
<td>Alk.</td>
<td>Nil</td>
<td>Nil</td>
<td>E.</td>
<td></td>
</tr>
<tr>
<td>Acid</td>
<td>Nil</td>
<td>Nil</td>
<td>P.</td>
<td></td>
</tr>
</tbody>
</table>
ANALYSIS of RESULTS: VIDE TABLE. IV.

I. DEMENTIA PRÆCOX. 17 CASES. (13 M. 4 F.)

Organisms were present in 16 Cases and absent " 1 Case.

ORGANISMS:

(1) Diphtheroid bacillus. 7 Cases

- Aerobe 1
- Anaerobe 3
- Aerobe & anaerobe 3
- Sole organism (1 anaerobe). 2
- Aerobe & anaerobe, with Strep.-Pyog., & Staph.Albus (M.N.F.) 2
- Aerobe & anaerobe, with B.Friedländer & Staph.albus (M.N.F.) 1
- Anaerobe, with Staph.albus (M.N.F.) 1
- Anaerobe, with Micrococcus Tetragenus 1

(2) B. Coli Communis. 1 Case.

- Aerobe & anaerobe, sole organism present.

(3) B. Friedländer. 1 Case.

- With a Diphtheroid bacillus, aerobe & anaerobe, & Staph.albus (M.N.F.)

(4) B. Proteus vulgaris. 1 Case

- With Staph.albus (M.N.F.)

(5) B. Pyocyaneus. 1 Case.

- With Strep.pyog. & Staph.albus (M.N.F.)

(6) Streptococcus Pyogenes. 7 Cases.

- Sole organism/
Sole organism 1

With Staph-albus. (M.N.F.) & a Diphtheroid bacillus 2

With Staph.albus (M.N.F.) 1

With Staph.pyog.albus. & Staph.-albus (M.N.F.) 1

With B.Pyocyaneus & Staph.albus (M.N.F.) 1

With Strep.Faecalis 1

(7) Streptococcus Faecalis. 2 Cases.

Sole organism 1

With Strep.Pyogenes 1

(8) Staphylococcus Pyogenes Albus, 2 Cases

Aerobe 1

Anaerobe & aerobe 1

With Strep.Pyog. & Staph.albus (M.N.F.) aerobe 1

With Staph.Pyog.Citreus Aerobe & anaerobe 1

(9) Staphylococcus Pyogenes Citreus 1 Case.

Aerobe & anaerobe.

With Staph.Pyog.albus 1

(10) Staphylococcus albus (M.N.F.), 3 Cases.

Sole organism 1

With Strep.Pyog. & a Diph.bacillus 2

With Strep.Pyog. 1

With Strep.Pyog. & Staph.Pyog.albus 1

With Strep.Pyog. & B.Pyocyaneus 1

With B.Friedlander & Diph.bacillus 1

With B.Prot.Vulgaris 1
(11) Micrococcus Tetragenus, 1 Case.

With a Diphtheroid bacillus, (anaerobe).

<table>
<thead>
<tr>
<th>Organism</th>
<th>Cases</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diphtheroid bacillus</td>
<td>7</td>
</tr>
<tr>
<td>Coliform organisms</td>
<td>3</td>
</tr>
<tr>
<td>(2 F., 1 M.)</td>
<td></td>
</tr>
<tr>
<td>B. Pyocyaneus</td>
<td>1</td>
</tr>
<tr>
<td>Streptococci</td>
<td>9</td>
</tr>
<tr>
<td>Staphylococci</td>
<td>11</td>
</tr>
<tr>
<td>Micrococcus Tetragenus</td>
<td>1</td>
</tr>
<tr>
<td>3 Organisms present in</td>
<td>5</td>
</tr>
<tr>
<td>2 &quot;       &quot;</td>
<td>6</td>
</tr>
<tr>
<td>1 &quot;       &quot;</td>
<td>5</td>
</tr>
<tr>
<td>No organisms in</td>
<td>1</td>
</tr>
</tbody>
</table>

CELLS present in all 17 Cases.

<table>
<thead>
<tr>
<th>Reactions</th>
<th>Cases</th>
</tr>
</thead>
<tbody>
<tr>
<td>P. E. R.</td>
<td>6</td>
</tr>
<tr>
<td>P. E.</td>
<td>5</td>
</tr>
<tr>
<td>E. R.</td>
<td>1</td>
</tr>
<tr>
<td>P.</td>
<td>2</td>
</tr>
<tr>
<td>E.</td>
<td>3</td>
</tr>
<tr>
<td>REACTION</td>
<td>Acid in</td>
</tr>
<tr>
<td>Alkaline</td>
<td>2</td>
</tr>
<tr>
<td>CHEMICAL CONSTITUENTS.</td>
<td>Albumin in</td>
</tr>
<tr>
<td></td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Indican in</td>
</tr>
<tr>
<td></td>
<td>2</td>
</tr>
<tr>
<td>CRYSTALS or AMORPHOUS DEPOSIT.</td>
<td>Calcium oxalate crystals in</td>
</tr>
<tr>
<td></td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>Phosphates in</td>
</tr>
<tr>
<td></td>
<td>1</td>
</tr>
</tbody>
</table>
II. INFECTIVE EXHAUSTIVE CONFUSIONAL INSANITY
(PUERPERAL), 3 CASES (F.)
Organisms were present in 2 Cases & absent in 1 Case.

(1) Diphtheroid bacillus, 1 Case.
   Aerobe & anaerobe sole organism.  1
(2) B. Coli Communis, 1 Case.
   Aerobe & anaerobe, sole organism.  1
      1 Organism present in
      No organism in
CELLS present in all 3 Cases.
P.E.R.
E. in the case in which no growth was obtained.  1
REACTION Acid in all
CHEMICAL
CONSTITUENTS Albumin in
   A trace of sugar and of indican in

III. GENERAL PARALYSIS of the INSANE.
   4 CASES. (3 M., 1 F.)
Organisms were present in 3 cases and absent in 1 case.

(1) Diphtheroid bacillus, 3 Cases.
   Aerobe  2
   Aerobe & anaerobe,  1
   Aerobe & anaerobe with Strep.Pyog.  1
   With Strep.Pyog.& Staph.Albus (M.N.F.)  1
   With Staph.Albus (M.N.F.)  1

(2)/
139.

(2) *Streptococcus Pyogenes*, 2 Cases. CASES.

<table>
<thead>
<tr>
<th></th>
<th>1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aerobe</td>
<td>1</td>
</tr>
<tr>
<td>Aerobe &amp; anaerobe</td>
<td>1</td>
</tr>
<tr>
<td>Aerobe &amp; anaerobe with a Diph. bacillus</td>
<td>1</td>
</tr>
<tr>
<td>With a Diph. bacillus &amp; Staph. Albus (M.N.F.)</td>
<td>1</td>
</tr>
</tbody>
</table>

(3) *Staphylococcus albus* (M.N.F.) 2 cases.

<table>
<thead>
<tr>
<th></th>
<th>1</th>
</tr>
</thead>
<tbody>
<tr>
<td>With a Diph. bacillus &amp; Strep. Pyog.</td>
<td>1</td>
</tr>
<tr>
<td>With a Diph. bacillus</td>
<td>1</td>
</tr>
<tr>
<td>3 Organisms present in</td>
<td>1</td>
</tr>
<tr>
<td>2 &quot; &quot; &quot;</td>
<td>2</td>
</tr>
<tr>
<td>No &quot; &quot; &quot;</td>
<td>1</td>
</tr>
</tbody>
</table>

CELLS present in 3 cases

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>P.E.R.</td>
<td>1</td>
</tr>
<tr>
<td>P.E.</td>
<td>1</td>
</tr>
<tr>
<td>E.</td>
<td>1</td>
</tr>
</tbody>
</table>

REACTION Acid in all 4 Cases.

IV. PARAPHRENIA, 2 CASES. (M.)

Organisms were present in both cases.

(1) A Diphtheroid bacillus & Strep. Faecalis, 1 Case.

(2) Strep. Pyog., & Streptothrix, anaerobe 1 Case

2 Organisms present in each of the 2 Cases.

CELLS were present in both cases.

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>P.E.R.</td>
<td>1</td>
</tr>
<tr>
<td>P.E.</td>
<td>1</td>
</tr>
</tbody>
</table>

REACTION Both urines were acid.
V. DELUSIONAL INSANITY. 1 Case. (F.)

An anaerobic Diphtheroid bacillus was present associated with Bacillus Friedländer and Streptococcus Faecalis.

CELLS

P. E.

REACTION Alkaline.

VI. CONFUSIONAL INSANITY. 1 Case. (M).

A Diphtheroid bacillus was present associated with Staph. albus (M.N.F.)

CELLS

P. E.

REACTION Acid.

VII. ACUTE MANIA. 2 CASES. (F.)

Organisms were present in both cases.

(1) B. Coli Communis, aerobe & anaerobe, with Streptococcus Pyogenes.

(2) Streptothrix, aerobe.

Sole organism.

2 Organisms in 1 Case.

1 Organism in 1 Case.

CELLS were present in both cases.

P. E. R. 1

P. E. 1

REACTION Acid 1

Alkaline 1

CHEMICAL CONSTITUENTS: Albumin in 1

Indican in 1
VIII. ENCEPHALITIS LETHARGICA. 1 CASE. (F).

No organisms were present.

CELLS.

P.E.

REACTION.

Alkaline.

IX. MELANCHOLIA. 19 CASES (7 M., 12 F.).

Organisms were present in 18 Cases and absent in 1 Case.

(1) Diphtheroid bacillus, 14 cases.

<table>
<thead>
<tr>
<th>Organism Description</th>
<th>Cases</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aerobe</td>
<td>11</td>
</tr>
<tr>
<td>Anaerobe</td>
<td>1</td>
</tr>
<tr>
<td>Aerobe &amp; anaerobe</td>
<td>2</td>
</tr>
<tr>
<td>Anaerobe with B. coli communis</td>
<td>1</td>
</tr>
<tr>
<td>Aerobe &amp; anaerobe with Staph. Pyog. Citreus</td>
<td>1</td>
</tr>
<tr>
<td>Aerobe &amp; anaerobe with B. Friedländer</td>
<td>1</td>
</tr>
<tr>
<td>Staph. Pyog. Albus, Micrococcus Para-tetragenus</td>
<td>1</td>
</tr>
<tr>
<td>With Strep. Pyog. &amp; Staph. Albus (M.N.F.)</td>
<td>5</td>
</tr>
<tr>
<td>With Strep. Faecalis</td>
<td>1</td>
</tr>
<tr>
<td>With Staph. Albus (M.N.F.)</td>
<td>1</td>
</tr>
<tr>
<td>With an aerobic streptothrix</td>
<td>1</td>
</tr>
<tr>
<td>With B. Coli Comm. &amp; Staph. Albus (M.N.F.)</td>
<td>1</td>
</tr>
<tr>
<td>Aerobe was the sole organism in</td>
<td>1</td>
</tr>
</tbody>
</table>

(2)/
B. Coli Communis, 1 Case.

With an anaerobic Diph. bacillus 1

B. Coli Communis, aberrant, 1 Case.

With a Diph. bacillus & Staph. albus (M.H.F.) 1

B. Friedländer, 1 Case.

Aerobe & anaerobe with Staph. Pyog. Albus, Micrococcus Paratetragenus & an aerobic & anaerobic Diphtheroid bacillus 1

B. Proteus Vulgaris. 1 CASE.

With a Diph. bacillus, Strep. Faec., & Staph. Pyog. Citreus. 1

Streptococcus Pyogenes, 6 CASES.

With a Diph. bacillus & Staph. albus (M.H.F.) 5

With Staph. albus (M.H.F.) 1

Streptococcus Faecalis, 4 CASES.

With a Diph. bacillus 1

With Staph. Albus (M.H.F.) 1

With a Diph. bacillus, Staph. Pyog. Citreus, & B. Proteus Vulgaris, and was the sole organism in 1

Staphylococcus Pyogenes Albus, 1 Case.

With Micrococcus Paratetragenus & aerobic & anaerobic B. Friedländer & Diphtheroid Bacillus 1

Staphylococcus Pyogenes Citreus, 2 CASES.

With an aerobic & anaerobic Diphtheroid bacillus 1

With Strep. Faec., Diph. bacillus, & B. Proteus Vulgaris 1
(10). *Staphyloccus Albus*, (M.R.F.), 10 CASES.

<table>
<thead>
<tr>
<th>Type</th>
<th>Cases</th>
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<tbody>
<tr>
<td>Aerobe</td>
<td>9</td>
</tr>
<tr>
<td>Aerobe &amp; anaerobe</td>
<td>1</td>
</tr>
<tr>
<td>With Strep. Pyog. &amp; Diph. bacillus</td>
<td>5</td>
</tr>
<tr>
<td>With B. Coli Communis &amp; Diph. bacillus</td>
<td>1</td>
</tr>
<tr>
<td>With a Diph. bacillus</td>
<td>1</td>
</tr>
<tr>
<td>With Strep. Faecalis</td>
<td>1</td>
</tr>
<tr>
<td>With Strep. Pyog.</td>
<td>1</td>
</tr>
<tr>
<td>And as aerobe &amp; anaerobe was the sole organism in</td>
<td>1</td>
</tr>
</tbody>
</table>

(11) *Micrococcus Paratetragenus*, 1 CASE.


(12) *Streptothrix*, aerobe, 1 CASE.

With a Diph. bacillus

**TOTAL.**

<table>
<thead>
<tr>
<th>Organism</th>
<th>Cases</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diphtheroid bacillus</td>
<td>14</td>
</tr>
<tr>
<td>Coliform organisms, 4 cases (4 M.)</td>
<td>4</td>
</tr>
<tr>
<td>Streptococci</td>
<td>10</td>
</tr>
<tr>
<td>Staphyloccci</td>
<td>13</td>
</tr>
<tr>
<td><em>Micrococcus Paratetragenus</em></td>
<td>1</td>
</tr>
<tr>
<td>Streptothrix, aerobe</td>
<td>1</td>
</tr>
</tbody>
</table>

4 Organisms present in

3 " " "
2 " " "
1 " " "
No " " "

6
7
3
1
CELLS present in 18 Cases & absent in 1 Case.

P.E.R. 9
P.E. 4
E.R. 1
P. 2
E. 2

REACTION

Acid in 13
Alkaline 6

CHEMICAL CONSTITUENTS.

Albumin in 3
Indican 2
Sugar 1

CRYSTALS or AMORPHOUS DEPOSIT. Calcium Oxalate in 1
Phosphates 1
Amorphous urates 2

SUMMARY/
### SUMMARY of ANALYSES.

Organisms present in 45 Cases, 90%

"absent in 5" 10%

**ORGANISMS.**

<table>
<thead>
<tr>
<th>Diphtheroids</th>
<th>CASES.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aerobes</td>
<td>16</td>
</tr>
<tr>
<td>Anaerobes</td>
<td>5</td>
</tr>
<tr>
<td>Aerobes &amp; Anaerobes</td>
<td>7 = 28</td>
</tr>
<tr>
<td>B. Coli Communis</td>
<td></td>
</tr>
<tr>
<td>&amp; aberrant form</td>
<td>5</td>
</tr>
<tr>
<td>B. Friedlander (2 F.1 M.)</td>
<td>3</td>
</tr>
<tr>
<td>B. Proteus Vulgaris(F.)</td>
<td>2 = 10</td>
</tr>
<tr>
<td>B. Pyocyaneus</td>
<td>1</td>
</tr>
<tr>
<td>Streptococcus Pyogenes</td>
<td>17</td>
</tr>
<tr>
<td>Streptococcus Faecalis</td>
<td>8 = 25</td>
</tr>
<tr>
<td>Staph. Pyog. Albus</td>
<td>3</td>
</tr>
<tr>
<td>Staph. Pyog. Citreus</td>
<td>3</td>
</tr>
<tr>
<td>Staph. Albus (M. N. F.)</td>
<td>21 = 27</td>
</tr>
<tr>
<td>Streptothrix</td>
<td></td>
</tr>
<tr>
<td>Aerobe</td>
<td>2</td>
</tr>
<tr>
<td>Anaerobe</td>
<td>1 = 3</td>
</tr>
<tr>
<td>Mic. Tetragenus</td>
<td>1</td>
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<tr>
<td>Mic. Paratetrigenus</td>
<td>1</td>
</tr>
</tbody>
</table>

4 Organisms in

<p>| 3 &quot; &quot;            | 13 |
| 2 &quot; &quot;            | 19 |
| 1 &quot; &quot;            | 11 |
| No &quot; &quot;           | 5  |</p>
<table>
<thead>
<tr>
<th>Cells</th>
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<tbody>
<tr>
<td>E.R.</td>
<td>20</td>
</tr>
<tr>
<td>E.</td>
<td>15</td>
</tr>
<tr>
<td>P.</td>
<td>2</td>
</tr>
<tr>
<td>P.E.</td>
<td>4</td>
</tr>
<tr>
<td>Nil</td>
<td>7</td>
</tr>
<tr>
<td></td>
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</table>

<table>
<thead>
<tr>
<th>Reaction</th>
<th>Cases</th>
</tr>
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<tbody>
<tr>
<td>Acid</td>
<td>39</td>
</tr>
<tr>
<td>Alkaline</td>
<td>11</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Chemical Constituents</th>
<th>Cases</th>
</tr>
</thead>
<tbody>
<tr>
<td>Albumin</td>
<td>8</td>
</tr>
<tr>
<td>Indican</td>
<td>5</td>
</tr>
<tr>
<td>Sugar</td>
<td>1</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Crystals &amp; Amorphous Deposit</th>
<th>Cases</th>
</tr>
</thead>
<tbody>
<tr>
<td>Calcium Oxalate</td>
<td>3</td>
</tr>
<tr>
<td>Phosphates</td>
<td>2</td>
</tr>
<tr>
<td>Amorphous Urates</td>
<td>2</td>
</tr>
</tbody>
</table>
## Analysis of Diagnoses

<table>
<thead>
<tr>
<th>Diagnosis</th>
<th>No. of Cases</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>I.</strong> Dementia Praecox (13M, 4F)</td>
<td>17</td>
<td>16</td>
<td>1</td>
<td>1</td>
<td>3</td>
<td>3</td>
<td>1F</td>
<td>1M</td>
<td>1F</td>
<td></td>
</tr>
<tr>
<td><strong>II.</strong> I.E.C.I. (Puerperal) (F)</td>
<td>3</td>
<td>2</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td>1F</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>III.</strong> G.P.I. (3M, 1 F)</td>
<td>4</td>
<td>3</td>
<td>1</td>
<td>2</td>
<td></td>
<td></td>
<td>1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>IV.</strong> Paraphrenia (M)</td>
<td>2</td>
<td>2</td>
<td></td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>V.</strong> Delusional Insanity (F)</td>
<td>1</td>
<td>1</td>
<td></td>
<td></td>
<td>1</td>
<td></td>
<td>1F</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>VI.</strong> Confusional Insanity (M)</td>
<td>1</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>VII.</strong> Acute Mania (F)</td>
<td>2</td>
<td>2</td>
<td></td>
<td></td>
<td></td>
<td>1F</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>VIII</strong> Encephalitis Lethargica (F)</td>
<td>1</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>IX.</strong> Melancholia (7M, 12F)</td>
<td>19</td>
<td>18</td>
<td>1</td>
<td>11</td>
<td>1</td>
<td>2</td>
<td>2F</td>
<td>1F</td>
<td>1F</td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>50</td>
<td>45</td>
<td>5</td>
<td>16</td>
<td>5</td>
<td>7</td>
<td>5F</td>
<td>3</td>
<td>2F</td>
<td></td>
</tr>
</tbody>
</table>

Coli-Form Organisms
- **B. coli-Comminus** & **B. aberrant**
- **B. Friedlander**
- **B. Proteus vulgaris**
<table>
<thead>
<tr>
<th></th>
<th>E. PYOCYANUS</th>
<th>STREP. PYOGENES</th>
<th>STREP. F. ACALIS</th>
<th>STAPH. PYOG.</th>
<th>STAPH. ALB (M.N.F.)</th>
<th>AEROBE</th>
<th>ANAEROBE</th>
<th>MIC. TETRAG.</th>
<th>MIC. PARATETRAG.</th>
<th>4 ORGANISMS</th>
<th>2</th>
<th>1</th>
<th>NO ORGANISMS</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1</td>
<td>7</td>
<td>2</td>
<td>3</td>
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<td>1</td>
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<tr>
<td>6</td>
<td>4</td>
<td>3</td>
<td>10</td>
<td>1</td>
<td></td>
<td>1</td>
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<td>1</td>
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<td>17</td>
<td>8</td>
<td>6</td>
<td>21</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>213</td>
<td>19</td>
<td>11</td>
<td>5</td>
</tr>
</tbody>
</table>
TABLE IV (Contd.)

ANALYSIS OF RESULTS.

<table>
<thead>
<tr>
<th></th>
<th></th>
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<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>I. DEMENTIA PRÆCOX  (15M.4F)</td>
<td>6</td>
<td>5</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>15</td>
<td>2</td>
<td>3</td>
<td>2</td>
<td>2</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>II. I.E.C.I. (Puerperal) (F)</td>
<td>2</td>
<td></td>
<td>1</td>
<td>3</td>
<td>1</td>
<td>Tr</td>
<td></td>
<td>Tr</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>III. G.P.I. (3M.1F)</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>4</td>
<td></td>
<td></td>
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<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>IV. PARAPHRÆMIA (M)</td>
<td>1</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>V. DELUSIONAL INSANITY (F)</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>VI. CONFUSIONAL INSANITY (M)</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>VII. ACUTE MANIA (F)</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>VIII. ENCEPHALITIS LETHARGIA (F)</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>IX. MELANCHOLIA (7M.12F.)</td>
<td>9</td>
<td>4</td>
<td>1</td>
<td>2</td>
<td>2</td>
<td>1</td>
<td>13</td>
<td>6</td>
<td>3</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>TOTAL</td>
<td>20</td>
<td>15</td>
<td>2</td>
<td>4</td>
<td>7</td>
<td>2</td>
<td>39</td>
<td>11</td>
<td>8</td>
<td>5</td>
<td>1</td>
<td>3</td>
<td>2</td>
<td>2</td>
<td></td>
</tr>
</tbody>
</table>
The Cases were further analysed with regard to the presence of:-

1. Albuminuria, vide TABLE V., page 151

2. Indicanuria, vide TABLE VI., page 152

3. Coliform organisms, vide TABLE VII., pages 153 & 154

4. Diphtheroid bacillus as an aerobe and anaerobe, vide TABLE VIII., page 155

5. (a) Diphtheroid bacillus, Streptococcus Pyogenes, and Staphylococcus Albus (M.N.F.)
   
   (b) Diph; Strep. Pyog; Staph. Alb. (M.N.F.) + an anaerobic Diphtheroid bacillus, vide TABLE IX., page 156

6. No organisms, vide TABLE X. 157
<table>
<thead>
<tr>
<th>Symptoms</th>
<th>Organisms</th>
<th>Diagnosis</th>
<th>Sex</th>
<th>Amount of</th>
<th>Albuminuria noted</th>
</tr>
</thead>
<tbody>
<tr>
<td>CASE NO. V.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*TABLE*
<table>
<thead>
<tr>
<th>Symptoms</th>
<th>Organisms Associated</th>
<th>Diagnosis of Indican or Other Materials</th>
<th>Amount of Sex</th>
<th>Case No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constipated, Haxzirous, Constipated, Sunken</td>
<td>Streptococcus Pseudoe.</td>
<td>++</td>
<td>M</td>
<td>W M M</td>
</tr>
<tr>
<td>Constipated, Sunken, Sunk In</td>
<td>Streptococcus Pseudoe.</td>
<td>+</td>
<td>M</td>
<td>W M</td>
</tr>
<tr>
<td>Constipated, Haxzirous, Constipated, Sunken</td>
<td>Streptococcus Pseudoe.</td>
<td>+</td>
<td>M</td>
<td>W M</td>
</tr>
<tr>
<td>Constipated, Haxzirous, Constipated, Sunken</td>
<td>Streptococcus Pseudoe.</td>
<td>+</td>
<td>M</td>
<td>W M</td>
</tr>
<tr>
<td>Constipated, Haxzirous, Constipated, Sunken</td>
<td>Streptococcus Pseudoe.</td>
<td>+</td>
<td>M</td>
<td>W M</td>
</tr>
<tr>
<td>Constipated, Haxzirous, Constipated, Sunken</td>
<td>Streptococcus Pseudoe.</td>
<td>+</td>
<td>M</td>
<td>W M</td>
</tr>
</tbody>
</table>

Cases in which indicanuria was noted.
TABLE VII

CASES in which a coliform organism appeared in the urine.

<table>
<thead>
<tr>
<th>CASE NO.</th>
<th>DIAGNOSIS</th>
<th>SEX.</th>
<th>ORGANISMS PRESENT</th>
<th>SYMPTOMS</th>
</tr>
</thead>
<tbody>
<tr>
<td>XII</td>
<td>Dementia Praecox.</td>
<td>F.</td>
<td>E.Co. Com.</td>
<td>No notes were obtained. Albumin +.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Albumin +.</td>
</tr>
<tr>
<td>--------</td>
<td>-------------</td>
<td>----</td>
<td>-------------------------</td>
<td>----------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
</tbody>
</table>
TABLE VIII

Cases in which a diphtheroid appeared both as an aerobe, and as an anaerobe:

<table>
<thead>
<tr>
<th>CASE NO.</th>
<th>DIAGNOSIS</th>
<th>SYMPTOMS</th>
</tr>
</thead>
<tbody>
<tr>
<td>VII.</td>
<td>Dementia Praecox.</td>
<td>Fat stage. Occasionally violent.</td>
</tr>
<tr>
<td>XX.</td>
<td>Inf. Exh. Conf. Insan.</td>
<td>Died of exhaustion before any notes could be made.</td>
</tr>
<tr>
<td></td>
<td>(Puerperal)</td>
<td></td>
</tr>
<tr>
<td>XXI.</td>
<td>G. P. I.</td>
<td>Remission of Symptoms. (Wassermann reaction in blood and cerebro-spinal fluid ++)</td>
</tr>
</tbody>
</table>
Cases in which a diphtheroid, aerobic, streptococcus pyogenes, and staphylococcus albus (M.N.F.) were present.

<table>
<thead>
<tr>
<th>CASE NO</th>
<th>DIAGNOSIS</th>
<th>SYMPTOMS</th>
</tr>
</thead>
<tbody>
<tr>
<td>XXIII</td>
<td>G. P. I.</td>
<td>Well marked delusions of grandeur.</td>
</tr>
<tr>
<td>XXXII</td>
<td>Melancholia.</td>
<td>Depressed, stigmata of degeneration.</td>
</tr>
<tr>
<td>XXXVI</td>
<td>Melancholia.</td>
<td>Sunk in Apathy.</td>
</tr>
<tr>
<td>XLV</td>
<td>Melancholia.</td>
<td>Depressed.</td>
</tr>
</tbody>
</table>

Cases in which an anaerobic diphtheroid bacillus was present in addition to the above three.

<table>
<thead>
<tr>
<th>CASE NO</th>
<th>DIAGNOSIS</th>
<th>SYMPTOMS</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>Dementia Praecox.</td>
<td>Hallucinations. Occasionally violent.</td>
</tr>
<tr>
<td>VII</td>
<td>Dementia Praecox.</td>
<td>Fat stage. Occasionally violent.</td>
</tr>
<tr>
<td>Symptoms</td>
<td>Sex</td>
<td>Diagnosis</td>
</tr>
<tr>
<td>----------</td>
<td>-----</td>
<td>-----------</td>
</tr>
<tr>
<td>Case No.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**TABLE**

Cases in which no organisms appeared in the urine.
DISCUSSION of the OBSERVATIONS made, and
THEIR SIGNIFICANCE.

Two facts emerge prominently from a compari-
son of my findings, with those of PANTON:

a. diphtheroids figure frequently in my series, ap-
pearing in 28 cases, either as aerobes or ana-
robes, or both, while they are absent from all
of PANTON'S cases.

b. none of PANTON'S cases show infection with more
than one organism, while 34 of my cases do.

Is it legitimate then, to draw the inference that:

a. diphtheroiduria is peculiar to mental
disease,

& b. cases of mental disease show more evi-
dence of systemic organismal invasion
than cases of physical disease alone,
accepting, for the moment, the presence
of bacteria in the urine to be an in-
dication of their presence in the
blood-stream, and thus of a systemic
invasion, though I shall show later
that this cannot be accepted as an un-
qualified statement.

The first deduction is not tenable for a
moment. I have often seen diphtheroids in the urine
of both male and female patients with no suggestion
of mental disease - cultures were made in broth and
on ordinary agar. No anaerobic cultures were put up.

The second deduction appears at first sight
to be reasonable, for it is accepted that in the
psychoses/
psychoses, a physical exciting cause usually determines the attack, and that that cause may be organis-
mal in a large number of cases. But I am by no means certain that such an inference can be drawn from a comparison of PANTON'S findings with mine.

The entire absence of diphtheroids from all of PANTON'S cases lead me to the conclusion that his differentiation of gram-fast organisms could not have been carried as far as mine was. And the single infections in his cases against the multiple infections in mine may, to some extent, rest on the same fact. The cases in his Series II., 100 in-patients, presumably of both sexes, are best comparable with mine. I have, therefore, revised the figures in this series, and in mine, in terms of the reaction of the organisms to Gram's stain, and further, as his methods were aerobic only, I have shown as sterile the one case in my cases, in which only an anaerobe appeared. These revised figures are set out with the original figures in TABLE XI., pages 168 & 169.

It is interesting to note that there is no marked disparity between the two sets of revised figures, the main point of difference being that in PANTON'S cases 14% showed gram-ve flora only, while in my cases 4% were gram-ve only, and 18% gram-ve and gram +ve.

It must also be borne in mind that we were working with different media. I used haemoglobin agar.
agar, PANTON used ordinary agar and McConkey's medium. I have no doubt the reaction of our media was different too. I used a +6 and a +18 tube to every case, and on a few occasions I got growth only in the one tube.

The conclusion I draw, with two reservations, is that there is no striking difference between the bacterial content of patients with mental disease and those without. The two reservations I wish to make are that:

i. I have no evidence at present that anaerobic diphtheroids and streptothrices, aerobes and anaerobes, appear in the urine of patients, without mental disease, though I see nothing inherently improbable in their doing so.

ii. Multiple infections may be more common in mental disease than in cases of physical disease alone.

Can the presence of organisms in the urine be regarded as definite evidence that they are in the blood stream? I do not feel justified in supporting that statement. It may be recalled that in my cases catheter specimens were obtained from female patients, and 'carefully taken, mid-stream specimens' from males, for "It is unnecessary and undesirable to pass a catheter in the male, provided reasonable care be taken to cleanse the external parts and flush out the urethra with urine before taking the specimen, The anterior urethra/
urethra cannot be rendered sterile by previous irrigation, nor does the passage of a catheter
prevent such contamination". It must be accepted that organisms from the urethra, in both males and females, will appear in my specimens. It would, of course, be possible to develop a more rigorous technique of preliminary irrigations with sterile water, and in males at least, have controls by incubating in broth the last irrigation of the anterior urethra. But I do not think there is any practical value in adopting such methods. One excludes the possibility of external contamination by ordinary antiseptic methods, and greatly reduces the possibility of organisms coming from the anterior urethra by rejecting the first part of the specimen. And that is all that is necessary. For the presence of organisms in the urine must not be looked at as a detached fact. By itself it gives one no information of value. It must be considered along with other facts in the case, viz.: the presence of albumin, sugar, indican, the content of cells and crystals, the intestinal flora, and the symptoms.

It is of interest to note, vide TABLE VII, page 153, that only in one case out of twenty-six males did a coliform organism, B. Friedländer, appear in the urine, while in 9 cases out of 24 females, coliform organisms appeared in the urine.

This is in correspondence with the fact/
fact established in general medicine, that coliform infections are more common in females than in males.

Indican was present in pathological amount in five cases, and mental symptoms were prominent in all five, vide TABLE VI., page 152. It is of interest to note that coliform organisms appeared in three of the cases, one of them being the only male with such an infection, that all cases were constipated, that a large amount of indican was associated with a grave condition, which terminated fatally, and that the mental symptoms varied considerably, - lachrymose, apathetic, confused, occasionally violent, hallucinations and delusions. When one views these results, with, for example, SCHUYLER'S observation that indicanuria is associated in children with a pathological mental state, it is borne in upon one that the condition should be looked for and treated in mental disease.

A similar table has been prepared for albuminuria, TABLE V., page 151. In the eight cases in which it was present, mental symptoms were prominent and varied. Neither albuminuria nor indicanuria is peculiar to mental disease, but the point I wish to make is that one or the other or both, may have been part of the physical exciting cause that determined psychoses in individuals with appropriate mental predispositions.
I have recorded, on microscopical evidence alone, the presence of cells in the centrifuged deposit of all but two of my cases, of pus and epithelial cells and red blood corpuscles in twenty. I should add that in no case was there sufficient pus or blood to enable it to be recognised naked eye, and that, owing to the cells being so few in number, several of these cases were diagnosed in the Laboratory of the Scottish Asylums as "presenting no evidence of cystitis". I should further add that I made no attempt to differentiate between leucocytes and pus cells in the urine.

In ten cases in this series I had the opportunity of comparing the analysis of the urinary flora with the analysis, in every case, of the intestinal flora, and in some cases of the flora in the nose, throat, or teeth as well. The result is most interesting, vide TABLE XII., page 170 & 171. In six cases what were regarded as important pathogenic flora in the faeces, also appeared in the urine. I submit the evidence is in favour of the fact that these organisms have got into the urine from the intestinal canal via the blood stream, and that whether they are, at the moment, doing any damage to the individual or not, they should at least be regarded as potentially harmful. It seems to me that corroborative evidence of their nature may be of great value/
value in assessing the pathogenicity of members of the intestinal flora. In three cases certain organisms were common in both the faeces and the urine, but what were regarded as pathogenic organisms in the faeces did not appear in the urine. In one case the flora in the faeces and in the urine were strikingly different. Unfortunately in the majority of these cases adequate notes of the clinical condition were not obtained, so the clinical picture has not been set out in the table.

A study of the cases in which the same group of organisms appear, viz.:—Diphtheroid, Strep-tococcus Pyogenes and Staphylococcus Albus (M.N.F.) is of interest, vide TABLE IX., page 156. In six of the cases the diphtheroid appeared as an aerobe only, and in two of them as an aerobe and anaerobe. It will be observed that the symptoms are very varied, the Dementia Praecox cases had at the time a remission of symptoms with a history of occasional violent outbursts, in the G.P.I. there were well marked delusions of grandeur, and in the Melancholias there was depression.

The group of seven cases in which a diphtheroid appears as an aerobe and anaerobe, and the group of ten in which coliform organisms appear, are set out in TABLE VIII., page 155 and TABLE VII., page 153 respectively. A variety in the symptoms presented will again be observed.
No analysis from the point of view of symptoms could be made of the five cases, Nos. V., XIV., XVI., XXVII., and XXXIV., in which a diphtheroid appeared in the urine as an anaerobe only, or of the five cases, Nos. XIV., XVI., XXVII., XXXIV., and XLIII., in which an anaerobic diphtheroid was present both in the faeces and in the urine, as unfortunately adequate notes of the patient's clinical condition were not obtained in the majority of these cases.

The group of five cases in which the urine was sterile is very interesting, vide TABLE X., page 157. It will be observed that in four of the cases there was practically an absence of symptoms, while in one case, in which indican was present in the urine, mental symptoms were marked.

In a series of cases such as mine, where practically all the patients either have mental symptoms or at best have only a temporary remission of symptoms, one has to be on one's guard against attaching too much importance to the association of symptoms with a common element in a group of cases, e.g. albuminuria, or indicanuria. But a negative picture as presented in TABLE X., page 157, is of great value. And a picture of similar value, though based on so few cases, is presented in TABLE XIII., pp. 172-173, showing the contrast between two patients ill and/
and one well in two groups of cases. The close correspondence between the clinical picture and the urinary picture is most instructive. In the first group of cases, Infective Exhaustive Confusional Insanity (puerperal), the toxic element was obvious and marked, and it is probable that in the second group the toxic element was also marked.

A study of these groups of cases leads one to the following conclusions:

(1) Organisms may appear in the urine while the patient is having a temporary remission of symptoms.

(2) They may be associated with diverse symptoms in different cases, indicating diseased individuals rather than disease.

(3) In four out of five cases in which the urine was sterile there were practically no symptoms.

(4) A close correspondence is observed between the urinary picture and the clinical picture in those cases in which a toxic element is very marked.

It is being recognised in an increasingly large number of mental cases that a toxic element is, or has been, present, and was indeed responsible for determining the psychosis in an individual with the appropriate mental predisposition. And it is in these cases, taken early, that prognosis is best.

"The/
"The greater the influence of the extrinsic cause, especially if it be pathological - for example, toxic conditions - the more probable is the recovery by treatment removing the source of the sepsis, and the liability to recurrence".

Any evidence that can be furnished of the toxic element in a case of mental disease is of the utmost value, and I submit that the urinary picture is an important means to that end. It is essential that the toxic condition be recognised early, and treated effectively, whether along general or specific lines. Time is against the patient in these cases as in few diseases. Brain cells are being attacked, and if the elimination of the toxins be too long delayed, irreparable damage to the brain will result.
<table>
<thead>
<tr>
<th>TABLE XI.</th>
</tr>
</thead>
</table>

**PANTON'S SERIES**

<table>
<thead>
<tr>
<th>I</th>
<th>100 males, all of whom had, or recently had had gonorrhoea.</th>
</tr>
</thead>
<tbody>
<tr>
<td>II</td>
<td>100 in-patients, sex not reported, with no pus or albumin in the urine.</td>
</tr>
<tr>
<td>III</td>
<td>50 apparently healthy male medical students.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>II Sterile</th>
<th>18%</th>
<th>III Sterile</th>
<th>40%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Staph. albus</td>
<td>52%</td>
<td>Staph. albus or Enterococcus</td>
<td>52%</td>
</tr>
<tr>
<td>Staph. aureus</td>
<td>3%</td>
<td>Enterococcus</td>
<td>10%</td>
</tr>
<tr>
<td>Enterococci</td>
<td>10%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Air contaminations</td>
<td>3%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Coliform</td>
<td>14%</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

| I Coliform | 8% | II Coliform | 14% |
| Males & Females | | | |
| III Coliform | 8% |

**MY SERIES.**

<table>
<thead>
<tr>
<th>Sterile</th>
<th>10%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diphtheroids</td>
<td>56%</td>
</tr>
<tr>
<td>Staphylococci</td>
<td>54%</td>
</tr>
<tr>
<td>Streptococci</td>
<td>50%</td>
</tr>
<tr>
<td>Coliform</td>
<td>20%</td>
</tr>
<tr>
<td>Streptothrix</td>
<td>6%</td>
</tr>
<tr>
<td>Others</td>
<td>6%</td>
</tr>
</tbody>
</table>

| Coliform, Males | 4% | Average | 20% |
| Females | 36% |
Expressed in terms of reaction to Gram's stain.

II

<table>
<thead>
<tr>
<th>Type</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sterile</td>
<td>18%</td>
</tr>
<tr>
<td>gram + ve.</td>
<td>65%</td>
</tr>
<tr>
<td>gram - ve.</td>
<td>14%</td>
</tr>
<tr>
<td>Air contaminations</td>
<td>3%</td>
</tr>
</tbody>
</table>

Expressed in terms of reaction to Gram's stain, and regarding the one case as sterile in which only an anaerobic organism appeared.

<table>
<thead>
<tr>
<th>Type</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sterile</td>
<td>12%</td>
</tr>
<tr>
<td>gram + ve.</td>
<td>66%</td>
</tr>
<tr>
<td>gram - ve.</td>
<td>4%</td>
</tr>
<tr>
<td>gram - ve. &amp;</td>
<td></td>
</tr>
<tr>
<td>gram + ve. com-</td>
<td>18%</td>
</tr>
<tr>
<td>bined.</td>
<td></td>
</tr>
<tr>
<td>CASE NO</td>
<td>THROAT OR NOSE</td>
</tr>
<tr>
<td>---------</td>
<td>---------------</td>
</tr>
<tr>
<td>XI</td>
<td>Str. Pyog, Mic. Pseudom. Catarrh (anaer)</td>
</tr>
<tr>
<td>XIII</td>
<td>Str. Pseudalis</td>
</tr>
<tr>
<td>XIV</td>
<td>Diph. (anaer)</td>
</tr>
<tr>
<td>XV</td>
<td>B. Prot. vaginalis</td>
</tr>
<tr>
<td>XVI</td>
<td>Micr. Tetrag.</td>
</tr>
<tr>
<td>Case</td>
<td>Bacteria 1</td>
</tr>
<tr>
<td>--------</td>
<td>------------</td>
</tr>
<tr>
<td>XXXV</td>
<td>Diph;</td>
</tr>
<tr>
<td></td>
<td>Strep. Faec.</td>
</tr>
<tr>
<td></td>
<td>Diph. (anaer)</td>
</tr>
<tr>
<td>XXXV</td>
<td>B. Coli Communis</td>
</tr>
<tr>
<td></td>
<td>Diph. (anaer)</td>
</tr>
<tr>
<td></td>
<td>Staph. Pyog. Cit.</td>
</tr>
<tr>
<td></td>
<td>Diph. (anaer)</td>
</tr>
</tbody>
</table>

N.B. The diagnoses in these cases were taken, with Dr. W. Ford Robertson's kind permission, from the reports of the Laboratory of the Scottish Asylums.
<table>
<thead>
<tr>
<th>CASE NO.</th>
<th>DIAGNOSIS</th>
<th>SEX</th>
<th>URINE</th>
<th>SYMPTOMS</th>
</tr>
</thead>
<tbody>
<tr>
<td>XX</td>
<td>Inf. Ex. Conf. Insan. (Ruerp)</td>
<td>F.</td>
<td>Acid. A few pus &amp; epithelial cells. 1 or 2 red blood corpuscles in an occasional field. Diph(aer. &amp; anaer)</td>
<td>Died of exhaustion before any notes could be obtained.</td>
</tr>
<tr>
<td>CASE NO.</td>
<td>DIAGNOSIS</td>
<td>SEX</td>
<td>URINE</td>
<td>SYMPTOMS</td>
</tr>
<tr>
<td>---------</td>
<td>-----------------------------------</td>
<td>-----</td>
<td>-------------</td>
<td>-----------------------------------------------</td>
</tr>
<tr>
<td>XIX</td>
<td>Inf., Ex. Conf. Insan. (Rump)</td>
<td>F</td>
<td>Acid</td>
<td>Reaction time prolonged. Some confusion, otherwise in good health.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>A few epithelial cells. No organisms.</td>
<td></td>
</tr>
<tr>
<td>XLII</td>
<td>Melancholia (attempted suicide)</td>
<td>F</td>
<td>Alkaline</td>
<td>Short reaction time. Cheerful - putting on weight - Well on the road to complete recovery.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>a few pus and epithelial cells.</td>
<td></td>
</tr>
</tbody>
</table>
SUMMARY of CONCLUSIONS.

I. Bacteria are present in the urine of patients with mental disease.

II. They are mainly diphtheroids, both aerobes and anaerobes, staphylococci, streptococci and coliform organisms.

III. They appear in 90% of the cases in this series, 10% being sterile.

IV. They appear in various forms of mental disease.

V. They appear in both male and female patients, coliform organisms appearing in nine cases out of twenty-four females and in only one case out of twenty-six males.

VI. There is no striking difference between the nature of the organisms appearing in the urine of patients with mental disease and in the urine of patients without, except that at present, I have no evidence that anaerobic diphtheroids and streptothrices, aerobes and anaerobes, appear in the latter, though I see nothing inherently improbable in their doing so.

VII. There is no striking difference in the proportion in which different organisms appear.
appear in the two types of cases, though there may be more multiple infections in cases of mental disease than in the others.

VIII. The bacterial content of the urine must be studied along with the associated facts, viz: - the presence of albumin, sugar, and indican, the content of cells and crystals, the intestinal flora, and the symptoms. Albuminuria and indicanuria occur in eight and in five cases respectively and were associated with symptoms in every case.

IX. In six cases out of ten the urinary flora compared very closely with the intestinal; in three there was a certain similarity, though not to so marked a degree; in one the flora were strikingly different.

X. Organisms may appear in the urine while the patient is having a temporary remission of symptoms.

XI. They may be associated with diverse symptoms in different cases, indicating diseased individuals rather than disease.

XII. In four out of five cases in which the urine was/
was sterile there were practically no symptoms.

XIII. A close correspondence is observed between the urinary picture and the clinical picture in those cases in which the toxic element is very marked.

I desire to express my indebtedness, and grateful thanks, to Professor George M. ROBERTSON, M.D., Physician Superintendent, and the assistant physicians of the Royal Edinburgh Mental Hospital for their kind assistance in enabling me to use the clinical material in their care, and in particular to Dr. W. FORD ROBERTSON, M.D., for the facilities generously afforded me at the Laboratory of the Scottish Asylums, and much help and encouragement during the course of this investigation.
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