LEUCORRHOEA IN THE VIRGIN.

by

Albert Sharman, B.Sc., M.B., Ch.B.

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ProQuest LLC.
789 East Eisenhower Parkway
P.O. Box 1346
Ann Arbor, MI 48106 – 1346

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PART 1

INTRODUCTION.

It is essential, at the outset, that my interpretation be defined on the meaning and scope of this subject.

It is, of course, generally known that etymologically, 'leucorrhoea' means 'white flux'. Gynaecologists, however, have almost universally, come to regard it as synonymous with a vaginal discharge, other than menstrual or blood stained, and having its origin from some part of the female reproductive tract. It is to this broader meaning of leucorrhoea that I have adhered and have included in this work, vaginal discharges which are generally white or yellowish and of a degree of profuseness such as to warrant it being considered abnormal.

It is readily appreciated that it is no easy matter to diagnose certainly the virgin state. There is no positive, single sign of virginity. Absence of the hymen does not necessarily indicate, as Glaister (1) expresses it, loss of virginity, neither does its persistence unequivocally point to the existence of virginity. Cases, indeed, have been known of pregnancy in women in whom the hymen was apparently intact and it is not impossible for a gonorrheal infection to be obtained with no local signs of defloration. It is obvious, therefore, that a primary difficulty is here encountered in investigating these cases, but I have laid down as the criteria of judgment, (a) an apparently intact hymen, (b) a normal condition of the fossa navicularis and (c) an emphatic denial of sexual intercourse -- on this, in many cases, little reliance can be placed. All patients in whom the vagina admitted one finger easily without anaesthesia, or two fingers easily under anaesthesia, were excluded from my series. In those cases which have merely been reviewed and have not, personally, come under my attention, I have had to base observations on the recorded notes of examination, but there, too, I have endeavoured to exclude those admitting of some reasonable doubt as to virginity.

An endeavour has been made in all instances to exclude cases, particularly in the series not personally examined, where the vaginal discharge was definitely greenish in colour, or where there was the slightest doubt, in whatever way obtained, as to the possibility of a gonococcal infection. It is recognized that absence of gonococci on even careful bacteriological examination is no proof of the absence of gonorrhoeal infection, either present or past.

An increase of the normal 'white' vaginal discharge is not uncommon in young unmarried women whose health becomes 'run down'. Anaemia, asthenia, malnutrition and constipation are causative factors and when these are remedied, the excessive 'whites', generally temporary and varying from day to day, soon cease to trouble. This mild condition is not to be confused with the profuse, persistent leucorrhoea that so very often defies treatment.

The investigation has been confined to women between puberty and menopause, the interpretation of the former being the onset of the first menstrual period and of the latter, the stoppage of menstruation or commencement of gross menstrual irregularity after forty years of age.

ANATOMICAL CONSIDERATIONS.

In order to understand the pathogenesis of the condition, it is necessary to study the anatomy, more particularly, the histology, of the female genital tract. The two Mullerian ducts of the embryo, lined by columnar epithelium, fuse to form the Fallopian tubes, uterus, cervix and vagina of the adult. The epithelium becomes converted, in the tubes to ciliated columnar epithelium; in the body of the uterus to low columnar epithelium; in the cervix to a non-ciliated high columnar epithelium with regular basal nuclei, and in the vagina to squamous epithelium. Actually, the change in vaginal epithelium is not due to a conversion of the original columnar epithelium but to a replacement of it by squamous epithelium growing from below upwards, from the region of the uro-genital membrane. Simple tubular glands appear in the uterine endometrium and compound or racemose glands in the mucus-secreting cervical epithelium. The vaginal mucosa, as a rule, contains no glands, but elementary glandular structures have occasionally been detected. Normally, squamous epithelium lines the entire vagina and also the vaginal aspect of the cervix: there it contains no glands. This squamous epithelium is, in its deeper basal layer, composed of cylindrical cells, superficial to this being several layers of polygonal "prickle" cells and more superficial still, flat cells which may be cast off at intervals. Normally, the cervical canal is lined with columnar epithelium but in the six-month foetus squamous epithelium is found there, which is later replaced by the columnar type (2). Occasionally, the columnar epithelium of the cervical canal spreads out beyond the external os over the cervix, thus producing the so-called congenital erosion or pseudo-erosion (Barris, 2).

The secretion from the racemose glands of the cervix is thick, mucoid, and viscous, and forms the typical cervical secretion. Munro Kerr (3) points out that the uterine mucosa, in common with other mucous membranes, secretes a certain quantity of mucus; the vaginal mucosa, on the other hand, having no glands, secretes very little, unless it is actually inflamed. Most of the secretion coming from the

vagina, therefore, is really of uterine origin. In the quiescent period of the menstrual cycle, if conditions are normal, the natural secretions are hardly appreciated. For a varying number of days preceding menstruation and sometimes for a day or two after it, secretion is increased and the woman's attention may be drawn to it. The quantity, however, varies in different people.

PATHOGENESIS OF LEUCORRHOEA.

Leucorrhoea, in the married woman, is a common complaint, Davis (4) having found, in a review of one thousand histories of gynaecological and obstetrical patients, that about 33% had some type of leucorrhoea. In them, he found that the discharge varied greatly in consistence and amount but, he stated, when a woman has to wear a sanitary napkin at all times or when there is sufficient vaginal discharge to keep the external genitalia moist and soil the underclothing, then that discharge is abnormal and requires careful investigation.

I have endeavoured to fix these criteria in virgins in distinguishing the abnormal from a slight excess of the normal.

Davis listed the causes and associated conditions under four headings:- (a) Parasite and infective, (b) Local, (c) Constitutional, (d) Circulatory.

Many of his etiological factors are only encountered in non-virgins and I have modified his original and extensive tabulations to include possible pathogenic factors in virgins, as follows:

A. Parasitic and infective conditions:

Pyogenic Bacteria (Staphylococcus.
(Streptococcus.
(Coliform Bacilli.
(Pneumococci.

Micrococcus Catarrhalis.

Vincent's Bacillus.

Saprophytes.

Rare Infections (B. Tuberculosis.
(B. Aerogenes Capsulatus.
(B. Diphtheria.
(B. Tetanus.
(B. Typhosus.

Protozoal Infections (Trichomonas Vaginalis.
(Amoeba Urogenitalis.

Vermian Infections (Oxyuris.
(Ascaris.
(Echinococcus.
(Filaria Bancrofti.

Thrush, Oidium Albicans.

Streptothrix infections, Actinomyces.

B. Local conditions:

Endocervicitis and cervicitis.
Cervical erosion.
Polypi.
Vaginitis.
Uterine Retrodisplacement.

Foreign bodies.
Chemical Irritants.
Adenomas.

Endometrioma.
Cancer of cervix.
Cancer of corpus.
Sarcoma.
Tuberculosis of endometrium.
Tubal disease.
Fistulas.
Tuberculosis of cervix.

C. Constitutional Conditions.

Anaemias, including chlorosis and pernicious anaemia.

Endocrine Disturbances.

Debilitating Infections.

D. Circulatory Conditions:

Cardiac Disease with vascular stasis.

Hepatic Disease with Portal stasis.

(Pelvic congestion is said to follow this stasis and to cause a discharge or greatly augment an existing mild one.)

Some of these are possibly not causes of leucorrhoea, but merely associated conditions and many of them are rare even in multiparae, possibly not encountered in virgins and certainly not met with in the course of my study.

In multiparae, however, by far the commonest cause of leucorrhoea is the condition which owes its origin generally to childbirth, or abortion, or gonorrhea, namely, chronic cervicitis, or, to give it its synonyms, cervical erosion, proliferative adenoma (B.P. Watson5), and pseudo-adenoma (Eden and Lockyer, 6). Certainly, in non-virgins, examination of the cervix very often shows signs of obvious infection and appropriate treatment directed to it is clearly indicated. Strachan (7) states that, in general, leucorrhoea is almost always a sign of cervical infection. Whether this is true or not in virgins remains a matter of doubt, and both macroscopic and bacteriological investigations which I have made and which will be commented upon at a later stage, make one sceptical. Indeed, Curtis (8) has stated, working mainly on the non-virgin, that continued leucorrhoea may persist in the absence of cervical infection, provided there is extensive hyperplasia of gland tissue or partal obstruction of the cervical canal, interfering with drainage: also that, in the event of disappearance of bacteria from the tissues, the cervix is no longer a focus responsible for ill-health, othe than that incident to mechanical annoyance from innocent discharge. He holds, however, that the infected cervix is the chief source of the chronic leucorrhoea and that the pathology responsible consists of redundant hypersecreting glandular tissue, often associated with insufficient drainage of the secretion. In an earlier paper, Curtis (9) investig-

ated the corporeal endometrium as a possible site of infection and source of leucorrhoea, but came to the conclusion after histological and bacteriological examinations that it only rarely revealed evidence of infection. Accordingly, his view was that employment of the curette in attempts to relieve infection was a misdirected and harmful procedure. A case illustrating the occasional infection of the corporeal endometrium in a young unmarried woman, is instanced by Munro Kerr (10):

"The patient was 20 years of age and brought to me by the mother because of a foul-smelling leucorrhoeal discharge. She had been working very hard in a munition factory for 2 years during the war and was generally run down. She was a very strong girl and there was no suspicion of any gonorrheal infection. On examination, the hymen was found intact.

Under an anaesthetic I took some discharge from the uterine cavity. The infecting organisms were found to be B. coli and staphylococcus aureus. The condition cleared up after disinfection of the uterus and a course of vaccine treatment."

A watery vaginal discharge ~~discharge~~ may be met with in two tubal lesions, namely, hydrops tubal profluens and carcinoma, but it is not of the type of true leucorrhoea.

Finally, the vagina may be the source of leucorrhoea both in the non-virgin and in the virgin and I hope to emphasise that it is a more frequent source of discharge in the virgin than is generally accepted. It is to be remembered too, that, as Farquhar Murray emphasised in the course of a discussion on chronic cervicitis in the Section of Obstetrics and Gynaecology, at the Manchester Meeting, July, 1929, (of the British Medical Association), in a large number of patiens who complain of leucorrhoea, there may be no evidence of any inflammatory process.

On the pathogenesis of virginal leucorrhoea, little has been written. Schauffler (11), in an article on vaginal discharge in girls before puberty, has pointed out that a simple catarrhal vaginitis is common in high-strung, neurasthenic girls and that often such a discharge is noted only when the child suffers from fatigue or nervous depression. Anaemia, malnutrition, or debility of any sort are strikingly associated with relapses or exacerbations of the chronic condition. There is an absence of trauma and of repeated exposure to infection. He comments on the really striking feature in the examination of miniature vaginas being the rugose, contracted condition, a state not seen in the non-virginal, because of repeated ~~dilati~~ dilatation from coitus or childbirth. An unruptured hymen serves, further, to obstruct these rugose, contracted vaginas and all factors are present to constitute a true "harbour of infection": indeed, in adult virginal

women and in old women whose vaginas show the contraction and stasis of senile atrophy, a primary vaginitis is often found. Payne (12), writes that infection of the nulliparous cervix, the canal of which is normally filled with a thick tenacious mucus, acting as a barrier to the usually sterile canal from contamination from the vagina, generally begins as an endocervicitis and is usually of an ascending type. For this reason, the brunt of the infection is usually borne by the lower portion of the cervical canal. Burns (13), also, asserts that in the case of the young girl with intact hymen, infection of the cervix arises by direct spread upwards from the external genitals. This mode of infection, he states, may be denied by those who believe that the vaginal secretion is capable of preventing infection from travelling upwards. In cases of endocervicitis investigated by him, five are stated to have shown certain stigmata usually associated with masturbation. He believes that sexual excitation is accompanied by congestion of the pelvic organs and, if frequently indulged in, brings about a condition approaching chronic congestion. This congestion induces hyper-secretion of the cervical glands, in other words, leucorrhoea. The external genitals become bathed in this vaginal discharge, the bacteria which are always present spread up to the cervix and the glands become infected, Once the glands are infected, the presence of the organisms and their toxins keep up the hyper-secretion and so the condition of endocervicitis is established.

Eden and Lockyer (loc. cit.) describe the extremely rare condition of simple benign adenoma of the cervix and cite the only case in their experience. The woman had suffered from profuse leucorrhoea from childhood.

PART 11

A SURVEY.

INCIDENCE AND GENERAL FEATURES.

In order that a general idea of the frequency of virginal leucorrhoea and a broad knowledge of a large number of cases might be obtained, I decided to investigate the records and histories of all patients admitted to the Royal Samaritan Hospital Hospital for Women over a period of twenty years.

The period selected is that of 1904-1924 and the total number of cases reviewed is twenty-three thousand, seven hundred and thirty-eight. (23,738) . Of these, there are found, two hundred and fifty-two (252) unmarried nulliparae who complained of profuse white or yellowish discharge, after excluding all instances where, from the details in the journals, non-virginity or gonorrheal infection might be presumed or suspected. Care is taken in assessing the values of histories and notes of vulvar and vaginal examinations, as to reasonable opinion of virginity, but as none of this series was examined personally it is obvious that I can not be absolutely certain that they were all virginal or not infected at some time with the gonococcus. Again, the standard of discharge adopted, ~~as mentioned~~, as mentioned previously, is that described as a profuse one, or sufficient to necessitate the almost constant use of sanitary pads or to soil the underclothing daily. Slight or moderate leucorrhoeas, merely secondary features and associated with other more definite symptoms are not considered. The 252 cases thus found among in-patients numbering 23,738, gives an incidence of 1·06%.

Most of the cases found are of the types to be investigated and analysed later, viz., associated with, 'erosion of the cervix', 'endometitis', retrodisplacement, underdevelopment, endocrine disturbances and the large number of cases with no discoverable pelvic pathology,

often labelled "no abnormality detected", and which conveniently, if incorrectly, might be designated "idiopathic leucorrhoea".

The etiological or associated factor in a number of cases is sufficiently rare to merit closer attention and study, and these conditions are particularised below and on each I have commented.

1. Calculus weighing three drachms, situated in the anterior vaginal wall but not connected with urethra or bladder.

The origin and pathology of this calculus is not elaborated upon and it is difficult to account for, but it appears to have been the cause of a yellowish-white vaginal discharge.

2. Uterine Prolapse.

This, of course, is uncommon in an unmarried nulliparа before the menopause.

3. Non-Venereal ulcers on the labia.

4. Almost imperforate hymen.

In this case there was only a pin-point hymeneal opening and at monthly intervals there was a very thin trickle of blood. Probably some menstrual fluid was retained within the vagina and may have been associated with infection or vaginitis.

5. Hypertrophy of Supra-vaginal cervix.

As only the fibro-muscular stroma is usually involved in this type of hypertrophy, it is problematical whether this condition predisposed to leucorrhoea or not.

6. Stone in bladder, removed by cystotomy.

It is quite probable that the profuse yellow discharge complained of in this case was urethral in origin.

7. Uterus Didelphys.

8. Rudimentary Vagina.

9. Epithelioma of the Vulva.
This condition, occurring in a girl 25 years of age, is very rare.

10. Carcinoma of Body of Uterus.
The patient was aged 46 years but her 'periods' were ~~a~~ normal and regular. The average age incidence of this condition is somewhat higher.

11. Two Cases of Cardiac Disease, one complicated by Chorea.
These patients had valvular disease of moderate severity but no actual failure of compensation or evidence of heart failure.

12. Two Cases of Pelvic or generalised Tuberculosis.
These were the only ones in the entire series and inclined one to the view that tuberculosis, contrary to statements in text-books, is very rarely a cause of virginal leucorrhoea except possibly of slight degree. An investigation of the records of a large sanitorium confirms this view.

13. Tubercular Perineal Abscess opening into Vagina.
In this case, the skin surface of the perineum was not broken and the hymen was quite intact. A sinus led from the ischio-rectal fossa into the vagina.

It was not thought advisable or, probably, profitable, to institute a follow-up and a studied investigation of these cases from 1904-1924, but the period 1924-1929 was selected for detailed examination. As the Out-Patient Department appeared to offer information of a general nature thar might not be obtained in the wards, attention was first given to it.

I have tabulated the results of my analysis of the Out-Patient records and histories and the table on the following page shows a division of the period of time selected into five-yearly intervals, opposite each being figures of the number of patients falling into the different categories, stated at the heads of the columns.

	I	II	III	IV	V	VI	VII	VIII	IX	X
YEAR	TOTAL NO. OF OUT-PATIENTS	No. OF UNMARRIED NULLIPAR.	PROFUSE LEUCORRHOEA	DOUBTFUL VIRGINITY OR GONORRHOEA	VIRGINAL LEUCORRHOEA	VIRGINAL LEUCORRHOEA SOLE SYMPTOM	LEUCORRHOEA WITH DYSMENORRHOEA	DYSMENORRHOEA ONLY	PREGNANT	MISCELLANEOUS COMPLAINTS
1925	982	45	7	2	5	3	0	26	11	31
1926	940	66	5	1	4	3	1	18	10	33
1927	913	70	15	2	13	7	2	16	9	30
1928	1220	107	29	10	19	12	4	22	15	41
1929	1342	120	20	3	17	5	2	38	15	47

(It is to be noted that columns IV, V, VI, and VII represent details of column III and that the figures of column V are obtained by subtracting those of IV from those of III.)

The total attendance is 5,397, of whom 438 are unmarried nulliparae; in 58 of them the "diagnosis" is virginal leucorrhoea. This represents a percentage of the latter to the total out-patients of 1·07, a figure strikingly close to that of 1·06 previously obtained and noted in the in-patients' series of 1904-1924. The percentage of 'Virginal Leucorrhoea' to 'unmarried nulliparae' is 13·2. These are the average percentages over the period of five years but it is of interest to note that the figure of the former percentage rose from ·46% for the years 1925 and 1926 to 1·4% for the years 1928 and 1929; and for the same years, in the percentage of virginal leucorrhoea to unmarried nulliparae, from 6·4% to 15·8%. Two apparent explanations of this marked increase in the number of these cases, offer themselves:

(1) Virginal leucorrhoea has been increasing in incidence from 1924 to 1929.

(2) Women have been showing less diffidence, latterly, in presenting this complaint.

Of the 58 cases, only 9 complained also of dysmenorrhoea i.e. 15 5%. Thirty virgins had the solitary symptom of discharge.

In passing, it might be mentioned that in this series of 438 unmarried nulliparae, (1) 120 or 27·4% complained solely of dysmenorrhoea and (2) 60 or 13·7% were found to be pregnant.

Of the 58 cases of leucorrhoea, 35 were not admitted to hospital but the remainder were: the latter are included in the in-patient series and studied in more detail. The reasons for the non-admission of many of these cases are, either that medical and general measures were thought to be indicated rather hospital treatment, or that the patients failed to appear when seht for. However, I endeavoured to follow-up the progress of these thirty-five women but managed to trace only thirteen, the leading features of whose histories and progress I shall describe in subsequent pages.

Attention was then directed to the In-Patient records from November 1st. 1924 until November 1st. 1929 and the histories of all patients admitted to hospital during that period were surveyed and all cases of virginal leucorrhoea collected. The total number of admissions is found to be 11,051 of whom 1140 are unmarried nulliparae. Cases of virginal leucorrhoea number 116, representing 1·05%of the total admissions and 10·2% of the unmarried nulliparae.

It is to be noted that the hospital, in which my work has been carried out, having over 150 'gynaecological beds' and now admitting some 2,700 patients per annum, affords one very extensive material and this accounts for the very many cases with which I have dealt.

CLINICAL FEATURES: TREATMENT AND ITS RESULTS.

The main particulars of the thirteen Out-Patients who were followed-up and received no hospital treatment, initially, are detailed below:

Case 1.- C.B. aged 32.

22-10-25; She complained only of a white discharge, which was not very profuse.
24-2-30; She states that discharge gradually disappeared without any treatment , whatsoever.

Case 11.- E.C. aged 22.

20-3-26; She complained of a profuse yellowish discharge of one years duration, which started after swimming when she thinks she 'got a chill'. She was advised to douche.
24-2-30; She douched herself frequently after visit to hospital in 1926 and discharge improved a little. Three months after attending 'Dispensary' she married and about four months later (when pregnant), the discharge disappeared and has been absent to-date. Since then she has had two normal, healthy babies.
Examination of the pelvis reveals no abnormality.

Case 111.- V.B. aged 13.

3-2-27; She complained of nocturnal incontinence of urine of several years' duration. No urinary trouble was present during the day. There was also a constant, irritating, white, profuse discharge since puberty, worse after exertion and ~~aft~~ after menstruation.- She had menstruated twice. She was referred to the Urological Department in Glasgow Royal Infirmary.
1-3-30; After attendance, for about six months, at Royal Infirmary, where she had "bladder wash-outs" and "medicine", nocturnal incontinence ceased and has remained absent to-date.
The white vaginal discharge has, however, persisted continually and at present is more profuse than ever, still white and irritating.
1-3-30; I commenced her treatment with Radiostoleum, one drachm twice daily.

While she was undergoing treatment with Radiostoleum, considering the urinary element in this case to be of much importance, I examined a catheter specimen of urine with the following result:

'In the fresh drop, numerous pus cells are seen. In the smear from the centrifuged deposit, short chains of Gram positive cocci are seen. A few shrt Gram negative bacilli are present'.

21-3-30; After about four ounces of Radiostoleum, patient states that there has been an emphatic improvement in the discharge and less irritation.

Case IV.- J.T. aged 24.

17-3-27; She complained of dysmenorrhoea in the right side and a moderately profuse leucorrhoea. General hygienic measures were advised, no abnormality being detected in the pelvis.

3-3-30. She states that dysmenorrhoea improved considerably after attending 'dispensary'. In June 1929, she had appendectomy performed but neither this nor tonics had any appreciable effect on leucorrhoea which, however, has gradually and spontaneously diminished considerably

Case V.- A.W. Aged 32.

24-1-27; She complained of menstrual periods being too frequent, for about six months, and of a profuse yellow discharge of about the same duration. The menstrual cycle was $\frac{9-10}{14-21}$ and irregular. On abdomino-rectal examination, retroversion of the uterus was diagnosed. Her name was placed on the waiting-list for admission to hospital but a severe sudden haemorrhage in March 1927, necessitated her urgent treatment. Then, a large fibroid in the posterior wall of the uterus and partly sub-mucous was found and hysterectomy performed.

26-2-30; General health very good and no leucorrhoea is present.

Case VI.- C.Bu. aged 28.

1-3-27; The complaint was discharge and backache, the latter being worse at the 'period'. Leucorrhoea was present since she was fourteen years of age although puberty was at seventeen: it was profuse, white, non-odorous and non-irritating.

5-3-30; She reports the discharge to be just as profuse as in 1-27 and to have been present since then continually, despite the following treatment:

June 1927: Burnbank Hospital - uterus curetted.

Leucorrhoea relieved for a few weeks; but returned to its former condition soon. The backache, however, was much improved.
September 1927: Western Infirmary - appendectomy,
April 1929: Homoepathic Hospital, Glasgow.
Here, she was treated for seven weeks with varied tablets and pills but with no appreciable effect on the leucorrhoea.

The general health has been better during the last six months but this has made no difference to her complaint.
5-3-30; Treatment commenced with Radiostoleum Capsules, two per diem, for fourteen days.
26-3-30; Definite improvement noted by patient.

Case V11.- J.R. aged 28.

25-8-27; Complaint was that of profuse white discharge of two years' duration and vague, irregular backache since puberty at 15. She had had bottles of tonics, douching twice weekly and holidays on several occasions, but all without benefit.
23-2-30; She had been advised at her previous attendance, to enter hospital but failed to do so. The discharge is as troublesome as hitherto but a little more watery.
(I arranged for her admission then to hospital and her case will be studied in more detail among the In-Patient series.)

Case V111.-K.F. aged 26.

22-11-27; Complaint was profuse white discharge of six months' duration. There were no other symptoms.
13-1-30; Patient is very much better, the discharge being practically gone, no treatment having been employed.

Case 1X.- M.L. aged 21.

29-5-28; A thick, white discharge started about four months ago, gradual in onset but soon profuse and remained so. It was worse for about a week before the period and decidedly increased by excitement. A vague backache and abdominal discomfort was present during this time. Tonics made no difference and douching was only of temporary benefit. No abnormality was detected in the pelvis on examination and general hygienic measures were suggested.

20-1-30; Since leaving 'dispensary', she attended to the bowels regularly and douched on alternate nights for two months. The discharge lessened a little and has remained so, since. It is still, constant and increased by excitement. She has, now, no pain or discomfort in abdomen or back. Leucorrhoea was increased in August 1928, when she was confined to bed with "tonsillitis" and "rheumatism".

I examined the vaginal discharge with the following results:

Reaction - mildly acid.
Fresh drops - Abundant epithelial cells, organisms, and a few pus cells: no Trichomonas Vaginalis.
Vaginal smear - Gram negative bacilli of coliform type.
Vaginal Culture - A slight growth is obtained on ordinary agar after 48 hours at 37°C, Gram-positive diplococci and Gram-negative bacilli of the coliform type being present.

She was given Radiostoleum to-day, one drachm twice daily, for ten days.
21-2-30; Discharge has been almost absent since her last visit. She states that the improvement is very marked.

Case X.- B.Mc.D. aged 24.

26-11-28; Leucorrhoea has been present for foyr months and amenorrhoea for the same length of time. The only abnormality detected was an erosion of cervix.
30-12-29; "Periods returned naturally again and white discharge disappeared completely. She thought she had been 'run down', took one or two bottles of tonic and everything came right".

Case Xl.- J.B. aged 18.

7-2-29; She complained of pain in the right side of the abdomen of ten days' duration and more severe during the past four days. A yellowish-white discharge was present for several weeks and varying in its profuseness. The menstrual periods were irregular during the preceding few months. On examinations, no abnormality was detected in the pelvis. There was some abdominal tenderness in the right iliac fossa, her temperature was 100·4°, and she was advised to rest in bed.
13-1-30; Since last visit, she has been in Glasgow Royal Infirmary, for "appendicitis", but was not operated on. She has been working in a pottery and has had colic, falling out of hair and pigmentation of the gums. Her periods have continued irregular but discharge has practically gone, although there has been no treatment.

Case XII.- J.Ba. aged 24.

21-5-29; Her complaint was that of pain in the back, at intervals for 2 years and, of about the same duration, a yellowish, non-constant discharge which varied in profuseness. Her lumbar region, hip-joints and urinary tracts have been skiagraphed but no abnormality was detected. Her complaint was considered as not having a gynaecological origin.
27-12-29; Lumbar pain has persisted, but leucorrhoea has been absent "for weeks at a time". Since marriage, three weeks ago, there has been no leucorrhoea.
Under anaesthesia, the pelvis is found to be normal except for a small cervical erosion. Dilatation and Curettage performed and the cervical erosion excised.

Case XIII.- P.S. aged 25.

6-6-29; Patient complained of a profuse yellow discharge, present for about 1 year and 8 months. It was continually present and very profuse, more marked on exertion and it was worse during an attack of pneumonia eight months ago. The vulva was found to be red, tender and inflamed and the hymen intact. Nevertheless, urethral and vaginal smears were taken but no gonococci were found.
8-1-30; The discharge has in no way improved, despite douching and frequent, hip-baths. I examined the vaginal contents with the following result:
Reaction - Neutral.
Fresh Drop - Pus cells, epithelial cells and organisms present; no Trichomonas Vaginalis seen.
Vaginal Smear - Coliform bacilli present.
Vaginal Culture - A slight growth only is obtained on ordinary agar after 48 hours at 37°C. It is one staph. albus.
25-1-30; Hospital treatment advised, but declined.

A study of these cases shows that on the date of their being followed-up, eight were cured and five were in statu quo, as far as their leucorrhoea was concerned.

Of the 8 'cures', 5 had been gradual and had no treatment, but of the latter, 3 cases were not really of the very profuse type. Of the remaining 3 'cures', marriage appeared to have removed the complaint in 2, (in one of whom discharge was of the varying type) and removal of a fibroid uterus to have effected a cure in one.

Case X is noteworthy as being illustrative of the 'endocrinous' type to which further reference will be made. Here, a period of four months amenorrhoea was associated with profuse leucorrhoea and examination of the pelvis showed neither the physiological enlargement of the uterus that might have been suspected nor any gross pathology except for an erosion of cervix.

Believing that little or no importance is to be attached to the presence of an erosion of the cervix in virgins - reasons for this view will be adduced later - I think that the amenorrhoea and leucorrhoea in this case were concurrently due to hormonal causes. Their temproary nature and coincident disappearance are to be noted, as is also the fact, which I have observed, that, in cases where menstruation is very irregular and there is leucorrhoea, during the longer spells of amenorrhoea, leucorrhoea is increased.

The five patients in the Out-Patient series who were not improved, had very profuse leucorrhoea. One failed to report regularly, one (Case VII) came into hospital and the other three were treated with Radiostoleum as detailed above. During the time of observation, admittedly short, there was a distinct improvement in each of these three cases.

Turning now to the In-Patient series of 1924-1929, one finds, as mentioned before, 116 cases of virginal leucorrhoea, representing approximately 1% of the total admissions to hospital during that period.

Two patients are aged 13 years and one is aged 42 years; the following table shows the age incidence:

Age Incidence (At time of operation)

AGE	No. OF CASES	PERCENTAGE
10-15 Years.....	3	2·6
15-20 Years.....	14	12·0
20-25 Years.....	41	35·3
25-30 Years.....	35	30·1
30-35 Years.....	15	13·0
35-40 Years.....	5	4·3
40-45 Years.....	3	2·6

It is to be noted that almost two-thirds of all the cases of virginal leucorrhoea occur between 20 and 30 years of age.

Of the series, 60% have no dysmenorrhoea, whatever, and 73 cases, or about 63%, are noted as being in very good general health, with no obvious anaemia, and are of normal appearance and build.

Constipation occurs in 58 cases or 50% but, being so very common in women, is of no special significance.

Urinary symptoms, usually in the form of frequency and dysuria, are complained of in 24 or almost 20% of the patients. Young (14) points out that bladder symptoms are very common in cervicitis and that, in some cases, there is definite evidence of infection of the urinary tract with bacilluria and pyuria and he suggests that it is possible to account for the trouble either by predicating a direct spread of the inflammatory process from the cervix to the adjacent bladder, or on the basis of a blood stream infection. It is also noted that often the urine is free from any abnormal elements, and it may be that in such cases the condition is reflexly induced by sympathetic irritation. In virginal leucorrhoea, - whether a cervicitis is thought to be present or not - my findings on urine examination are similar to those of Young and will be detailed later.

By means of a circular letter, requesting patients to attend at the Out-Patients Department, I endeavoured to study the results of treatment and progress in the series, but 40 failed to report and the results are thus available in 76 cases.

A mere consecutive description of the clinical features of each of these 76 cases would, I think, fail to present the important points with relative emphasis, apart from being trying to a reader, and, in order that a better general perspective might be obtained, I have tabulated, under several headings, the essential details of these cases. In the following tables, certain contractions are used: in column III, 'm' for 'months', and 'y' for 'years'; in column IV, 'dysm' for 'dysmenorrhoea'; in column VII, 'N.A.D.' for 'no abnormality detected' and 'cong'. for 'congenital'; in column VIII, 'D and C' for Dilatation & Curettage; and in column IX, 'leuc'. for leucorrhoea.

The date in the last column indicates when I interviewed these patients, and their 'progress' refers to the interval between operation and this date and to the leucorrhoea only, and not to any other concomitant symptoms.

I	II	III	IV	V	VI
Case No.	Age	Duration of Discharge	Additional Symptoms	Menstruation	Other Features
1	32	2Y	-	Normal	-
2	27	2Y	Dysm.	"	Pale, Slightly "Anaemic"
3	30	1m	Dysm.	"	Poor Health; Pale. Very Stout; "Endocrine."
4	21	6Y	-	Irregular	-
5	26	6m	Dysm.	1924: Had 6 Months' Amenorrhoea.	Neurotic. "Endocrine?"
6	25	13Y	Dysm.	Irregular	Stout since Puberty. Weighs 14 st.: "Endocrine."
7	36	8Y	Dysm.	Normal	-
8	29	2Y	Dysm.	Menorrhagia	-
9	33	9Y	-	Scanty	-
10	22	8Y	Dysm.	Menorrhagia	"Anaemic". Health Poor;
11	28	3Y	-	Irregular	Health Poor: Anaemic. Leuc. Gradual.
12	42	11Y	-	Irregular	-
13	20	1½Y	Dysm.	Normal	-
14	29	2Y	Dysm.	Normal	-
15	13	1Y	Dysm.	Menorrhagia	-
16	34	8m	-	Normal	-
17	30	6m	-	"	-

VII	VIII	IX
Diagnosis	Treatment & Date	Progress
Cong. Retroversion & 'Endometritis'	~~24-11-24:~~ D & C. After Operation, Douched Daily for 18 months.	6-3-30: Leuc. Cured. June, 1926 — Married:- No Leuc. Since then: Now 6 months Pregnant.
N. A. D.	18-2-25: D & C Dec. 1925. Appendectomy.	26-2-30: Leuc. not improved
Appendicitis Cystic Ovaries	27-2-25: Appendectomy. Later: Thyroid Extract Medication.	13-3-30: Operation removed pain; Leuc. persisted several months: then much improved.
Cong. Retroversion & 'Endometritis'	10-4-25: D & C. Uterine Cavity Carbolized.	20-3-30: Cured.
N. A. D.	8-5-25: D & C	13-3-30: Leuc. gone for 2 months, then returned & now as before operation.
N. A. D.	25-5-25: Cervix dilated.	19-3-30: Leuc. not improved. 2½ years after operation, married & has had a child.
Cong. Erosion	20-5-25: D & C	4-3-30: Improved since operation: varies, occasionally profuse.
Appendicitis Cong. Erosion	12-6-25: D & C Appendectomy.	12-3-30: Much improved
Cong. Erosion	2-10-25: D & C Cervix Carbolized.	28-2-30: Much improved
Retroverted Uterus	14-12-25: Cervix Dilated	6-3-30: Leuc. improved for 6 months & then as bad as ever.
'Endometritis' & Fundus enlarged	12-2-26: D & C	3-3-30: Cured.
Uterus Enlarged. Pathological Report: 'Multiple Endometrial Polypi.'	22-3-26: Sub-total Hysterectomy.	4-3-30: Much improved
Under-developed uterus	1-11-26: Cervix dilated	Dec., 1928: Acute Appendicitis. 3-3-30: Much improved
Under-developed uterus	17-3-27: D & C	8-3-30: Much improved
N. A. D.	10-11-27: Nil.	1-3-30: Cured
Erosion of cervix	4-2-28: D & C	14-3-30: not improved by operation: latterly improving.
Erosion of cervix (slight)	21-2-28: D & C	7-3-30: Cured.

I	II	III	IV	V	VI
Case No.	Age	Duration of Discharge	Additional Symptoms	Menstruation	Other Features
18	34	7Y	-	normal	-
19	39	5Y	-	"	leuc. followed chill
20	21	4m	dysm.	"	-
21	24	1Y	-	"	-
22	26	1Y	dysm.	irregular	-
23	24	4m	-	normal	-
24	25	6m	-	"	Health poor; anaemic
25	22	3Y	-	irregular	-
26	20	7Y	dysm.	irregular & scanty	Very stout; "Endocrine"
27	13	6m	" Something hanging down"	normal	-
28	37	5Y	dysm.	irregular	very stout
29	28	1Y	-	normal	-
30	27	3Y	-	"	Very stout "Endocrine"
31	21	1Y	-	"	-
32	34	6m	-	"	-
33	29	1m	-	Menorrhagia.	Very pale: "Anaemic"
34	27	1Y	-	scanty	Goitre: "Endocrine"

VII	VIII	IX
Diagnosis	Treatment & Date	Progress
subserous-fibroid in body of uterus	17-3-28: myomectomy & appendectomy	10-3-30: operation did not help Leuc.: then douching, improved. Married 1 year — No family.
N. A. D.	1-4-28: nil.	10-3-30: Leuc. was profuse for 3 weeks, then cured.
erosion of cervix	31-3-28: D & C Iodized phenol to cervix.	5-3-30: unimproved Re-admitted.
N. A. D.	21-4-28: nil.	13-3-30: gradually improved. married, 10-5-29, & no leuc. since then: not pregnant.
erosion of cervix (slight)	16-8-28: D & C Iodized phenol to cervix.	19-3-30: Leuc. gone for a month, then returned almost as profuse as ever.
N. A. D.	1-9-28: cervix dilated	14-2-30: Had cervix dilated again in Royal Infirmary 2-2-30, as unimproved: has "Cancerophobia"
acute retroflexion	6-11-24: Round Ligament Suspension. May, 1925: Cervix Dilated.	6-3-30: Leuc. returned immediately, also after second operation: now a little improved.
N. A. D.	15-10-29: D & C	2-12-29: unimproved Re-admitted.
Underdevelopment of All genital organs.	10-12-27: D & C. After Operation, Thyroid Tablets continually.	8-3-30: Improved. Occasionally profuse e.g. during prolonged amenorrhœa.
N. A. D. ("Neurotic")	22-12-24: Cervical Canal Swabbed with Iodine.	16-3-30: Cured
cervix much eroded: fibroids in uterus	27-4-27: D & C Owing to great stoutness, Laparotomy not done.	27-2-30: not improved
slight erosion of cervix	18-11-27: D & C	10-3-30 much improved. March, 1928, married & became pregnant in first month.
N. A. D.	23-3-27: D & C 23-11-27: Lactic Acid Douches for 12 days, twice daily.	18-3-30: much improved
N. A. D.	19-1-28: D & C Since then cervix Carbolized.	3-3-30: Leuc. returned 5 weeks after operation: since Carbolizing, almost cured.
N. A. D.	21-1-28: D & C	4-3-30: Leuc. cured. Married 1 year & Has child: no leuc. since marriage.
Inoperable Carcinoma of Cervix — malignant ulceration, involving Vagina &	18-8-28: Radium — 3000 millicuries. 12-4-29: growth scraped, & formalin applied.	for 6 months: well. then severe haemorrhage, 12-4-29 26-3-30: Untraced, presumed dead.
N. A. D.	21-3-28: D & C	14-3-30: Unimproved for 6 months, then spontaneous improvement.

Case No.	Age	Duration of Discharge	Associated Symptoms.	Menstruation	Other Features.
35	27	2Y	-	Normal	-
36	23	2Y	dysm.	"	-
37	40	1½m	-	"	'anaemic'
38	29	3Y	dysm.	"	Asthmatic
39	21	6m	-	"	-
40	26	5Y	-	"	Health not good.
41	31	5Y	'pain in both sides'	menorrhagia	Stout: 'Endocrine'
42	23	1Y	dysm.	normal	-
43	26	4Y	-	"	Cardiac murmur 1924: Cystoscopy for Dysuria.
44	28	2Y	-	"	-
45	26	8M	dysm.	"	Cardiac murmur. Had Chorea.
46	20	6m	-	"	-
47	20	2Y	dysm.	irregular	'anaemic'
48	20	4Y	dysm.	irregular	very poor health
49	19	4Y	dysm.	normal	-
50	21	1Y	-	"	-
51	34	5Y	dysm.	menorrhagia	Cardiac murmur. 'anaemic'
52	31	5Y	-	menorrhagia	-

VII	VIII	IX
DIAGNOSIS	Treatment & Date.	PROGRESS
N. A. D.	4-5-28: D & C	22-3-30: Cured
Chronic Appendicitis: Right Salpingo-oophoritis: Erosion of Cervix.	28-7-28: Appendectomy: Right Salpingo-oophorectomy D&C. Erosion Excised.	10-3-30: Much Improved
small fibroid in uterus: endometritis	Cervix Dilated 15-8-28: Lactic Acid Douches (for 7 days)	21-3-30: not improved
N. A. D.	17-10-28: D & C	6-3-30: Cured
'Endometritis' Some sero-pus from cervix.	29-11-28: D & C	6-3-30: Cured
Cervix hypertrophied. Severe Congenital Erosion.	13-3-29: "Small Double Emmett" Repair of Cervix: D & C.	1-3-30: not improved
N. A. D.	8-4-29: D & C	15-1-30: much improved leuc. varies
uterus retroverted	10-5-29: Round Ligament Suspension	20-3-30: not improved
Cystitis.	24-12-28: D & C Silver Nitrate Instillations in Bladder.	20-3-30: not improved
Large Erosion of Cervix	15-3-29: Excision of Erosion	19-3-30: not improved
Erosion of Cervix	4- 2-29: D & C	8-3-30: not improved
Cong. Erosion of Cervix	6-2-28: D & C	17-3-30: Improved after Operation. Married, Dec., 1928 – one child. No Leuc. since Marriage.
Erosion of Cervix	15-8-29: Cervix dilated	12-3-30: slightly improved
Pyuria	12-9-29: D & C	8-3-30: improved much: Leuc. varies. General Health Improved.
Uterus Retroverted: Hypertrophied Cervix & Erosion.	30-10-29: D & C	6-3-30: not improved. (3 weeks after operation, had acute appendicitis.)
N. A. D.	12-7-29: D & C	8-3-30: Cured
N. A. D.	29-6-25: D & C	19-3-30: not improved for 6 months, then gradually lessened spontaneously.
uterus retroverted	18-9-25: D & C	2-3-30: not improved Until 3 years after operation & then disappeared.

I	II	III	IV	V	VI
Case No.	Age	Duration of Discharge	Additional Symptoms	Menstruation	Other Features
53	26	2Y	-	normal	-
54	42	3m	-	"	Health poor:'anaemic'
55	23	9Y	-	"	-
56	23	2Y	dysm.	"	-
57	32	1Y	-	very scanty	Neurotic
58	25	2Y	-	scanty	Exophthalmic goitre:'anaemic'
59	25	3Y	-	normal	-
60	18	2Y	dysm.	"	-
61	23	5Y	dysm.	"	Stout:'Endocrine'
62	33	16Y	pain and sickness	scanty	16 years ago Appendicitis & peritonitis.
63	28	7Y	dysm.	normal	D & C. 5 years ago for leucorrhoea
64	21	6Y	-	"	-
65	14	1Y	dysm.	"	-
66	26	9m	-	"	-
67	18	2Y	swelling in abdomen	"	-
68	26	2Y	dysm.	irregular	-
69	26	10m	-	normal	-

VII	VIII	IX
Diagnosis.	Treatment & Date.	Progress.
Small Cicatricial Nodule in Posterior Vaginal Vault: ? developmental scar.	8-7-27: D & C 17-4-29: D & C	17-4-29: not improved
Ulcerating Carcinoma Vaginae.	23-9-27: *Portion of Growth Excised for Examination.*	Sept. 1928, Died.
Vulvar Eczema.	28-8-26: D & C and local treatment.	18-3-30: Cured.
uterus retroverted	12-1-27: D & C	14-1-30: slightly improved
Uterus enlarged & hard: Endometrium thick: Patholog. Report - Polypoid Endometrit	12-12-28: D & C	*13-3-30: not improved until 3 months after operation, when improved gradually.*
Retroversion, Hyperplastic Endometritis: Small Erosion of Cervix.	31-12-29: D & C	18-1-30: not improved
(Haemorrhoids) N. A. D.	4-4-28: *(Removal of Haemorrhoids)*	14-3-30: not improved
uterus retroverted	2-5-28: D & C	25-1-30: not improved
uterus retroverted	7-5-28: D & C	24-2-30: not improved
Dense adhesions in pelvis, involving uterus, tubes, etc.	*26-6-29: Adhesions separated. Sub-total Hysterectomy & Bilateral Salpingo-oophorectomy*	27-6-29: Ileus Paralyticus - Died.
Multiple Sub-serous Fibroids: "Blood cyst" in right ovary: Chronic Appendicitis: & Erosion.	*15-2-28: Myomectomy (4 fibroids) Appendectomy & Oophorectomy (Right)*	27-2-30: Cured.
N. A. D.	6-5-29: Nil.	15-3-30: *Not Improved until married: — child born: no Leuc*
N. A. D.	29-5-29: cervix dilated	*18-3-30: improved a little for 8 months & then as profuse as before.*
Anterior lip of cervix hypertrophied & elongated.	5-7-29: D & C	11-3-30: Cured.
Large Multilocular serous cyst of right ovary: small serous cyst of left ovary.	18-8-29: Double Salpingo-Oophorectomy	12-3-30: Cured.
N. A. D.	8-9-29: D & C	10-3-30: not improved
Chronic Vaginitis	*19-9-28: D&C: & daily iodine douches & Picric acid instillations (12 days)*	*3-1-30: No improvement for 4 months, then gradually disappeared.*

I	II	III	IV	V	VI
Case No.	Age	Duration of Discharge	Additional Symptoms.	Menstruation.	Other Features.
70	28	3Y	-	normal	-
71	20	1Y	-	"	-
72	25	8m	-	scanty	-
73	30	2Y	Menorrhagia	irregular & Menorrhagia.	-
74	25	3Y	pain in 'left side'	irregular & scanty	Health poor: 'Endocrine': weighs 13st.
75	22	5Y	dysm.	Menorrhagia	-
76	23	3Y	dysm.	Menorrhagia	'Neurotic'.

VII	VIII	IX
DIAGNOSIS.	TREATMENT & DATE.	PROGRESS.
Cochleate uterus Chronic vaginitis	20-9-28: Daily Iodine douches & Picric acid (4%) instillations for 12 days.	18-12-29: not improved
Erosion of cervix Chronic vaginitis	12-1-29: Daily Iodine douches & Picric Acid (4%) instillations for 12 days.	13-12-29: slightly improved.
small Erosion of cervix.	23-3-29: D & C Daily Picric acid instillations.	4-3-30: not improved
Fibroid Polyp of Uterus, & glandular hyperplasia of endometrium.	8-5-29: D & C Polyp removed.	11-12-29: Cured.
Sexual underdevelopment External genitals rudimentary.	29-6-29: D & C	3-12-29: Cured.
Pathological report:- "marked cystic hyperplastic endometritis"	31-7-29: D & C	31-1-30: leuc. worse than before.
N. A. D.	10-8-29: D & C	20-12-29: not improved

Investigating the whole series of 116 In-Patients, one finds that the discharge varied in its duration before operation, from one month to 16 years, the average being three years.

In 82 of the 116 cases or 70%, menstruation was perfectly normal and regular.

The diagnoses and findings reached by the various surgeons at the time of operation are summarised below:

'DIAGNOSIS'	No. of Cases
No abnormality detected	41
Erosion of cervix	25
Retroversion of uterus	17
Endometritis (Hyperplastic or Polypoidal)	9
Miscellaneous (cystic ovaries, fibroids, etc.)	9
Underdevelopment of Reproductive organs	5
Chronic vaginitis	3
Simple Adenoma of Endometrium	1
Dermoid cyst of right ovary	1
Hypertrophic elongation of cervix	1
Chronic pelvic peritonitis	1
Carcinoma of Cervix	1
Carcinoma of Vagina	1
Chronic vulvar eczema	1

It is to be noted that in several instances more than one factor was present, e.g. Retroversion with 'erosion' (4 cases), Chronic vaginitis with 'erosion', (1 case), and Endometritis with 'erosion', (1 case), but in these instances I have classified them under 'erosion' in the above table.

It is to be emphasized that these 'causes' in many cases may be merely associated conditions and that anatomical variations from the normal in the female pelvis are not necessarily productive of disturbed physiology or of any particular symptom that may be present, e.g. leucorrhoea.

The high proportion of cases (35%) in which no abnormality is said to be detected is noteworthy and includes many cases which are often loosely diagnosed as 'endometritis', in the absence of confirmatory microscopic evidence, and for want of a definite explanation for the leucorrhoea present.

Among the 25 cases of erosion of cervix, most are described as being 'congenital', but some as associated with infection. These descriptions frequently correspond merely to the surgeon's view on the origin of the so-called 'congenital erosions' as a whole.

The treatment employed in the series varies considerably, but it is of interest to note that of the 41 cases in which no abnormality was detected , 25 had Dilatation and Curettage performed (in some cases supplemented with carbolization of endometrium of body or cervix), 7 had dilatation of cervix alone and 9 had no surgical treatment but were examined under anaesthesia.

A study of the lines of treatment employed over the whole series is unsatisfactory, since the results in 40 patients are unknown and so one must return to the tabulated series of 76 cases in order to analyse the methods of treatment and their results.

ANALYSIS OF SERIES OF 76 CASES.

Improvement, unless evidenced within six months of the operation (or examination under anaesthesia without surgical interference) is not considered as being attributable to that operation. The results are as follows:-

TABLE A :— RESULTS OF OPERATION.

Result.	No. of Cases.	Percentage.
Slightly Improved . . .	5	6·6
Much Improved	14	18·4
Cured	19	25·0
Not Improved . . . . . (including 3 deaths)	38	50·0

It is apparent that only 50% of patients benefited by their stay in hospital. Among those not improved, there were three patients who died:

(1) Case no. 33: 29 years of age- inoperable carcinoma of cervix.

(2) Case No. 54: 42 years of age- ulcerating carcinoma of vagina.

(3) Case No. 62: A case of chronic pelvic peritonitis, subsequent to appendicitis and peritonitis 16 years previously; death from ileus paralyticus on the day following sub-total hysterectomy and bilateral salpingo - oophorectomy.

The following table gives the results of treatment as correlated with the findings or associated conditions present:

TABLE B - DETAILED RESULTS OF OPERATION.

'Diagnosis'	No. of Cases.	Cured.	Much Improved.	Slightly Improved.	Not Improved.
N. A. D.	23	8	2	0	13
Erosion of cervix.	13	1	3	2	7
Retroversion	9	2	0	1	6
Endometritis.	7	3	2	0	2
Erosion + other lesion.	6	1	2	0	3
Underdeveloped reproductive organs	4	1	2	1	0
Chronic Vaginitis.	3	0	1	1	1
Miscellaneous.	11	3	2	0	6

A glance at the above figures shows that there were 6 cases in which an 'erosion' was accompanied by some other condition and these were as follows:-

(1) Chronic appendicitis - Case No. 8.
(2) Fibroid uterus - Case No. 28.
(3) Chronic appendicitis & right salpingo-oopheritis - Case No. 36.
(4) Retroverted uterus & hypertrophied cervix. - Case No. 49.
(5) Retroverted uterus & Endometritis. - Case No. 58.
(6) Multiple sub-serous fibroids; "blood-cyst" in right ovary, & chronic appendicitis - Case No. 63.

The particulars of the miscellaneous group are given below:-

Condition.	Treatment.	Result.
Bilateral ovarian cysts and appendicitis.	Appendectomy: later Thyroid extract.	Much Improved.
Bilateral ovarian cysts.	Bilateral salpingo-oophorectomy.	Cured.
Subserous uterine fibroid.	Myomectomy.	Not Improved.
Chronic cystitis.	D & C. Bladder Instillations.	Not Improved.
Pyuria.	D & C. Medical Treatment.	Much Improved.
"Nodule in vaginal vault".	D & C.	Not Improved.
Carcinoma of cervix.	Palliative.	Died.
Carcinoma of vagina.	Palliative.	Died.
Hypertrophy of cervix.	D & C.	Cured.
Chronic pelvic peritonitis.	Pan-hysterectomy.	Died.
Vulvar eczema.	D & C. and local treatment.	Cured.

There were 9 cases which showed features suggestive of an endocrine imbalance, e.g. gross stoutness, very irregular or scanty menstruation or evidence of disturbed thyroid metabolism. Four of them were not improved after dilatation of cervix or dilatation and curettage. Two were improved with thyroid extract after dilatation and curettage.

In the follow-up, I found that 8 of the 76 cases were married subsequent to operation and it is of interest to observe that only one of them since marriage has been troubled with leucorrhoea and that she is one of the "endocrine group", having been very stout since puberty and weighed 14 stone at time of operation. She was married two and a half years after her stay in hospital and subsequently had a child. Examination of the cervix now shows it to be lacerated and infected.

The apparent cure or marked improvement in those now married is noteworthy, as is the additional fact that five patients, subsequent to marriage have borne one or more children; one woman (at the time of my examination of her) was found to be pregnant for the first time. It would be rash to draw definite conclusions on the effect of marriage on virginal leucorrhoea, but the evidence available supports my opinion that it is not only likely to be improved or cured by marriage but that it is not a factor in the production of sterility.

I have already indicated that almost two-thirds of all cases of virginal leucorrhoea occur before thirty years of age and how I would emphasise that it is in this group that so frequently a definite cause for the disch arge is not apparent and that surgical treatment is so unsatisfactory. On the contrary, results im women of thirty years of age and over are good, and in the series studied, 18 fall into this category. Only 6 of these were not improved by operation, (excluding the two cases which died, one of carcinoma vaginae and the other of chronic pelvic peritonitis), but of these 6 women,4 were found to have improved spontaneously apparently, at some time later than 6 months after hospital treatment. Thus, there were only two of this group of 16 who, at the time of my follow-up, still complained of vaginal discharge: one of them had multiple fibroids but a laparotomy was not thought advisable, and the other had a single fibroid in the body of the uterus. In each of these cases dilatation and curettage had been performed. Thus, the prognosis is good in virgins of thirty years of age and older, whether a definite pathological lesion is found (and treated) or not. In addition, in some of these cases, improvement or cure seems to occur irrespective of treatment.

A survey of the relationship of the duration of the discharge to the result of treatment reveals no corresponding features of note.

It is very striking that out of 58 patients under 30 years of age, 30 were not improved in the slightest as a result of their residence and treatment in hospital. Most of these 'failures' had a dilatation and curettage performed, (including a deep curettage of an erosion when present), some had only a dilatation of cervix (in two cases supplemented by the application of iodized phenol to the cervical canal), two had a Round Ligament Suspension of the uterus and a few were simply examined under anaesthesia and had no surgical interference. It is obvious that the treatment employed in these cases is unsatisfactory. It must not be overlooked, however, that in every instance of failure of treatment, numerous attempte at cure had been made, either before operation or after it, by the patient's own medical attendant. General measures, holidays, 'tonics', purgation and douching were the usual lines prescribed,as outlined to me by the patients at the'follow-up'.

Two of the 'failures' are of particular interest as affecting one's opinion of the rôle of the 'congenital erosion' in the production of virginal leucorrhoea. In one, there was a "severe congenital erosion and hypertrophied cervix"; dilatation and curettage was performed, the erosion removed and repair of the cervix by a "small double Emmett" carried out; one year later, leucorrhoea was as troublesome as before operation, and, on examination, I could not detect any signs of erosion;- in the other case, a "large erosion of cervix" was found and excised on 15th. March, 1929; on 19th. March, 1930, I examined the patient and found only some slight irregularity of the cervix---she declared that profuse leucorrhoea returned immediately after operation and had persisted. The results of these two cases would make one exceedingly dubious as to considering the mere presence of an erosion as pointing to it being the source of leucorrhoea complained of in a virgin and as to the wisdom of directing treatment to it alone.

In a large majority of the patients, who had also dysmenorrhoea or menorrhagia, operation effected an improvement or cure in this associated symptom, contrasting markedly with the frequently unsatisfactory progress of their leucorrhoea.

PART 111

CLINICAL INVESTIGATION.

Since commencing this study of profuse leucorrhoea in virgins, ten cases have come under my care; I have investigated them in detail during their stay in hospital and followed their progress after treatment.

CASE 1

G. A., aged 26. Occupation -- Clerkess.

History of Complaint:

She had been troubled with a profuse yellowish discharge for the previous four months. It was irritating and foul-smelling. Its onset was sudden. She had to wear vulvar pads during the preceding month and each was much soiled with discharge after two days' wear and had to be changed. Leucorrhoea was worse just after a 'period' and was very profuse when she had "just got out of bed in the morning". Menstruation was regular, normal amd painless. She had been having 'tonics' from her medical attendant but these, she stated, while improving her general health, had no effect on the profuseness of the vaginal discharge.

General Condition:

She stated that she had felt "run down" and easily tired since the onset of her complaint. She looked healthy and well-nourished and the mucous membranes were well coloured. I examined her blood with the following results:-

Haemoglobin--- 90%,
No. of Red Blood Corpuscles per cubic mm. --- 5,040,000.
No. of White Blood Corpuscles per cubic mm. --- 10,000.
Wassermann reaction --- negative.

Examination of a catheter specimen of urine revealed it to be sterile, no organisms being found in a smear or a culture from the centrifuged deposit.

Findings under Anaesthesia:

Hymen present. Vulva normal, with no evidence of inflammation of orifice of urethra or of Bartholin's ducts. Vaginal wall red and inflamed. A pool of pus was present in the vagina, behind the cervix. The cervix was apparently healthy and the passage of a 'sound', into the cervical canal did not show any issue of discharge through the external os. The uterus and adnexae were normal.

Vaginal Secretion:
Reaction . . . . . mildly acid.
Examination of a fresh-drop (diluted with normal saline) of vaginal content . . . . . Pus cells abundant, numerous organisms; no Trichomonas Vaginalis.

Bacteriology:
Vaginal Smear . . . . . Abundant extra-cellular diplococci, not gonococci, and numerous short bacilli; no Bacilli Vaginae seen.
Vaginal Culture . . . . . A profuse and pure growth of staphylococcus albus obtained on ordinary agar after 24 hours at 37 °C.
Cervical Smear . . . . . No organisms seen.
Cervical Culture. . . . . No growth obtained on ordinary agar after 24 hours at 37 °C.

Treatment.
Jan. 30th., 1930:
Vaginal wall painted with 1% solution of Silver Nitrate and some of the solution left in situ(under anaesthesia). Cervix not dilated.

On the second day after the above treatment, I swabbed the vaginal mucosa with Lugol's Iodine (5% iodine in 10% potassium iodide)by means of a small swab held between the tips of a fine-bladed pair of dressing-forceps, but finding this manipul-ation too painful to the patient, I substituted for this, on six successive occasions (once daily), instillation into the vagina of 10 c.cs. of Lugol's Iodine by means of a syringe and silver catheter. On each occasion, the vagina was first douched, with the same solution throughtthe catheter, the vaginal contents then being with-drawn into the syringe and disposed of. A thin iodoform-gauze drain was left after each instillation in the vagina, as near into the posterior fornix as possible and removed after about twelve hours.

Progress:
After leaving hospital, (seven days after admission), there was no recurrence of leucorrhoea and two months later she declared that discharge was quite gone.

Comment:
This was a case of vaginitis only, apparently primary, and unaccompanied by any evidence of uterine infection. No culture was obtained from the cervical canal. The cervix was not dilated and so no intra-uterine culture could be made, but the patient's excellent progress later justified the treatment adopted.

CASE 11

R. H., aged 26. Occupation -- Domestic Servant.

History of Complaint:

A copious, white discharge, thick in consistence and non-odorous was present for about three months. It commenced suddenly and necessitated the constant wearing of sanitary towels. It was present continually between 'periods' and most marked just after menstruation and after exertion. At no time was there any trouble with micturition: the 'periods' were normal and painless. a 'tonic' from her doctor made no difference to her complaint.

General Condition:

The patient looked healthy and well-nourished. She was not neurotic in type but stated that the discharge was a source of great worry and inconvenience to her and was actually "making life miserable".

Findings under Anaesthesia:

Hymen intact. Profuse purulent discharge present: vulvitis and extensive peri-vulvar intertrigo obvious.

Cervix, uterine body and the appendages were apparently normal.

Vaginal Secretion:

Reaction . . . . . mildly acid.

Fresh Drop . . . . . abundant yeast-like cells and many branching hyphae -- septate mycelial threads -- were seen. A microphotograph was taken -- see following page -- (Fig. 1).

Numerous motile, coliform organisms were present but no Trichomonas Vaginalis.

Bacteriology:

Before treatment:

Vaginal smear . . . . . stained with methylene blue, a film showed a fungus composed of numerous branching mycelia and abundant yeast-like cells, some elongated into hyphae. With Gram's stain, abundant Bac. Vaginae were seen and coliform bacilli.

Vaginal Culture:. . . . Abundant, fine, 'powdery' colonies obtained on ordinary agar after 24 hours at 37 °C.; a similar, but not so profuse growth was obtained on blood-smeared agar. A film stained with methylene blue showed abundant groups of yeast-like bodies and a few mycelial threads (Fig. II). Gram-stain showed variation in the staining properties of the cells, some being 'positive', some faintly so and others 'negative'. No Bac. Vaginae were seen.

After Treatment: (about three weeks).

Smear and culture, on ordinary agar, showed findings almost identical with those before treatment: stained preparations showed numerous discrete colonies of 'yeast-like' bodies,

Fig. I (× 450)

Fresh-Drop of Vaginal Discharge.

(Case II. R. H.) The fresh drop was tending to dry when the above photograph was taken but a few of the branching hyphae and some of the yeast-like cells are quite apparent.

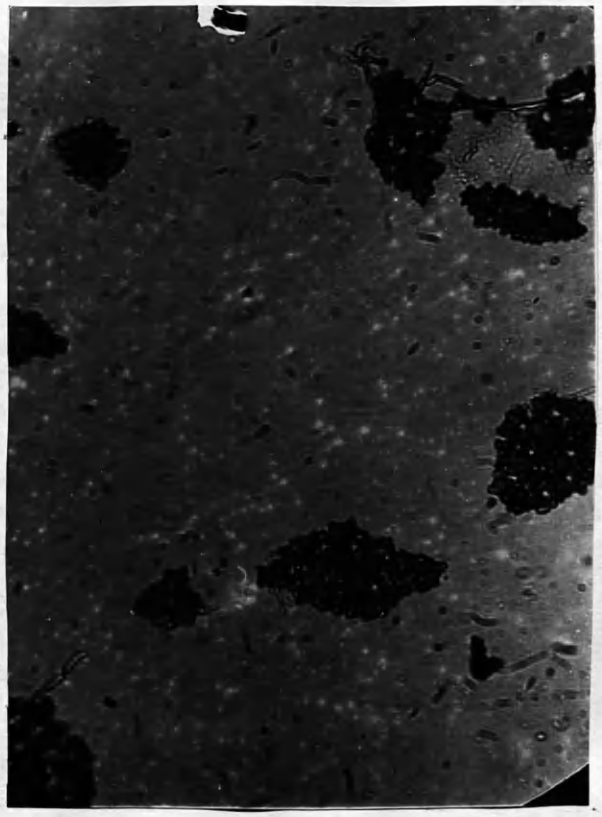

Fig. II (x 450)

Film of Culture from Vaginal Discharge.
(on ordinary agar)

(Case II. R. H.) Clumps of yeast-like bodies and mycelial threads are seen --- stained with methylene blue.

bodies, in places producing a delicate honeycomb appearance, (A), and here and there forming groups or chains along a branching mycelial thread. (B).
The appearances, under oil-immersion lens, shown diagrammatically, are as follows:

A.

B.

Culture on Beerwort agar (Bacto Wort Agar dehydrated-for cultivation of yeasts):
No growth appeared on Beerwort agar until seven days after incubation at 37°C. Then, a raised, large, irregular grey-white growth, nodular in form, appeared and it increased gradually in size. Smears taken from this culture showed numerous yeast-like bodies, varying in size and also in staining reaction, although most retained Gram's stain. Mycelia were not as abundant as in the fresh-drop or in the direct smear and stained better with methylene blue than with Gram's stain. (Fig. 111).

Treatment:
Feb. 8th., 1930:
Vaginal wall was painted with acetone and some of this was left in the vagina.
On the following day and on three further occasions, once daily, the vagina was douched with 1-500 Lactic acid.

Progress and Further Treatment:
On the second day after dismissal from hospital, menstruation commenced. As soon as this was finished, leucorrhoea returned just as profuse as before treatment and was very marked when I saw her fifteen days after she was discharged from the ward. I repeated a vaginal smear and also made cultures on ordinary agar and on Beerwort agar. These confirmed the findings reached about three weeks previously and detailed above.
Treatment had been carried out as in an ordinary case of vaginitis and before I had determined that a fungus infection was present: it was obvious that it had proved ineffective.
Acting on a suggestion, contained in a recent letter to me from Davis of Milwaukee, I commenced the treatment of this patient with Lugol's solution of iodine applied locally. Davis found that this, diluted 1 part in three parts of water, gave good results without local irritation in cases of yeast vaginitis and trichomonas vaginalis vaginitis. In Case 1, it had been used with very gratifying results.
I tried the undiluted Lugol's solution in the form of a vaginal douche, followe d by the instillation into the vagina of 20 c.cs. of it by means of a syringe and catheter.

Fig. III (x 450)

Film of Culture from Vaginal Discharge
(on beerwort)

(Case II.R. H.) No threads of the fungus are seen in the above field. The cells, however, are large and clearly defined.

After two daily instillations, it being found too irritating and painful, particularly to the inflamed and tender peri-vulvar skin in this case, it was thought advisable to use some other solution. Accordingly, I had the following solution made, based on a similar fungicide used frequently by dermatologists in a much more dilute form:

℞

Ac. Salicyl.	2%
Ac. Tannic.	1%
Sp. Vini Rect.	5oz.
Aqua ad	10 oz.

This was used as a douche, followed by 20 c.cs. being instilled, in the same manner as before, into the vagina and left there; the procedure was repeated daily for seven days. At this stage, with drawal of the vaginal contents after instillations (but no douching), revealed very little turbidity in the clear solution in the syringe. Four days later, the patient reported that the discharge was almost gone, and, with no further treatment, one month later there was no further complaint of leucorrhoea.

Comment:

This was a case of vaginitis due to infection with a fungus, yeast-like in its morphology, elongating into filaments, (15), septate mycelial threads and 'spore' formation, and probably, although not certainly, -- in the absence of clinical features of Thrush and non-investigation of its fermentative properties -- Monilia or Oidium Albicans. A 'scraping' of the perivulvar skin in Liquor Potass. was examined by Dr. Somerville, Assistant Dermatologist, Glasgow Victoria Infirmary, and he found a definite fungus infection of the skin, composed of numerous branching septate hyphae with 'spores' on the ends of some of the branches and with the general appearances of the order of fungi, Hyphomycetes.

CASE III

C. M., aged 22. Clerkess.

History of Complaint:

She complained of an excessive vaginal discharge of three years' duration, which was absent only for two - three days in every month. It necessitated her changing her underclothing almost daily but she did not wear sanitary pads, as she found them uncomfortable and irritating. During the six months prior to admission to hospital, discharge was constant and did not seem to be either improving or worsening. About one year after leucorrhoea commenced, she had been taking bottles of 'tonics' but these had made no appreciable difference to her symptom. Later,

later, she had been douching herself at irregular intervals but without more than temporary benefit.

General Condition:

Patient seemed in good general health and there was no suggestion of anaemia, the mucous membranes being well-coloured and the teeth and tonsils healthy. She stated, however, that for the preceding three years she had not felt really well and suffered from lack of energy and continual tiredness. She was very constipated.

Blood Examination:-

Haemoglobin 80%
No. of Red blood corpuscles per cub. mm. 4,960,000
No. of White blood corpuscles per cub. mm. 6,000

Wassermann reaction . . . . . negative.

Catheter specimen of urine:

In the fresh drop, no pus cells, no casts and no organisms were seen. Epithelial cells were present. In a smear from the centrifuged deposit, a few short Gram negative bacilli were found. A growth of Gram negative organisms of the coliform type and of Gram positive cocci was obtained on ordinary agar after 24 hours at 37 °C.

Findings under Anaesthesia:

External genitals normal: Hymen intact: the vagina contained a pool of pus, lying in a well-defined retro-cervical pouch or fossa. The vagina had a slight anatomical abnormality in the form of a 'constriction ring' about the junction of the middle and upper thirds of its extent and mainly affecting the posterior wall. The effect of this was to produce a 'pocket' or pouch behind the cervix and in this, discharge tended to accumulate. Cervix normal and apparently healthy: no discharge was apparent from it. The uterus and adnexae were normal.

Vaginal Secretion:

Reaction . . . . . neutral.
Fresh drop . . . . . numerous organisms but no Trichomonas Vaginalis.

Bacteriology:

Vaginal Smear . . . . . abundant coliform bacilli and staphylococci; no Bac. Vaginae.
Vaginal Culture . . . . . a pure growth obtained on ordinary agar of staphylococcus albus after 24 hours at 37 °C.
Cervical Smear . . . . . a few staphylococci.
Cervical Culture . . . . . a moderate growth was obtained on ordinary agar after 48 hours at 37 °C. and showed on examination staphylococci, coliform bacilli and a few short Gram positive bacilli.

Treatment:

Oct. 15th., 1929:

The cervix was dilated and three 'scrapings' of the uterine endometrium made with the curette for diagnostic purposes, but as the endometrium seemed normal, curettage was not proceeded with.

Progress and Further Treatment:

About one month after operation, she reported that discharge was not improved, despite rest and efficient purgation, and had returned within three days of dismissal from hospital.

She was re-admitted for further investigation and was examined, again, under gas and oxygen anaesthesia: the 'retro-cervical pouch' and vagina were cleansed and washed out with Acriflavine (1-2000in saline) and some of this solution was left in situ. Irrigation was carried out by means of a 20 c.c. syringe and a catheter (connected by rubber tubing) and the procedure repeated once daily for seven days. Carbolic lotion (1-20) was substituted for Acriflavine on two further occasions and the patient dismissed.

About one month later, she reported that the discharge was as 'profuse as ever' despite treatment, purgation, rest from work and close attention to general health and hygiene, and that it had reappeared on the day following her second dismissal from hospital. It was most profuse in the morning and still stained her underclothing yellowish. The only improvement noticed was that vulvar irritation had disappeared.

She was given Radiostoleum, one drachm twice daily, and reported fourteen days later. One was agreeably surprised to hear from her that discharge was definitely diminished and that this had been very noticeable during the pre-menstrual days when it had hitherto, been usually more profuse. Radiostoleum treatment was continued and one month later she stated that for fourteen days (while taking this preparation) discharge was negligible and that, during fourteen succeeding days, it was diminished. Treatment was continued with Radiostoleum until six ounces, in all, had been taken. Improvement was definite and was found to continue for several weeks after she ceased taking this preparation.

Comment:

Despite the fact that a vaginal abnormality, of slight degree, seemed to be predisposing in this case to accumulation of discharge, defective vaginal drainage and vaginitis, local treatment failed to remove or lessen the complaint. Radiostoleum, however, was associated with a very definite improvement but whether this will continue or be permanent, time alone will tell.

CASE IV

E. Mc.L., aged 21. Domestic Servant.

History of Complaint:

In March, 1928, she complained of a profuse, constant, yellowish discharge that had been present for about four months. It was sudden in its onset and was increased for several days before menstruation and by excitement. She had to wear sanitary towels and required to 'change one every second day'. The bowels were quite regular and at no time had there been dysuria. The 'periods' were regular, normal and painless.

She had had no treatment for her complaint.

General Condition:

The patient's general health was good, and she was well-nourished and of good colour. She stated that she felt tired more readily than hitherto.

Blood Examination:

Haemoglobin 90%

No. of Red blood corpuscles per cub. mm. . . . 4, 600, 000

No. of White blood corpuscles per cub. mm. . . . 6, 875

Wassermann reaction . . . . . negative.

Catheter specimen of urine:-

In the fresh drop, a few pus cells were seen. No organisms were found in the smear from the centrifuged deposit. A growth of staphylococcus albus was obtained on ordinary agar after 24 hours at 37 °C.

Findings under Anaesthesia: (first occasion)

External genitals normal: hymen present: vagina apparently healthy: cervix was the seat of an erosion: the uterus was a little below average size but otherwise normal as were the adnexa.

Treatment:

March, 31st., 1928:

Dilatation and curettage. The cervical erosion was deeply curetted and to it and to the cervical canal, iodized phenol was applied.

Progress:

After operation, leucorrhoea improved for about six weeks but did not disappear and was still yellowish. It then began to return as profuse as hitherto and necessitated her wearing pads. The general continued good and she changed the scene of her occupation to the coast. Despite this, the discharge did not improve and she was re-admitted to hospital almost two years after her first treatment.

Findings under Anaesthesia: (second occasion)

Vulva and vagina apparently healthy: no evidence of cervical erosion which had been present almost two years previously. Uterus small in bulk but uterine cavity enlarged ($3\frac{1}{2}$").

Vaginal Secretion:

Reaction . . . . . mildly acid.

Fresh drop . . . . . a profuse, septate, branching mycelium associated with yeast-like bodies was found. A micro-photograph was taken and is reproduced in Fig. IV.

Numerous organisms present but no Trichomonas vaginalis found.

Bacteriology:

Vaginal Smear . . . . . scanty staphylococci: no Bacilli Vaginae.

Vaginal Culture . . . . . a growth of staphylococcus albus was obtained on ordinary agar after 24 hours at 37 °C.

Fig. IV (x 450)

Fresh-Drop of Vaginal Discharge.

(Case IV. E. Mc.L.) The above shows a profuse, septate, branching mycelium, associated with yeast-like bodies.

Cervical Smear . . . . . no organisms seen.
Cervical Culture . . . . . no growth obtained on ordinary agar after 48 hours at 37°C.

Further Treatment:
March, 5th., 1930:
The cervix was fully dilated, the cervical canal cauterized longitudinally with the actual cautery along four lines, one in front of the canal, one posteriorly and one on each side; a small area around the external os was seared in a radiate manner.

Progress:
One month later there was little or no improvement.

Comment:
Two operative procedures were tried in this case and, at each time, before the very definite fungus, shown in Fig. IV, was found. Again, in this case, a growth of staphylococcus albus and of a coliform bacillus was obtained from an intra-uterine culture, and staphylococci found in a direct uterine smear. One can only theorize as to the relationship of the vaginal fungus infection to the intra-uterine bacterial infection, and as to which of them is productive of the leucorrhoea forming the complaint.

Surveying the case now, it is not surprising that the treatments employed failed, but unfortunately I have lost touch with this patient, temporarily at least, and have not been able to attempt some other method of treatment.

CASE V.

H. R., aged 21. Domestic Servant.

History of Complaint:
This patient first menstruated at the age of 17, her first two 'periods' being profuse and at three-monthly intervals. Similar intervals elapsed between succeeding ones, which became more and more scanty. In March, 1928, she had appendectomy performed and since then she has not menstruated. Since puberty, she was troubled with considerable leucorrhoea, which necessitated her wearing 'pads'. About every three weeks, white discharge became more profuse and was succeeded by pain in the right side of the abdomen and by backache for one to three days. Excitement seemed to have no effect on the profuseness of the discharge. Previous treatment had consisted of 'tonics' and of Hormotone (50) tablets but neither seemed to affect her leucorrhoea or amenorrhoea.

General Condition:
The patient was very stout and coarse-featured and her appearance alone strongly suggested that she was a case of endocrine imbalance. The mucous membranes were well-coloured; there was no history of dysuria and the bowels were regular.

Blood Examination:
Haemoglobin 92%
R. B. C. per cub. mm. . . . 4,960,000

W.B.C. per cub. mm. . . . . 3,125.
Wassermann reaction . . . . . negative.
Catheter specimen of urine:-
Smear and culture from the centrifuged deposit revealed it to be sterile.

Findings under Anaesthesia:
External genitals of normal developement: hymen present: vagina and cervix apparently healthy: uterus underdeveloped: Right ovary not palpable and left ovary small.

Vaginal Secretion:
Reaction . . . . . alkaline.
Fresh drop . . . . . a few organisms, abundant epithelial cells: no Trichomonas vaginalis.

Bacteriology:
Vaginal Smear . . . . . a few long Gram negative bacilli of coliform type and Gram positive cocci.
Vaginal Culture . . . . . a growth of coliform bacilli and of Gram positive cocci obtained in 24 hours.
Cervical Smear . . . . . no organisms.
Cervical Culture . . . . . no growth obtained on ordinary agar after 48 hours at 37°C.
Intra-uterine Smear . . . . . no organisms.
Intra-uterine Culture . . . . . no growth obtained on ordinary agar after 48 hours at 37°C.

Treatment:
30th., Jan., 1930:
Cervix dilated.

Progress:
Six weeks after operation, she reported that leucorrhoea had increased rather than diminished. Menstruation had not occurred. She was given 50 tablets of Ovacoids (Reed, Carnrick & Co.) and two were ordered to be taken twice daily. A fortnight later she wrote: "Discharge has now almost disappeared and I have, at present, a slight period. On the whole, I have felt better since taking the tablets".

Comment:
Gross irregularity of menstruation, followed by almost two years of amenorrhoea and profuse leucorrhoea, were associated in this patient. Her general features and appearance, too, were those associated with an endocrine imbalance, probably of ovarian or thyro-ovarian origin. Ovacoids were given, less in the belief that they contained any proved active ovarian hormone than as " a shot in the dark", and their success, even if it will be shown by time to have been but temporary, came rather as a surprise. Possibilities of coincidence, the neurotic and psychogenic elements and other factors cannot, of course, be overlooked in assessing the value of any treatment and especially so in that of gynaecological ailments.

CASE VI.

J. R., aged 29. Hairdresser.

History of Complaint:

There was a profuse, white discharge, thick in consistency and irritating, for about four and a half years. It gradually became worse and she was advised at the Out-Patient Department to enter hospital for treatment. This advice she did not take and the discharge persisted; it was increased by cold weather, by excitement and emotion. During two attacks of tonsillitis, leucorrhoea was aggravated. Menstruation was scanty and accompanied by moderate pain "in the left side and back". She stated that the discharge made her feel "miserable, lifelessand easily tired". Treatment had consisted of several 'bottles of tonics' and of douching, once or twice weekly, for about two years. She found douching very painful and it did not help her complaint.

General Condition:

She was of good general health and the mucous membranes were well-coloured. She was, however, somewhat neurotic and introspective.

Examination of Blood:

Haemoglobin 90%
R.B.C. per cub. mm. 5,600,000
W.B.C. per cub. mm. 5,312

Wassermann reaction. . . . . negative.

Catheter specimen of urine:-

No organisms found in smear or culture.

Findings under Anaesthesia:

Hymen intact: no signs of inflammation of vulva or vagina: circular erosion of cervix: uterus normal in size, shape and position: right adnexa normal: left ovary slightly enlarged but freely mobile.

Vaginal Secretion:

Reaction . . . . . neutral.
Fresh drop . . . . . abundant pus cells, a few organisms and epithelial scales: no Trichomonas vaginalis.

Bacteriology:

Vaginal Smear . . . . . staphylococci, coliform bacilli and a few Bac. Vaginae.
Vaginal Culture . . . . . a growth of staph. albus on ordinary agar after 24 hours at 37°C.
Cervical Smear . . . . . no organisms.
Cervical Culture . . . . . no growth after 48 hours(agar).
Intra-uterine Smear . . . . . no organisms.
Intra-uterine Culture . . . . . no growth on ordinary agar after 48 hours at 37°C.

Treatment:
Feb. 27th., 1930:
The cervix was fully dilated and the thermo-cautery applied in four longitudinal lines within the cervical canal, one anteriorly, and posteriorly and one on each side; the circular cervical erosion was seared in several lines radially.
Progress:
About five weeks after cauterization of the cervix, the patient reported that there had been no return of vaginal discharge.

CASE VII.

H. R., aged 23. Domestic Work.

History of Complaint:
In August, 1929, she complained of a profuse and irritating yellowish discharge which had been sudden in its onset, commenced about three years previously and had persisted. At no time were there any urinary symptoms and the bowels were regular. She also complained of profuse and frequent 'periods' of of three month's duration: hitherto, menstruation was normal, regular and continued for three days, but during the preceding three months, the 'periods' were occurring weekly and extending over five days and were painful. She stated that the discharge varied in quantity, being worse in the morning after rising from bed. She had to wear a sanitary towel continually. Past treatment consisted of 'medicines' and several spells of rest in bed, but no improvement was effected.
General Condition:
She was of good general health but somewhat neurotic.
Examination of Blood:
Haemoglobin 88%
R.B.C. per cub. mm. 5,600,000
W.B.C. per cub. mm. 8,333
Wassermann reaction . . . . . negative.
Catheter specimen of urine . . . . . no organisms found in smear or culture.
Findings under Anaesthesia: (first occasion).
External genitals normal: hymen intact: cervix healthy: uterus normal in size, position and mobility and adnexa normal.
Treatment:
August, 8th., 1929:
Dilatation and curettage -- no thickened endometrium.
Progress and Further Treatment:
Four months later, she reported that irregularity of menstruation had improved but that operation had had no effect on her leucorrhoea and that it had returned almost immediately on her leaving hospital.

She was given 50 tablets of Ovacoids and instructed to take one, thrice daily.

While taking them she stated, that there was a marked improvement in discharge; in her own words, "they made a great difference". However, she was given a further supply of Ovacoid tablets, but one week later, she reported that leucorrhoea was once again very profuse, despite the fact that she had continued taking the tablets. She was then re-admitted to hospital.

Findings under Anaesthesia: (second occasion).

The previous findings were confirmed. A minor degree of vaginal constriction, however, was noted about the level of the cervical external os and a shallow pool of sero-pus was observed lying in the retro-cervical pouch.

Vaginal Secretion:

Reaction . . . . . mildly acid.
Fresh drop . . . . . numerous epithelial cells and organisms: no Trichomonas vaginalis.

Bacteriology:

Vaginal Smear . . . . . staphylococci and coliform bacilli; abundant pus cells; no Bac. Vaginae seen.
Vaginal Culture . . . . . a profuse growth of staph. albus and coliform bacilli was obtained on agar after 24 hours at 37°C.
Cervical Smear . . . . . staph. and B. coli.
Cervical Culture . . . . . a growth of staph. albus and coliform bacilli was obtained on agar in 24 hours at 37°C.
Intra-uterine Smear . . . . . staph.
Intra-uterine Culture . . . . . a scanty growth of staph. albus in 48 hours.

Further Treatment:

March, 12th., 1930:

The cervix was fully dilated and the cervical canal cauterized with the thermo-cautery along four longitudinal lines, as described previously. A circular area around the external os was also cauterized.

Progress:

One month later, she reported that there was no improvement in the leucorrhoea.

Comment:

The result has been very unsatisfactory in this case but I am keeping in touch with her, hoping to try Radiostoleum treatment at some future date.

CASE VIII.

M. S., aged 17. Domestic Servant.

History of Complaint:

For four months prior to admission to hospital, she was troubled with a constant, profuse, white vaginal discharge. She had to wear 'pads', using about twelve per week. If she walked quickly, leucorrhoea increased and she had often to rest in the course of her work, in order to lessen temporarily the flow of discharge. Menstruation was normal and painless but during the preceding four months it had occurred at slightly shorter intervals than usually. Treatment had consisted of 'bottles' from her doctor and these had proved unavailing.

General Condition:

The patient was well-developed and well-nourished. The skin and mucous membranes were of good colour. She was not constipated and there was no dysuria.

Examination of Blood:

Haemoglobin 85%
R.B.C. per cub. mm. 4,000,000
W.B.C. per cub. mm. 8,120

Wassermann reaction . . . . . negative.

Catheter specimen of urine:-

No pus cells or organisms were found in the fresh drop: a smear and a culture from the centrifuged deposit were sterile.

Findings under Anaesthesia:

External genitals, hymen and vagina normal: cervix apparently healthy: uterus slightly soft and above normal size: appendages not palpable.

Vaginal Secretion:

Reaction . . . . . acid.
Fresh drop . . . . . many pus cells and organisms: no Trichomonas vaginalis.

Bacteriology:

Vaginal Smear . . . . . staph. and coliform bacilli.
Vaginal Culture . . . . . a growth of staph. albus, obtained on agar after 24 hours at 37 °C.
Cervical Smear . . . . . no organisms.
Cervical Culture . . . . . no growth obtained on agar after 48 hours at 37 °C.
Intra-uterine Smear . . . . . no organisms.
Intra-uterine Culture . . . . . no growth obtained on agar after 48 hours at 37 °C.

Treatment:

Jan. 10th., 1930:

Dilatation and curettage performed -- endometrium normal.

Progress:

Six weeks after operation, the patient reported that

leucorrhoea was not improved and had recurred immediately after her operation and persisted. She was then treated with Radiostoleum, one drachm twice daily, and for a fortnight, while taking this preparation, leucorrhoea appreciably diminished. However, during the following fortnight, when Radiostoleum was still continued, discharge reappeared just as profuse as before operation. On March, 18th., i.e. nine weeks after operation, she declared that her complaint was just as it was before operation.

Comment:

This case emphasised the inefficacy of dilatation and curettage in cases of this type, where no actual cause of leucorrhoea or site of enfection could be detected. The immediate return of discharge was very definite, as was the temporary but not maintained improvement with Radiostoleum.

CASE IX.

E. E., aged 30. Clerkess.

History of Complaint:

A profuse, malodorous, yellowish-white discharge was present for five years, more copious just before menstruation and when excited. It was less marked at the week-ends and when she was on holiday. Her clothes were soiled occasionally but she did not wear pads. She also complained of nervous symptoms, mainly of the nature of "queer sensations". Menstruation was normal and painless. She had various "bottles of medicine" from her medical attendant from time to time an d also had taken proprietary tonics. Almost all of these things helped the discharge. She had never douched.

General Condition:

The patient was in poor general condition, the complexion being pasty, pale and blotchy and the skin sallow. She was of a neurotic and hysterical type and very constipated, admitting that frequently five days elapsed between bowel evacuations. However, she had no dysmenorrhoea. There was frequnecy of micturition.

Examination of Blood:

Haemoglobin. 92%
R.B.C. per cub. mm. 3,300,000
W.B.C. per cub. mm. 14,100

Wassermann reaction ! ! ! ! ! negative.

Catheter specimen of urine:-

In the fresh drop, pus cells, a few epithelial cells and short bacilli were seen. In the smear from the centrifuged deposit, Gram negative short bacilli were found. Growths of Gram positive cocci in groups, staph. albus and of coliform bacilli were obtained on ordinary agar after 24 hours at 37 °C.

Findings under Anaesthesia:
No abnormality detected beyond a circular erosion of cervix; much serous discharge was seen issuing through external os.
Vaginal Secretion:
Reaction . . . . . acid.
Fresh drop . . . . . many organisms and epithelial cells: no Trichomonas vaginalis.
Bacteriology:
Vaginal Smear . . . . . coliform bacilli.
Vaginal Culture . . . . . a very scanty growth of coliform bacilli was obtained on agar after 24 hours at 37°C.
Cervical Smear . . . . . no organisms.
Cervical Culture . . . . . no growth obtained on agar after 48 hours at 37°C.
Treatment:
Nov. 29th., 1929:
Nil -- Examined under anaesthesia.
Progress:
She was instructed to take a prescribed purgative mixture regularly and to get as much exercise and fresh air as possible. Two months after examination, she reported that leucorrhoea was almost gone and was less than it had been for five years. The bowels were now more regular, she was taking malt extract and various 'tonics' and considered herself cured.
Comment:
A close study of the history and features of this case showed one that it was of the type (reviewed in an earlier part of this work) met with mainly in women of thirty years of age and over. In the absence of any gross pelvic pathology, the condition, as described before, clears up with general treatment and no form of operative interference is called for. The lengthy duration of the discharge is to be noted.

CASE 10.

B. S., aged 38. Salesgirl.

History of Complaint:
A white vaginal discharge was present for about one year but not sufficiently profuse to necessitate her wearing 'pads'. It was increased with exertion and just before the 'period' and diminished at week-ends and during holidays. Menstruation was normal and painless. She was also troubled with a "lump in the left groin", present for nine years. This was found to be a femoral hernia and, as it was beginning to cause pain, the patient was admitted to hospital on Nov. 16th., 1929. Previous treatment for her leucorrhoea consisted of purgation and douching and, while the discharge lessened a little, she thought that the douching was unsatisfactory andof little value.

General Condition:

She was of normal build and of quite good colour. There was no evidence of anaemia or of indifferent health. She was troubled with indigestion, sickness and very severe constipation, admitting that frequently one week elapsed between evacuations of the bowel. There was no dysmenorrhoea, however,.

Examination of Blood:

Haemoglobin 94%
R.B.C. per cub. mm. 4,496,000
W.B.C. per cub. mm. 3,125

Wassermann reaction . . . . . negative.

Catheter specimen of urine:-

In the fresh drop, no pus cells were seen, but short motile bacilli were found. In the smear from the centrifuged deposit, short Gram negative bacilli and a few Gram positive cocci were found. Growths of Gram negative coliform bacilli and of staph. albus were obtained on ordinary agar after 24 hours at 37°C.

Findings under Anaesthesia:

Hymen intact: no abnormality detected in pelvis.

Vaginal Secretion:

Reaction . . . . . neutral.
Fresh drop . . . . . organisms present; no Trichomonas vaginalis.

Bacteriology:

Vaginal Smear . . . . . coliform bacilli.
Vaginal Culture . . . . . a growth of coliform bacilli was obtained on agar after 24 hours at 37°C.

Treatment:

Nov. 18th., 1929:

Nil -- Examined under anaesthesia.
(Had operation for Femoral Hernia.)

Progress:

Four months after operation, she reported that she felt in excellent health and that there had been no leucorrhoea since she left hospital.

BACTERIOLOGY. (including Trichomonas Vaginalis & Fungus Infection)

Eden and Lockyer (16) state that for the first 24 hours of life the vagina is said to be sterile but that by the third day it always contains micro-organisms, these including staphylococci and streptococci. The vagina, therefore, even in a young virgin is not sterile. The upper part of the vagina is believed to contain, normally, the bacillus vaginae or bacillus of Doderlein, which is a large Gram positive, non-motile organism and does not grow on the ordinary culture media. Barris (loc. cit.) quotes Winter, Stroganoff and Menge as having shown that bacteria are not normally found above the external os of the cervix.

Roques (17) states that vaginal films or cultures are of little value in the adult except possibly in virginal vaginae and that in all cases of purulent vaginal discharge the material to be examined must be taken from the interior of the cervical canal.

In the ten cases which I have described in detail, I endeavoured to make as full a bacteriological study as possible but in some of them the cervix was not dilated and so no intra-uterine smear was obtained. Care in taking the latter must be observed to avoid contamination and the method employed was that of passing a sterile swab ('throat-swab') through a hollow, glass cervical dilator, specially made. In all of thes cases, vaginal smear or culture showed organisms; out of 8 cases, 6 were sterile on cervical smear or culture; 4 intra-uterine smears and cultures revealed organisms in 2 cases; the bacillus vaginae was found in 2 cases only. The urine in four cases out of nine showed organisms either on smear or on culture.

The bacteriological findings are summarized below:-

Case No.	Vagina.	Cervix.	Uterus.	Bac. Vag.	Urine.
1	staph.+ strept.	Sterile	-	Nil	Sterile.
11	Fungus+coliform.	-	-	+	-
111	Staph.+coliform	Staph.+ coliform	-	Nil	Staph.+coliform
1V	Fungus+staph.	Sterile	Staph.+ coliform	Nil	Staph.
V	Staph.+coliform	Sterile	Sterile	Nil	Sterile
Vl	Staph.+coliform	"	"	+	"
Vll	Staph.+coliform	Staph.+ coliform	Staph.	Nil	"
Vlll	Staph.+coliform	Sterile	Sterile	Nil	"
1X	Coliform	"	-	Nil	Staph.+coliform
X	"	-	-	Nil	" + "

The bacteriology of the vagina was also studied in 7 out-patients, who had previously received treatment but who still complained of leucorrhoea. Vaginal culture was negative in four of these cases;

two cases showed both staphylococcus albus and coliform bac. and the remaining one had coliform bac. only.

As control cases, four virgins who had no complaint of leucorrhoea were investigated. In two of them, cervical and uterine cultures were found to be sterile. Vaginal cultures were obtained in all, three showing staph. albus and coliform bac. and one showing staph. albus alone. The bacillus vaginae was very profuse in two of the cases.

I examined the fresh vaginal secretion (diluted in normal saline) in 19 cases of profuse leucorrhoea in virgins but failed to find the Trichomonas Vaginalis in any. Davis (18) states that this flagelleted parasite is relatively a common cause of persistent abnormal vaginal discharge and, in fact, that a persistent profuse, yellow or white discharge which causes a marked irritation of the vagina and external genitalia is usually due to it. Davis, according to my information received from him, in a period of 22 months has diagnosed Trichomonas Vaginalis vaginitis in 73 patients, 16 of whom were unmarried nulliparae and 4 of whom he thought were "relatively certain virgins". In 4 of his 73 patients a yeast infection was found with the Trichomonas; two had a typical Thrush and the other two had the round- celled type of yeast.

I have described earlier, two cases of yeast infection of the vagina and have shown by photographs, the appearances of the fresh drop and stained preparations. It is very probable that fungus infections of the vagina, either of a typical Thrush form or otherwise are commoner in virgins than is generally supposed.

OBSERVATIONS ON ETIOLOGY.

It cannot be too strongly emphasised that leucorrhoea is but a symptom, and an objective expression of some abnormality, which, in the parous woman, is generally easily appreciated, but in the virgin is often difficult to determine. Many causes may produce or be associated with this symptom in virgins and, while so very frequently no abnormality is detected under anaesthesia, the rarer possible causes, such as carcinoma, simple adenoma and others which have been mentioned, must not be overlooked.

Anaemia, constipation and tuberculosis have been, sometimes, held responsible for leucorrhoea in virgins. It is quite probable that these factors are of importance in producing mild or moderate degrees of this condition but they are of little or no importance in the production of the profuse, constant type of leucorrhoea that has been under study. A large series of cases shows that constipation is present in 50% of them: effective treatment of this has little or no effect on the progress of the discharge. Concerning tuberculosis, one has encountered in a review of cases extending over 25 years, only 3 cases of this nature, two of them having either pelvic or general tuberculosis and one having a perineal abcess opening into the vagina. Enquiry into the records of a large sanatorium provides corroborative evidence in that

that vaginal discharge is not a recorded feature in cases of virgins suffering from tuberculosis. Tuberculosis of the cervix uteri is very rare and fewer than twenty primary cases have been reported (19).

Examination of the blood, in almost all cases, reveals no diminution in haemoglobin or red cells. Even profound anaemias, such as chlorosis, pernicious anaemia and purpura, when they occur in young virgins, are not usually associated with this symptom.

The role of the so-called congenital erosion in the production of leucorrhoea is a matter of much question. It is usually regarded as a persistence of a foetal condition, but Bailey (20) has found inflammatory changes. In the course of reviewing a large number of cases in hospital, I have collected the 'notes' of 14 unmarried nulliparae in whom a "congenital erosion" of the cervix was found and in whom leucorrhoea was not present. The particulars recorded are very briefly as follows:-

J. K., aged 24. Complaint - pain over left iliac region.
Circular erosion of cervix.
H. C., aged 26. Velvety erosion around external os.
M. H., aged 25. Complaint - sickness and menorrhagia.
Cervix showed a well-marked erosion.
M. F., aged 21. Complaint - Dysmenorrhoea.
Cervix large and eroded.
L. M., aged 36. Hymen intact, cervix eroded posteriorly.
A. A., aged ?. Complaint - Dysmenorrhoea.
Diagnosis - endometritis and erosion of cervix.
M. C., aged 22. Complaint - dysmenorrhoea.
Slight erosion on cervix.
C. D., aged 26. Complaint - dysmenorrhoea.
Erosion of cervix.
H. H., aged 23. Complaint - dysmenorrhoea.
External os surrounded by a ring of erosion.
M. C., aged 22. Complaint - dysmenorrhoea.
Retroflexion: lips of cervix eroded.
J. I., aged 20. Complaint - dysmenorrhoea.
Uterus acutely anteflexed: congenital erosion.
A. T., aged 20. Complaint - painful periods.
Cervix extensively eroded.
E. Mc E. aged 20 Complaint - irregular and frequent periods.
Small erosion of cervix.
I. G., aged ?. Pain in right side.
Diagnosis - appendicitis and erosion.

These cases emphasise the fact that an erosion of the cervix is not necessarily productive of vaginal discharge and that it does not follow that in a case of virginal leucorrhoea, treatment

of an erosion is treatment of the source of the discharge. One has encountered cases in which, after excision of an erosion, leucorrhœa is as profuse as before, and also instances where improvement or cure has been effected but examination of the cervix shows it still to have an erosion.

There is no doubt that leucorrhoea is encountered in young women suffering from endocrine derangement: in them, usually, discharge is not constantly profuse and there is frequently an associated complaint of pain or of marked irregularity of menstruation.

Infection of the vagina only, by bacteria or fungi is an important cause.

In those cases in which no abnormality is detected, observations and bacteriological findings make one sceptical as to the presence of infection either of the cervix or of the body of the uterus. Curtis, in a recent letter, states that he considers infection of minor importance in these cases. "The trouble begins with an emotional increase in the gland secretion followed by maceration of the tissues and resultant hyperplasia of the glands. A vicious circle is thus established with the result that there is continuous out-pouring of secretion".

SOME CONSIDERATIONS ON TREATMENT.

On a thorough and methodical examination of the case, treatment should rest. The condition is a very distressing one to the patient, and particularly so, after various treatments and one or more operations have failed to give her relief. It is no more rational to curette the uterus in every case of this condition than to do the same operation in every case of uterine haemorrhage, irrespective of its cause. Bacteriological examination of the urine should be carried out in every case, for urinary infections are frequently present and require treatment. Vaginal, cervical and uterine cultures (where practicable) should be taken under anaesthesia and the patient carefully examined. Examination of the vaginal fresh secretion, diluted with normal saline, should be made.

When Trichomonas Vaginalis or yeast vaginitis is diagnosed, treatment with Lugol's iodine (one in three parts of water) should be tried. In other cases, in the absence of gross causative factors, Radiostoleum may be tried. Radiostoleum (British Drug Houses) is a solution of vitamin D and a concentrate of vitamin A. In several of my cases, but not in all it was associated with a distinct improvement of leucorrhoea.

It occurred to me to use this preparation after reading a report by Mellanby (21); he showed that a definite increase in resistance to infection is given by intensive vitamin A therapy. ~~Bow~~ Bauer (22), however, used Vigantol, which is a pure vitamin D (irradiated ergosterol) in 10 cases of leucorrhoea in young girls and virgins: 6 were cured, 1 improved and 3 unimproved. While he states that the condition is not necessarily due to vitamin deficiency, he attributes importance

to the nature of the food for its origin and for its treatment.

If it is thought that the cervix is the source of a profuse discharge, cauterization, preferably with the electric cautery, should be employed.

Indiscriminate or haphazard treatment such as the routine use of dilatation and curettage of the uterus is to be deprecated as an attempt to cure leucorrhoea in the virgin.

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REFERENCES.

1. Glaister, J.: Medical Jurisprudence and Toxicology, Edinburgh, 1910, 445.
2. Barris, J.: Brit. Med. Journ., 1929, Oct. 12, 658.
3. Munro Kerr, J. M.: Clinical & Operative Gynaecology, London, 1922, 90.
4. Davis, C. H.: Amer. Journ. Obst. & Gyn., 1929, XVIII, 2, 196-203.
5. Watson, B. P.: Eden & Lockyer New System of Gynaecology, London, 1917, II, 105.
6. Eden & Lockyer: Gynaecology, third edition, London.
7. Strachan, G. I.: Brit. Med. Journ., 1929, Oct. 12, 659.
8. Curtis, A. H.: Surg., Gyn., Obst., 1923, XXXVII, 657.
9. Curtis, A. H.: Surg., Gyn., Obst., 1928, XXVI, 178.
10. Munro Kerr, J. M.: loc. cit., 245.
11. Schauffler, G. C.: Amer. Journ. Dis. Child., 1927, XXXIV, 646.
12. Payne, F. L.: Amer. Journ. Obst. & Gyn., 1929, XVII, 841-847.
13. Burns, J. W.: Journ. Obst. & Gyn. Brit. Emp., 1922, XXIX, 619.
14. Young, J.: Brit. Med. Journ. 1930, March 29, 578.
15. Mackie, & Mc.Cartney: An Introduction to Practical Bacteriology, Edinburgh, 1928, 347-348.
16. Eden & Lockyer: Gynaecology, second edition, London, 236.
17. Roques, F.: The Lancet, 1929, II, 890-892.
18. Davis, C. H.: Wiscons. Med. Journ. XXVIII, 6, 249.
19. Douglass & Ridlon: Brit. Med. Journ., 1929, June 29, 112. (abstract).
20. Bailey, K. V.: Brit. Med. Journ., 1929, 1, 767. (abstract)!
21. Mellanby, E.: Brit. Med. Journ., 1929, June 1, 984.
22. Bauer, A. W.: Munch. med. Wschr., 1929, 1, 962.