

A CLINICAL REPORT

on

A FORM OF LEUCORRHOEA FOUND IN RELATION TO

CERTAIN RHEUMATIC STATES.

Thesis submitted for the

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by

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I

This brief clinical investigation originated in an auxiliary treatment centre run by the Swansea Corporation in connection with its Maternity and Child Welfare Department. To this centre are referred for examination and treatment all women attending the ante-natal and post-natal clinics who are found to be suffering from vaginal discharges, vulvar sores or genito-urinary infection. Here also as a routine ante-natal patients come in order to have blood taken for Wassermann tests. Those found to have a positive reaction receive treatment at the centre. From the infant clinics come babies with ophthalmia or little girls suffering from vulvo-vaginitis. Some school children are also treated, viz., cases of vulvo-vaginitis and of congenital syphilis. On the whole it is a working-class clientèle, of which in such a distressed area a high proportion exists on unemployment benefit, under the Means Test or on public assistance. The very lowest orders of society do not avail themselves of the clinic facilities; on the other hand a fairly large sprinkling of the cases are of the middle-class.

Nearly 600 new cases report to the Auxiliary

Centre each year. For instance in 1935 there were 571 new cases, of which 21 were diagnosed as syphilis, 69 gonorrhoea, and 481 conditions other than venereal. The total attendances in 1935 were 8,605. (These figures do not include the routine blood-tests on ante-natal patients.)

Among these non-venereal cases were some hundreds of women who had leucorrhoea as a symptom. Some were pregnant; many were not. In an attempt to obtain an exact diagnosis some interesting points emerged. For instance the proportion of all adult cases of leucorrhoea which proved to be gonococcal in origin was surprisingly low,¹ (38 out of 222 in 1935, i.e. 17%). What then were the causes underlying the vast majority of these cases of leucorrhoea? In endeavouring to find an answer to this question one was surprised by the duration of the discharges in many cases. Numbers of these patients stated that the discharge had arisen at puberty or even sooner. Cases giving such a history began to accumulate and among them there seemed to be so many with rheumatic complaints that it was decided to investigate these cases separately, with particular reference to rheumatism. In a

1. This is lower than Von Schaick's figure: he examined 65 married women complaining of leucorrhoea and found the gonococcus in 17, i.e. 26% (N.Y. Med. Journal. 30.X.97.)

period of about eighteen months all the cases in which a history of such adolescent leucorrhoea was given were collected, amounting to 82 in number, and these formed the basis of the investigation.

At the same time it was recognised that the incidence of rheumatism is extremely high in Glamorganshire. The large proportion of rheumatic cases among these 82 might simply represent the proportion of rheumatic cases in the local population generally. So a control series was made. These were taken from among the patients reporting at the ante-natal and post-natal clinics, without selection, in sequence as they appeared at those clinics. Such controls were roughly of an age with the cases chosen at the Auxiliary Clinic, and drawn from the same section of the population. In them no bacteriological examinations were made, as they were intended to be controls for incidence figures only. In any case, fuller investigation of these ante-natal and post-natal cases was impracticable.

While a very few of the selected cases might be termed adolescents the vast majority were in the 3rd and 4th decades of life. This was a satisfactory group to investigate for rheumatism, past or present, but any examination of the genito-urinary condition was complicated by the various results of marriage and child-bearing. It seemed

hopeless to try to distinguish causes and effects of a leucorrhoea that had first appeared 5 or 10 years or more before the examination. For this reason it was thought advisable to collect a parallel series of all the school-girls of eleven years or over who had been referred to the Auxiliary Clinic on account of leucorrhoea within the same period as the selected adult cases. These - 10 in all - were investigated clinically and bacteriologically, but no control series was made for them as the number was so small.

For convenience the 32 selected cases will be called Group A, the school-girls (10) as Group B, and the 32 controls Group C.

A preliminary survey of the clinical material showed plainly that rheumatic ailments were more common in Group A than in the controls, and immediately the possibility of focal sepsis suggested itself as the connecting link between the leucorrhoea and the rheumatism. It might be shown that as in gonorrhoea the genito-urinary infection predisposed to or produced the rheumatic condition. Was gonorrhoea itself the clue? The question was soon answered in the negative by reference to the cases in Group B: 9 out of the 10 were clinically and bacteriologically non-gonococcal. It seemed evident that in most of the cases examined primary genito-urinary infection was not the

cause of the rheumatic condition. In fact it appeared more likely that the rheumatic process preceded or predisposed to the leucorrhoea. If one can draw any conclusion from such an investigation as this it is that leucorrhoea arising about puberty or in adolescence is a symptom pointing to the existence of some "diathesis" or disease-process particularly rheumatism in one form or another. It is further suggested that the primary cause may be an infection in some part of the body especially the throat. Secondary infection of the genito-urinary tract may occur, but the symptomatic leucorrhoea in question is most probably in the first instance due to a mild toxæmia.

II

DEFINITIONS.

The word rheumatism is used in so many different connections and with such varied meanings that it has in certain quarters fallen into disrepute. While "acute rheumatism" retains its special significance as a clinical entity the term "chronic rheumatism" in the words of one authority¹ "conveys no exact meaning and would be better abolished". However a body of experts² appointed to deal with the subject has given the opinion that the time is "scarcely ripe for abolishing the term 'rheumatism' altogether." They suggest the following grouping of the rheumatic diseases:

Group 1. Rheumatic Fever, Acute or Subacute.

Group 2. Acute Gout.

Group 3. Chronic Arthritis. A. Rheumatoid Type.

- (a) Known aetiology.
- (b) Unknown aetiology.

B. Osteo-arthritic Type.

- (a) Known aetiology.
- (b) Unknown aetiology.

Group 4. Non-articular Rheumatic Affections.

Within the last thirty or forty years the concentration of clinical study on rheumatic fever or acute rheumatism has tended to divorce it from so-called chronic rheumatism. But the latest expressions of opinion show a "re-awakened interest in the possibility of a close relationship between acute rheumatism and the various forms of chronic arthritis and fibrositis".³ From the time of Aschoff's demonstration of the nodules in the cardiac muscle characteristic of acute rheumatic disease many workers have added evidence of the presence of similar lesions in other tissues and other rheumatic diseases. (Dawson & Boot. Fraser. Hadfield. Poynton & Paine. Still) The patient intensive work of Klinge⁴ and his assistants proved that a similar histological basis underlies chronic rheumatic conditions. Klinge concludes that "in the whole body everything points to a morphological rheumatic state". There is considerable justification therefore for the use of the word "rheumatism" as including all those painful affections of the joints, muscles and connective tissues embraced in the groups noted above.

For the present purpose it is necessary to consider Group 1 in further detail: "Rheumatic Fever, Acute or Subacute". Rheumatic fever has been defined as "an acute, specific disease

characterised by fever, arthritis and a special tendency to endocarditis or carditis"⁵. This description does not include several other manifestations generally accepted as part of the same disease-process, namely chorea, "growing pains", subcutaneous nodules and sore throats. Any one of these may be the only symptom in a particular case, or they may all occur in the same case. It would be convenient to have a concise term that would fully express the idea of this syndrome, but that seems unattainable until the underlying causes are better understood. The words "rheumatism" and "rheumatic" will therefore have to be used here not only to refer to Groups 2, 3 and 4 above but also in connection with rheumatic fever, rheumatic carditis, chorea, "growing-pains", subcutaneous nodules and sore throats. The last-mentioned is included in spite of some dissenting opinion (e.g. Kersley⁶). Certainly many sufferers from tonsillitis never develop any sign of rheumatism, but the coincidence of sore throats with attacks of rheumatism in predisposed persons, and the beneficial effects following treatment directed at the throat seem to support the idea of a "rheumatic" sore throat. Indeed there are many who regard the throat as the sole seat of the initial infection which eventually produces all the major manifestations of rheumatism.

Similarly not all "growing-pains" are rheumatic. (An investigation⁷ among London school-children showed that out of 92 children with normal hearts who complained of limb-pains or choreiform movements 11 had orthopaedic defects which could account for their symptoms.) But that in many cases they are truly an indication of the rheumatic process is a well-established fact. An American worker (Coborn) found that 50% of his rheumatic cases gave a history of muscular growing pains.

In the present survey sore throats or growing-pains by themselves were not regarded as rheumatic. But if other rheumatic signs or symptoms were found in association with either, or if the two were present in the same case, a diagnosis of rheumatism was made, following the view of a well-known authority.⁵

CLINICAL FEATURES.

One or two accepted clinical facts may be noted.

(a) Age of Onset.

In early childhood rheumatism reveals itself chiefly in a subacute or insidious form - as "growing-pains" or transient slight swellings of joints or recurrent sore throats; even carditis may develop without any indication of its advance at all. Chorea most commonly appears from the age of

seven to puberty. The maximum incidence of acute rheumatism or rheumatic fever is among adolescents and young adults: an initial attack rarely occurs after the age of thirty. Other forms of rheumatism belong mostly to later adult life - the rheumatoid type of arthritis mainly to the third and fourth decades, the osteo-arthritic type to the fourth and fifth.

It is impossible to dogmatise. Those with long experience acknowledge that the acute manifestations of acute rheumatism are disappearing.⁸ At the same time chronic rheumatism is attacking a younger section of the population than formerly.

(b) Familial incidence.

This is surer ground. It is agreed that among the members of certain families rheumatism occurs with striking frequency. This is especially noticeable with regard to the group comprising rheumatic fever, carditis and chorea. (c.f. Ministry of Health Report 1924. 62% of females and 40% of males suffering from acute or subacute rheumatism gave a family history of rheumatism.) Rheumatoid arthritis and gout also show this tendency particularly.

(c) The presence of toxæmia.

In many cases of rheumatism there are clinical signs which are characteristic of a

toxaemic condition, e.g. fever, loss of weight, sweating, skin rashes, anaemia and a raised blood sedimentation-rate. Cases of rheumatic fever demonstrate all these points and cases of rheumatoid arthritis many of them. These features are at least sufficiently clear to be useful as guides in treatment.

THE CAUSATION OF RHEUMATISM.

This has occupied much attention for years and is still the subject of intensive research. At the present time the main question seems to be "Is it an infection?" And if so, can any particular organism be incriminated? Freeman is impressed by the number of infective conditions which have "rheumatic pains or rheumatic changes of structure as a prominent or at least as an occasional feature".² (Compare also the views of Timbrell Fisher: Chronic Non-Tubercular Arthritis. 1929) He points out that if gonorrhoea, for example, "were not such a well-marked clinical entity that our attention must constantly be focused on it the resulting arthritis would just be called rheumatism". In the same way the typhoid and paratyphoid bacilli, the dysentery bacillus, the tubercle bacillus, the spirochaeta pallida, to name only a few, are organisms whose activity may result in

clinical appearances closely similar to "rheumatism" apparently not due to any of these causes. The majority of all cases of rheumatism are not yet satisfactorily proved to be due to any one particular organism. The streptococci especially have received a great deal of attention and have been demonstrated as the cause of chronic rheumatism on clinical⁹ and pathological^{10,11,12} grounds.

Attempts to confirm some of this work have not been entirely successful. Fox and Van Breemen state the broad view: "If we wish to offer no violence to clinical observation we must assume that infective foci of different origins (tubercle bacillus, gonococcus, diplococcus) and probably auto-intoxications too, may all, in special circumstances, be the provoking stimulus of a non-purulent arthritis."¹³

(a) "Infective Foci."

"The concept of the production of disease by a localized area of infected tissue" is so well-established and so popular that emphasis is unnecessary. The teeth, the tonsils, the nasal sinuses, the appendix, the gall-bladder, the intestines, have in turn been shown to be commonly the seat of infections - acute or chronic - which have produced disease in distant parts of the body. In fact there is scarcely an organ or tissue which has not in one

case or another been suspected of, or proved to be, harbouring an infective focus. In this connection the genito-urinary tract has scarcely received the attention and investigation it deserves. In women, in particular, the existence of chronic pelvic disease is apt to go unrecognised. Many women accept their complaints as natural evils incident to marriage and child-bearing, and unless their symptoms become acute or distressing they fail to seek advice. Young¹⁴ gives an opinion that in this country twenty to thirty thousand women each year suffer from non-fatal pelvic infections as a result of parturition. Statham¹⁵ estimates that about 30% of parous women have some degree of pathological vaginal discharge. If small periapical dental abscesses can give rise to severe and chronic illness, how important it is to investigate the equally common and more extensive infections of the genito-urinary tract.

From the focus the infection may spread via the blood or the lymph, or both. In some conditions, e.g. gonococcal arthritis, the organisms themselves travel thus to their distant nidus where they settle and multiply. In others only the products of bacterial growth are carried in this way, and the resulting lesion is presumably of a toxic nature.

(b) Allergy and Diathesis.

The theory of infection by itself leaves several problems unexplained. Why does one sufferer from focal sepsis develop a secondary lesion while another does not? And why is one organ or tissue singled out for attack more than another? Either the bacteria themselves must be capable of varying their behaviour or the tissues must vary in their response. The former hypothesis, though not without some experimental support¹⁶ seems to lead one deeper into the depths of the wood. The latter brings into view the vistas of allergy and diathesis.

i. Allergy. The joint swellings seen in serum-disease no doubt helped to focus attention on sensitisation as a possible factor in the causation of arthritis and other forms of rheumatism.^{17,18} Though a good deal of experimental work has been produced, particularly in America, English writers find the proof insufficient and the theory not "helpful". (Freeman)

ii. Diathesis. The conception of a "constitutional anomaly" or "hereditary diathesis" in rheumatism has long been held, especially by Continental authorities. In this country Llewellyn¹⁹ has stated it well: "the rheumatic diathesis is an inborn morbid 'potentiality' which may or may not eventuate in concrete rheumatism, which it pre-exists."

The evidences of this diathesis are easier to find than its cause and nature, but some relate it to endocrine imbalance.²⁰ An investigation by Payne²¹ into the acid metabolism in rheumatic children gave support to the theory of an "acid diathesis" in the rheumatic state. (This falls into line with the principles of fatigue and pain in rheumatic subjects emphasised by Fox and Van Breemen.)¹³ The action of an altered metabolism in the production of rheumatic lesions is seen classically in the case of gout, but the precise causal relationship between this and other forms of rheumatism has not been established.

(c) Disturbances in the circulation of the skin.

These are held by many^{12,13} to be decisive in the production of rheumatism, provided the factors of infection and predisposition (or constitutional anomaly) are present. These, in the form of capillary spasm or actual vascular changes, have not been experimentally investigated to the fullest extent, but the benefit from treatment by physiotherapeutic methods on this basis lend great support to the view.

(d) Other causes.

The effects of climate, housing and occupation (with particular reference to cold and damp) have clearly something to do with the production

of rheumatism. Trauma may also be noted. The subject of the nutritional state, which is the object of so much attention, is likely to be seized upon as ground for the digging up of some rheumatic bones. For all of these a passing reference must suffice.

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III

DEFINITION.

Leucorrhoea may be regarded as any abnormal or excessive discharge (other than blood) issuing from the vulva. To define the amount of what is "abnormal" or "excessive" is difficult, as it varies from one patient to another. A useful standard, however, is set by Sharman:¹ "that degree of vaginal discharge . . . considered by the patient as an appreciable departure from her normal state".

SOURCES OF LEUCORRHOEA.

These are in the adult the vulva (with the urethra, para-urethral ducts and Bartholinian glands), the vagina, the cervix uteri, the corpus uteri and the Fallopian tubes. Most commonly the profuse discharges come from the vagina or cervix. Discharges from the body of the uterus are unusual except in puerperal infections and certain tumour-growths. Leucorrhoeas arising in the Fallopian tubes are even more rare.

In the child prior to puberty the sources of abnormal discharge are the vulva (including the urethra), the vagina and the cervix, approximately in that order of frequency.

ANATOMY AND PHYSIOLOGY OF THE FEMALE GENITAL TRACT.

To understand the pathology underlying a symptom which has a variety of causes one may review some features of the normal anatomy and physiology of the femal genital tract.

In the infant the epithelium covering the vulva and vagina is more or less cubical. During the first few weeks of life its cells contain glycogen, which undergoes fermentation, with the result that from the third or fourth day the vaginal secretion becomes highly acid and hostile to all bacteria except Döderlein's bacilli.

From the second month until puberty the glycogen is absent and the tender epithelium is therefore more exposed to infection. Vulvitis and vaginitis at this age would certainly be more common were it not for the fact that in this area there are practically no glands and the surfaces are relatively dry. The cervix acts as a barrier between the lower and the upper parts of the genital tract, and the uterus and tubes lie undisturbed.

At puberty the glycogen suddenly reappears in the vaginal epithelium, which gradually becomes stratified and squamous in type. The vulvar covering undergoes a similar change, becoming somewhat cornified as well. The urethra, the Skene's ducts and the Bartholinian glands and ducts with their columnar epithelial linings are then the most

favourable areas for bacterial invasion and growth. The onset of menstruation, and later the traumas accompanying parturition render the uterus and tubes more vulnerable than before. Here the cervix holds the key-position. The squamous covering of the portio does not readily succumb to attack, but if it is deficient, as, for example, in congenital erosion, a susceptible tissue presents itself. The deep compound racemose glands of the endocervix in health secrete a thick tenacious mucus which effectually plugs the external os. (This is well seen during pregnancy.) This secretion is, however, alkaline and in some cases excessive in amount. The virgin uterus, protected from below, subject to periodic contractions and lined with a columnar ciliated membrane which is regularly destroyed and renewed does not sustain great risk of trauma or infection. The parturient or puerperal uterus, however, is exposed to both. In structure the Fallopian tubes have no advantages over the uterus. They also have a columnar-celled ciliated mucous membrane, but the latter is thrown into complicated folds and does not undergo cyclical regeneration like the endometrium. Moreover the tubes are freely open above into the peritoneal cavity and below into the uterus. The right tube may lie in close contact with the appendix. Lastly the ovaries,

though remote from most ascending infections are composed of highly specialised tissue, the function of which is readily influenced by substances circulating in the blood-stream. Their internal secretions are involved in the complicated endocrine system which controls growth, development and metabolism, and they also exercise particular local action upon the rest of the genital apparatus.

This is exemplified at the menopause when the ovaries undergo a gradual atrophic change, the cellular elements being replaced by fibrous tissue. The labia shrink; the vaginal secretion loses its bactericidal properties, the menstrual changes in the senescent uterus cease.

CAUSES OF LEUCORRHOEA.

These may be (1) general,
or (2) local.

(1) General causes.

General causes include fatigue^{2,5}, malnutrition^{3,5} and hypovitaminosis, calcium deficiency⁴, hormone imbalance⁵, anaemia and debilitating toxic states². Such conditions would not in themselves be likely to produce profuse discharge. Their role in the causation of leucorrhoea would be indicated by damage to cells, particularly of the more highly specialised tissues. (For example the glycogen metabolism of the vaginal mucous membrane

might be impaired, or ovarian activity restricted.) Desquamation of surfaces and fluid transudations would follow. These causes would therefore predispose to local bacterial invasions.

(2) Local causes.

Local causes may be divided into those operating

(i) before puberty,

(ii) after puberty.

- (i) A. Vulvitis and/or vaginitis may be accompanied by a discharge as a result of (1) infection, e.g. by gonococci, streptococci, staphylococci, pneumococci, bacillus coli, Vincent's organisms, aphthae, B. diphtheriae, B. tuberculosis; or (2) mechanical irritation, e.g. masturbation or infestation with threadworms or the presence of foreign bodies in the vagina (such as grains of sand); or (3) glycosuria.
- B. Passive hyperaemia such as results from venous stasis in heart-disease is liable to be followed by catarrh and infection.
- C. Neoplasms, especially if sloughing and infected are a rare source of discharge in young children.
- (ii) A. Inflammations (vulvitis, urethritis, Skenitis, Bartholinitis, vaginitis, cervicitis, endometritis, metritis, and

salpingitis) due to infection by gonococci, streptococci, staphylococci, diphtheroid bacilli, B. coli, B. diphtheriae, B. tuberculosis, pneumococci, mycoses, Trichomon^{es} vaginalis, or threadworms, may set up leucorrhoeal discharges.

The gonococcus primarily affects the urethra, Skene's ducts, Bartholinian glands and cervix; also the tubes, vagina and endometrium. It seems to possess an affinity for columnar epithelium and does not attack the squamous epithelium of vulva or vagina unless these tissues have been weakened or injured, e.g. by a soaking discharge from above.

The streptococci find their main opportunity in puerperal cases, entering by the placental site, or by lacerations in cervix or vagina and causing a profuse purulent discharge which mingles with or outlasts the lochia. Chronic streptococcal cervicitis is a not uncommon sequel.⁶ The latter may even exist in nulliparae however.

Bacillus coli often contributes towards a very profuse offensive yellow discharge. Such an infection may arise in cases of chronic constipation or appendicitis and is

frequently associated with bladder infections, the organisms travelling by the lymphatic or blood-stream or by local spread (as from appendix to right tube).⁵

The tubercle bacillus only rarely attacks vulva or vagina and even then does not always cause a leucorrhoea. Jameson calculates that about one-third of cases of tuberculosis of the cervix uteri have some discharge. In a larger series of cases of tuberculous salpingitis about the same proportion had leucorrhoea. In tuberculosis of the corpus uteri the percentage of cases who showed a discharge was 37.9%.

Trichomonas vaginalis gives rise to a profuse, thin, finely frothy, purulent, greyish-yellow discharge which is often extremely irritating, vulvitis being common. The organism is thought by some to be a vagrant from the bowel, and has been isolated from all parts of the genito-urinary tract.

- B. Malignant growths and polyps especially if infected and sloughing may cause a leucorrhoea. This is often of a dirty foetid nature. Watery discharges suggest a lesion of the body of the uterus or a tubal carcinoma.

- C. Venous congestion in the pelvis may be a factor in the production of discharge. It results from heart-disease or pregnancy or pelvic tumours or varicose veins and may be aggravated by constipation. In some cases the only result is to increase the normal vaginal "secretion" to an abnormal degree; in others infection of the congestion devitalised tissues occurs. X
- D. Trauma, particularly that due to childbirth plays a large part in the aetiology of leucorrhoea. Lacerations of cervix, vagina and perineum, and uterine prolapse account for many cases of chronic vaginal discharge. Foreign bodies such as neglected pessaries or ill-advised contraceptive appliances are less common causes. Chemical irritation, e.g. from douches of strong antiseptics, often induce or prolong a leucorrhoeal discharge arising from cervix or vagina.

*Hormonal
imbalance
esp. in
women
sexually
unsatisfied?*

X Imperfect drainage?

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IV

When two distinct conditions are manifest at once in a patient one has to decide for purposes of diagnosis and treatment whether they are related and if so in what manner - whether one is the cause of the other, or both are the results of a common cause. Even where no such direct connections can be shown the existence of the one condition may modify the symptoms and/or treatment of the other.

If a patient comes to a gynecological clinic on account of a troublesome vaginal discharge and gives in her history an account of rheumatism even the least wary would take note of the association. The coincidence of these two symptoms would immediately indicate the possibility of infection. Careful questioning about the onset of the symptoms might produce useful information. For instance if the leucorrhoea commenced suddenly and with urinary disturbances and was followed in four to six weeks by swollen joints the provisional diagnosis would be gonorrhoea. On the other hand if both symptoms made their first appearance after a difficult instrumental labour with a stormy puerperium, a puerperal infection (probably streptococcal) would be more likely. Again if the onset of the rheumatism

preceded the onset of the discharge by a number of years one would not tend to attribute the first condition to the second, always remembering, however, that the patient's observation or recollection might be faulty.

(i) The most complete and convincing evidence of rheumatism arising from a genital tract infection is seen in gonorrhoea. According to Luys¹ about 2% of all cases of gonorrhoea develop rheumatism, females being rather less often affected by this particular complication than males. In the female it is usually the sequel to endocervicitis or salpingitis.² It has been described - though much more rarely - in cases of vulvo-vaginitis in children and also of ophthalmia.

The gonococcus has been demonstrated microscopically and culturally from the local lesion in cases of periostitis, oste-periostitis, arthritis, myositis, synovitis and bursitis. Further the occurrence of muscular rheumatism and atrophy, neuralgia, neuritis and myelitis in cases of gonorrhoea is accepted by clinicians as being due to the infective process, probably through toxic absorption.

In systemic gonorrhoea the diplococcus gains access to the blood-stream either directly from the focus or via the lymphatics, and circulates

there, settling down and multiplying in one or more local situations, most commonly the joints.³ The reasons for the spread of the organisms into the blood-stream and for their subsequent choice of nidus are not clear, though Luys suggests cold, violent exercise and a peculiar predisposition as possible factors. Metastatic gonorrhoea is therefore essentially a septicaemia. The endocardium and myocardium have been known to suffer severe damage. In some cases the toxaemia is profound, evidenced by the usual signs of pyrexia, wasting, sweating and anaemia. In all cases the gonococcal complement-fixation test is positive.

(ii) Further examples of genital tract infections causing arthritis are not lacking. Laura Moench⁴ has shown that in certain cases of arthritis where all foci had been excluded or eliminated excepting in the genito-urinary tract a cervicitis could be found; anaerobic streptococci obtained from the depths of the endocervical mucosa in these cases produced, among other lesions, purulent arthritis when injected into rabbits. She concluded that the organisms showed an affinity for joint-tissues. It seems significant that out of the nine parous patients described four dated the onset of their arthritis from a confinement. Young,⁵ referring to this experimental work finds

it corroborated clinically by the improvement or arrest of a progressive arthritis when the accompanying cervicitis is suitably treated. Cumberbatch,⁶ applying diathermy to the pelvis reported similar good results.

In Moench's series of cases, where the cervix was the only, or the only remaining, focus, the problem was a fairly straightforward one. Greater difficulties arise when the rheumatic sufferer is found to have not only a cervicitis but also diseased tonsils and chronic appendicitis. In such a case rheumatism, cervicitis and appendicitis may all owe a common origin to the foci in the throat. Here the duration of the various symptoms may be a clue to their relationship: the organ which has protested the longest is the likely primary focus.

Could leucorrhoea be the result instead of the cause of rheumatism? One can see such a state of affairs in advanced failure of a rheumatic heart where there is venous congestion with local oedema and superimposed infection. Short of that the question may seem fantastic. Still, there emerges, for example, the clinical picture of the pallid twelve-year-old girl, prostrate, thin and dumb with chorea. If she subsequently attributes a leucorrhoeal discharge to this illness, to what

is this particular symptom due? Is it fundamentally the result of the action of a rheumatic toxin on the developing tissues? Or is it related to the anaemia and wasting? Or to some form of treatment employed? Those who describe a physiological leucorrhoea of puberty may postulate a coincidence only.

Papin⁷ contrasting infective with non-infective leucorrhoea defines an "idiopathic" form of the latter, related to disturbances of the general health or to the functioning of the genital apparatus. He considers that this symptom may arise as a result of damage to the "trophicité" of the vaginal wall, e.g. in cachexia, anaemia, intoxications and auto-intoxications, either directly or via the innervation and blood-supply, or through endocrine (particularly ovarian) disturbance. On this basis one can understand why a vaginal discharge should appear during or following illnesses such as acute rheumatism, chorea or rheumatoid arthritis. Nevertheless it is still necessary to explain why one rheumatic patient is so affected more than another. (Reference may be made here to Jameson's observations on the incidence of leucorrhoea in a series of cases of pulmonary tuberculosis. He found that this symptom was more constant and prominent among the milder cases. In

the advanced cachectic group he found leucorrhoea was less common and not so profuse.)

(iii) The rôle of the tubercle bacillus in the production of a genital tract infection causing a discharge has already been considered. Can this be linked up with tuberculous arthritis? It seems possible. But tuberculosis of the lower female genital tract is as rare as bone-and-joint tuberculosis is common. And tuberculosis of uterus or Fallopian tubes does not by any means always produce a discharge, and does not seem to be commonly associated with arthritis. So that while a local tuberculous infection should not be forgotten in differential diagnosis at the gynecological clinic it is not likely to be found as a cause of leucorrhoea associated with arthritis. On the other hand the presence of tuberculosis elsewhere in the body may be of significance and should not be overlooked.

The Investigation of a female case of rheumatism should therefore always include at least a full gynecological inquiry if not an actual examination of the pelvic organs. And in a patient who comes to a gynecological clinic complaining of symptoms suggestive of genital tract infection a history of rheumatic ailments should be given due weight.

(1) The co-existence of leucorrhoea and rheumatism in a case involves first a detailed account of the nature of the rheumatic symptoms, their onset and duration and previous treatment, if any. Next an inquiry should be made into the gynecological history, and any abnormal features noted. In a parous woman exact information about pregnancies, confinements and puerperia will be required. A list should then be made of any other complaints or illnesses from which the patient has suffered, particular care being taken to include minor infections. Special note should be taken of any symptoms referable to the urinary or alimentary tracts. A brief social history is useful, shedding light on habits and environment, work, climatic factors and nutrition. Finally the health of the patient's family and immediate relatives should be surveyed.

(2) The clinical examination must be complete and thorough. An initial assessment of the general condition and state of nutrition has immediate value. Appearances of anaemia, wasting, myotatic irritability and nervous instability are all significant. All the systems should then be examined in detail, careful watch being kept for evidence of infection. The locomotor system will come first under review, the condition of all the

joints, their mobility and function being recorded. The state of the muscles, their tone and function will at the same time be observed. The state of the skin is recognised to be important in a rheumatic case; its colour and dryness and reaction to stimuli should be examined, its texture felt, and the presence of nodules or thickenings noted. The cardio-vascular apparatus may next be investigated with special reference to the size of the heart, the purity of its sounds and its response to effort. The lungs should be examined, together with the upper respiratory passages, particular attention being paid to the condition of the nose and its accessory sinuses. In the month the trained observer will scrutinise the teeth, looking for evidence of disease and noting any conservative dental treatment, e.g. crowning, that may have been done. The state of the tongue and gums and throat will be examined, and then the rest of the alimentary system, particularly as regards signs of delay in the passage of contents, and tenderness related to particular areas, e.g. the appendix. A rapid review of the kidneys, spleen, lymphatic glands and central nervous system will precede the pelvic examination.

This may be carried out with or without general anaesthesia. The vulva will be inspected

for any signs of inflammation past or present, including scars, warts, etc. The urethra will be palpated from below forwards and any thickening tenderness or discharge noted. The Skene's tubules and Bartholinian glands will be compressed in turn in order to express their secretions. The uterus and appendages may next be palpated bimanually, particularly with regard to abnormal enlargement or tenderness, the position of the uterus and the consistency of the cervix. With the aid of a speculum the latter may be viewed, and the character of its secretion. At the same time the condition of the vaginal walls should be inspected and the nature of any vaginal discharge noted. Finally a rectal examination should be made and the urine tested.

(3) Bacteriological investigations should if possible be carried out ~~where~~ such are indicated as a result of the clinical findings, e.g. films and cultures of any pus found in the mouth, nasopharynx, tonsil-crypts, etc., and of any discharges from urethra, Skene's tubules, Bartholinian glands, cervix, vagina and rectum. (Hindley Smith⁸ recommended taking a pharyngeal swab for culture in every case of rheumatism to determine the "streptococcal index". A catheter specimen of urine should be fully examined bacteriologically, and if necessary

separate specimens obtained by ureteral catheterisation. Bacteriological investigation of the faeces may also be done.

(4) Blood-tests should include the Wassermann and gonococcal complement-fixation reactions, and the estimation of the blood sedimentation-rate. In certain cases agglutination tests may be required. Blood-count and haemoglobin estimation are useful, particularly as a guide to progress under treatment. The calculation of the blood-urea may be of help, but the bearing of the blood-sugar level, and the calcium and magnesium content upon the routine rheumatic case is still the subject of experiment.

The Mantoux test may be valuable, especially in young cases.

(5) Radiological examinations of bones and joints may be required e.g. in cases of arthritis, periostitis, etc. They are also a help in detecting foci of sepsis such as apical dental abscesses, pus-filled sinuses, and in investigation of the lungs and alimentary tract.

In the present study no attempt was made to investigate every case in the manner described above. Considerations of time and expense precluded routine radiological and complete pathological examinations. In all the cases, however, films of genito-urinary discharges were examined bacteriologically, and in

most cases the blood Wassermann reaction was tested. In a large proportion the gonococcal complement-fixation test was also carried out. The main attempt was to collect and to correlate as far as possible all the available clinical data.

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VINTRODUCTORY.

Group A consists of 82 cases, namely, all the women of child-bearing age who, reporting at the Auxiliary Clinic during a period of about eighteen months, gave a history of a vaginal discharge beginning during adolescence. The youngest was 17 years of age, the oldest 38 years, and the average ^{age} was $26\frac{3}{12}$ years.

The term "adolescence" is used here to denote the period from 11 years to 20 years.

Group B consists of all the adolescent girls who reported at the clinic during the same period with vaginal discharge: 10 in number. The youngest was 11 years of age, the oldest 15 years, and the average age was $12\frac{9}{12}$ years.

Group C consists of 82 unselected cases seen at the ante-natal and post-natal clinics. They were taken for comparison with Group A as a small cross-section of the child-bearing population attending the council's clinics. The youngest was 17 years of age, the oldest 43 years, and the average age was $26\frac{9}{12}$ years.

No.	Age	Age of onset of discharge	Menarché	Rheumatism	Rheumatic fever	Growing pains + sore throat	Chorea	TB.	TB. in family	Rheumatism in family	Infectious Diseases	Other Illnesses
4356	15	12	-	-	-	-	-	?	S. died P.T.B.	-	-	Septic throats often. Double otorrhoea. Tonsillectomy aged 7 years. Face swells in mornings.
4817	12	12	-	-	-	+	-	-	-	-	Measles Chicken-pox Whooping-cough	Tonsillectomy aged 6 years Mastoidectomy aged 9 years "Kidney Trouble" aged 9 years
4862	13	12½	-	Since 12 years of age	-	-	-	-	-	M. rheumatism	Measles German measles	Meningitis aged 5 years Chronic bronchitis "every winter" "Sunstroke" aged 12 years

GROUP B.

Group B, though small in number, will be considered first, as in these cases the histories are shorter and the relationship between the symptoms and the clinical findings may be more precisely judged.

The age of onset of the discharge in these cases ranged from 11 years to $12\frac{1}{2}$ years. 8 out of the 10 girls had not reached the menarché. The histories of these 10 cases are tabulated.

(i) The first point that impresses one is the list of illnesses in almost every case - mastoiditis, nephritis, meningitis, etc. The usual childish fevers moreover do not contribute largely to the list. Several of the histories further suggest the existence of focal spesis, e.g. 4356, who still suffers from septic throats and swelling of the face and double otorrhoea after tonsillectomy at the age of seven; 4817, who had tonsillectomy performed at the age of six, had to have mastoidec-tomy three years later, which was followed by "kidney trouble"; and 5304, who has had double otorrhoea for five years, has also had urticaria, jaundice and tonsillectomy, and still suffers from attacks of high fever "for no reason".

(ii) The incidence of rheumatism is also striking. Though none of these children had had

No.	Age	Age of onset of discharge	Menarché	Rheumatism	Rheumatic fever	Growing pains + sore throat	Chorea	TB.	TB. in family	Rheumatism in family	Infectious Diseases	Other Illnesses
4952	12	11 $\frac{3}{4}$	-	Since 11 $\frac{3}{4}$ years of age	-	+	-	-	-	B ₁) rheumatic B ₂) hearts	Measles Chicken-pox Whooping-cough Mumps	Tonsillectomy aged 7 years Worms Attacks of abdominal pain
5074	13	12	-	-	-	+	-	F. died P.T.B.	-	-	Measles Chicken-pox Whooping-cough	Pneumonia in infancy Swollen glands in infancy Attacks of abdominal pain said to be due to appendicitis for two years
5102	13	12	-	-	-	+	-	B. & S. have TB.	B. & S. have TB.	G.M. Rheumatic. M. rheumatic heart U. rheumatic heart	-	Tonsillectomy aged 2 years Said to be bordering on pernicious anaemia "a few years ago"

No.	Age	Age of onset of discharge	Menarché	Rheumatism	Rheumatic fever	Growing pains + sore throat	Chorea	TB.	TB. in family	Rheumatism in family	Infectious Diseases	Other Illnesses
5215	11	10 $\frac{3}{4}$	-	-	-	+	-	-	?	M. lumbago & sciatica A ₁ . rheumatic fever A ₂ . died haemoptysis A ₃ . chorea	Diphtheria	Frequent attacks of very septic throats "Swelling of stomach"
5241	13	12 $\frac{1}{2}$	-	-	-	+	-	-	-	GM. neuritis & rheumatism M. rheumatic A ₁ .) rheumatic A ₂ .) A ₃ rheumatic fever	Measles Whooping-cough Chicken-pox	"Nerves"
5267	13	11	12	-	-	++	-	-	F. had pleurisy 4 times M. died meningitis	-	-	Appendicectomy six months ago Very nervous & breathless Metrorrhagia Sick in mornings

No.	Age	Age of onset of discharge	Menarché	Rheumatism	Rheumatic fever	Growing pains + sore throat	Chorea	TB.	TB. in family	Rheumatism in family	Infectious Diseases	Other Illnesses
5304	12½	11	12	-	-	++ +	-	-	P.T.B. in F.'s family	M. rheumatic fever	Measles Whooping-cough	Roundworms aged 4 years Double otorrhoea present since 7½ years Jaundice aged 9 years Tonsillectomy aged 10 years Menorrhagia. Urticaria. Frequent high temperatures.

major manifestations such as rheumatic fever or chorea, 8 out of the 10 gave a history of pains in the limbs associated with sore throats. In 6 cases there is a rheumatic family tendency evident as well.

(iii) In 5 out of the 10 cases there is a history of tuberculosis in the family, but none of the children had had tuberculosis in any form.

(iv) The vaginal discharge in all cases appeared before the menarché, for in only 2 had menstruation begun and both of these gave a definite history of vaginal discharge for a year previous to the onset of menstruation. In none of the cases was the onset of the discharge related to a particular illness, though in 2 (4952 and 5074) the discharge and the limb-pains had made their first appearance about the same time.

The Clinical Picture.

(i) The general condition of these girls was fairly good. Not one came from a poor or wretched home, though several had suffered from chronic slight subnutrition as a result of periodic depressions in the family finances. (Such cases had received special attention via the school medical service, and had been granted milk or meals or cod-liver-oil and malt as seemed necessary.)

Several of the girls had comfortable homes, where nothing in the way of parental care, medical attention, nourishing food or drugs was stinted. This was reflected in their general appearance, which was good or excellent. In none of the 10 children could the state of nutrition be termed bad, and in one or two it was excellent.

2 out of the 10 were obviously anaemic (5102 and 5267). The former had been "bordering on pernicious anaemia" a few years previously, and had had a great deal of treatment, including iron in various forms, liver and liver extracts, ultra-violet radiation, calcium and cod-liver-oil. At examination there was evident but not profound anaemia. Two of the others were slightly anaemic. (4356 and 4817)

Two of the children were of a very nervous type (5241 and 5267) - excitable, apprehensive and loquacious. But in none of them were there any symptoms or signs of chorea.

(ii) Locomotor. None of these cases showed swollen joints at examination. There were no signs of previous arthritis, for example crepitus or limitation of movement. The musculature in one or two was poor and flabby. (5267 and 5241)

(iii) The Skin was pale and clammy in one or two cases. One or two had some myotatic irritability. No nodules were found.

(iv) Cardiac. One case (4952) had a pre-systolic mitral murmur but no other clinical sign of cardiac damage. No. 4356 had a soft systolic mitral murmur localised at the apex. There was a history here of swelling of the face in the mornings, but no oedema was found on examination and there was no sign of cardiac insufficiency. No. 4817 had a soft pulmonary systolic murmur.

(v) Ear, Nose and Throat. 5 cases had had tonsillectomy performed at ages ranging from 2 to 10 years. (4356, 4817, 4952, 5102, & 5304). No. 4952 had a small stump of tonsil on the right side. No. 5102 (operated on at 2 years) had substantial stumps on both sides. 3 cases had enlarged, much enlarged and very much enlarged tonsils: 4862, 5074 and 5215 respectively. In the two latter there was associated cervical adenitis. No. 4356 had some congestion of the naso-pharyngeal mucous membrane, and purulent discharge from the middle ear on both sides. No. 5304 had a slight discharge from both ears.

(vi) Pulmonary. No. 4356 was under observation for pulmonary tuberculosis. She had a dry

cough but there was no definite clinical sign present that would clinch the diagnosis. No. 4862 had clinical signs of chronic bronchitis.

(vii) Alimentary. In 9 cases the teeth were sound and the mouth healthy. No. 5241 had dental caries and profuse pyorrhoea. In spite of the various complaints of "morning sickness", "swelling of the stomach", abdominal pain and constipation nothing abnormal was detected on abdominal examination.

(viii) Urinary. No abnormalities were found in the urines.

(ix) Genital. In 5 cases the vulva was slightly moist and pale and the mucous membrane smooth. No. 5267 showed a roughening of the mucous membrane difficult to describe: it was suggestive of a "cat's tongue" appearance, but that term gives an exaggerated idea of the amount of roughening. In 2 cases (4356 and 5241) the vulva was red but not acutely inflamed or tender. In 2 cases (5304 and 4952) the vulva was slightly red.

There was no sign of urethritis, past or present.

The appearance of the vaginal walls (examined through a Lees speculum) corresponded to the appearance of the vulva in each case, i.e. in

5 the mucous membrane was healthy; in 5 there was some congestion, especially in Nos. 4356 and 5241. In 8 cases the vaginal discharge was similar - thin, milky and not profuse. In the case of 5241 it was simply pus. In the case of 4356 there was a little mucopus.

The cervix appeared healthy in 7 cases. No. 5241 showed some inflammation. In 2 cases (4356 and 5304) there was a small, annular erosion.

By abdominal examination no swelling or tenderness related to uterus or tubes was detected.

(x) Bacteriological. In 6 cases (4952, 4817, 4862, 5074, 5102 and 5215) the vaginal discharge showed microscopically only epithelial cells and normal vaginal bacilli.

In the case of 5241 there were pus-cells and gonococci.

In the case of 4356 there were pus-cells and profuse bacteria of several kinds, including Döderlein's bacilli.

In the case of 5267 there were leucocytes and Gram-positive cocci. Culture produced long-chained, non-haemolytic streptococci.

In the case of 5304 there were epithelial cells, a few pus-cells, and the normal vaginal bacilli. Diphtheroid bacilli and Gram-negative bacilli were grown on culture.

The conclusion arrived at after clinical and bacteriological examination of these 10 cases was that in spite of the unfavourable histories given the general condition of the children was surprisingly good.

One showed evidence of rheumatic endocarditis.

One had chronic bronchitis.

Four were anaemic.

Foci of infection were present in 6 cases:

2 chronic otitis media.

2 enlarged tonsils with cervical adenitis.

1 pyorrhoea (also gonococcal vulvo-
vaginitis).

1 streptococcal leucorrhoea.

To sum up the facts relative to Group B:

Among 10 cases of vaginal discharge appearing before the menarché in girls of 11-12½ years of age, 8 gave a personal history of rheumatism, 5 gave a family history of tuberculosis, and in the whole group there was an impressive list of illnesses. On examination 4 cases had an abnormal vaginal flora (including gonococci in one and streptococci in one); the remaining 6 cases had a mild leucorrhoea containing only epithelial cells and normal vaginal bacilli.

The general condition was good in most of the cases, though 4 were more or less anaemic. Foci of infection were present in 6 cases.

GROUP A.Age of onset of vaginal discharge.

In this group of 82 cases the age of onset of the vaginal discharge ranged from 11 to 20 years. In three-quarters of the cases the year of onset of the discharge fell into the quinquennium 14-18 years. In 9 cases the discharge was said to have first appeared before the menarché. In 17 cases the discharge arose at or about the menarché. The remainder (68% of all) gave a history of discharge first appearing after menstruation had begun.

In practically all the cases the first appearance of the discharge could not be accurately timed, as it had been very slight at first and gave rise to no discomfort. In 4 cases, however, the onset was precisely recollected as it had occurred during a severe illness, to which the discharge was attributed by the patient, viz.:

- No. 5037. Severe burns on the body at the age of $15\frac{1}{2}$ years.
- No. 5227. Rheumatic fever at the age of 13 years. (1 year pre-puberty)
- No. 5250. Chorea at the age of 13 years. (At puberty)
- No. 5325. Chorea and rheumatic fever at the age of 11 years. (1 year pre-puberty)

Previous illnesses.

As in Group B the histories in many cases were impressive. Long lists of illnesses and symptoms of ill-health characterised the majority. Outstanding among these, however, were rheumatic complaints.

54 out of the total 82 gave a history of rheumatism in one form or another, i.e. 66%, as follows:

Growing-pains and sore throat	16
Rheumatism, muscular rheumatism and lumbago	14
Rheumatic fever	4
Rheumatism and chorea	3
Rheumatism, rheumatic fever and chorea	3
Rheumatism and heart-disease	2
Rheumatoid arthritis	2
Nodules	1
Heart-disease	1
Rheumatism, neuritis and heart-disease	1
Rheumatism, rheumatic fever, chorea and nodules	1
Growing-pains, sore throats and heart-disease	1
Chorea and heart-disease	1
Chorea	1
Rheumatism, sciatica and sore throats	1
Rheumatism, lumbago and sciatica	1
Neuritis and sciatica	<u>1</u>
	54

All the different manifestations of rheumatism in the 54 cases are enumerated below:

Growing-pains and sore throats	29
Rheumatism, muscular rheumatism and lumbago	26
Chorea	9
Rheumatic fever	8
Heart-disease	6
Neuritis and sciatica	4
Nodules	2
Rheumatoid arthritis	2

As regards other illnesses a history of tuberculosis was given in 3 cases and a history strongly suggestive of tuberculosis in 4 cases. Thus the total number of cases with a possibly tubercular history is 7, or 0.85%.

Other complaints were

scarlet fever	10 cases	(12%)
sterility	9 cases	(10%)
appendicitis	7 cases	(9%)
catarrh of throat	7 cases	
quinsies	6 cases	(7%)
diphtheria	6 cases	
pneumonia	5 cases	(6%)
cystitis	4 cases	(5%)
bronchitis	4 cases	

anaemia	4 cases	
goitre	3 cases	(4%)
erysipelas	2 cases	(2%)
dental abscess	2 cases	
breast abscess	2 cases	
nephritis	2 cases	

And in one case each, urticaria, severe burns, gastritis, psoriasis, shingles, piles, floating kidney, ulcerated tongue, obesity, blepharitis, acne.

The usual childish complaints of measles, whooping-cough and chicken-pox are not given in this list. In 41 cases (exactly 50%) no history of any of these was obtained. Many of the cases with the longest lists of serious illnesses had never had any of these childish fevers.

17 cases (21%) complained of constipation. In 11 of these the history was that they "had always had it".

Gynecological History.

The following deviations from the normal were reported in the number of cases specified:

<u>Irregular menstruation</u>	15
<u>Dysmenorrhoea</u>	9
<u>Clotted menses</u>	5
<u>Menorrhagia</u>	2
<u>Metrorrhagia</u>	1
<u>Amenorrhoea</u>	1

The case of amenorrhoea (5160) had an infantile uterus and was sterile. The metrorrhagia (5023) was attributable to gonococcal endometritis. The two cases of menorrhagia (1389 and 4657) had congestive heart-failure.

Social and Environmental History.

In the majority this was good. Many of the patients came from comfortable homes at which they remained after leaving school until their marriage. A considerable proportion had done office-work or domestic service before marriage and there were no complaints elicited about the hygiene of their surroundings.

In only 7 cases could an unsatisfactory environmental history be obtained. Two of these had been brought up in a damp home and the members of their families suffered from rheumatism. One woman had been brought up in a good home, but after marriage she went to live in "a soaking wet house"; within six months she had developed rheumatoid arthritis. Two had been tin-plate workers from the time of leaving school, and consequently had had to work for long hours often standing in water. One of them, a member of a rheumatic family, had had rheumatism before entering the tin-plate works. The other developed rheumatic symptoms after three years. There was no rheumatism in her family.



Two girls had worked in damp surroundings in breweries from 14 years of age; they had had some premonitory rheumatic symptoms at school, and came from rheumatic families.

Family History.

(i) The incidence of rheumatism in these families was striking. The total number with a rheumatic family history was 38, or 46%. Altogether 65 relatives were involved, as follows: rheumatic fever (19), "rheumatic" (15), "rheumatic heart" (13), St. Vitus Dance (12), rheumatic fever, chorea and heart-disease (1), neuritis (2), sciatica (1), arthritis (1), rheumatoid arthritis (1).

(ii) Tuberculosis in the family was reported in 19 cases (23%). Most of those in which the exact diagnosis was known were cases of pulmonary tuberculosis.

(iii) Other familial complaints were much less common. One family suffered from goitre, one diabetes, one "catarrh" and one septic throats.

Clinical Examination.

(i) General. The general condition of these patients varied considerably from case to case. As in Group B it was evident that malnutrition or poverty was not a common factor. A considerable proportion had good homes and their general

normal (except for two retroverted and one infantile uterus). In them the discharge appeared to be simply an excess of the usual vaginal "secretion". In 6 cases, there was a characteristic appearance common to all: the vulvar epithelium was pale and had a roughened surface, suggestive of the pile on a very fine velvet or the surface of a cat's tongue, though these similes tend to convey an exaggerated impression of the picture. The mucous membrane lining the vaginal walls was also pale and had a spotty or granular appearance: the granules were small, round and regular, and slightly darker than the surrounding tissue, and were continued in one case on to the surface of the cervix. The cervix in these cases showed a very small superficial erosion and the os contained mucus. The discharge in these 6 cases also appeared to be an excessive normal vaginal "secretion" - it was milky and inoffensive. In one case the appearances were generally similar to those in the 6 cases noted immediately above, but in addition there was an obvious infection of the urethra and Skene's ducts and a purulent discharge from them.

The bacteriological results in these nulliparous cases corresponded to the clinical findings. In the case of urethritis the smears from urethra, and Skene's ducts showed many pus-cells and Gram-positive cocci. In all others the smears from urethra, vagina and cervix contained many epithelial cells,

? time of
exam. in
relation to
menstruation
i.e. hormonal
influence?

condition was satisfactory. A moderate or severe degree of anaemia was present in 13 cases and slight anaemia in 17. One patient was excessively nervous and one was obviously choreic. A patient who had become emaciated after confinement and breast abscess had a fine tremor of the hands. One was obese.

(ii) Locomotor. 3 cases of arthritis were seen. One was a text-book case of rheumatoid arthritis, whose history of a damp house has been noted already. A case of subacute arthritis of the right temporomandibular joint was seen in a patient whose mother was said to have died from rheumatoid arthritis. One case of subacute gonococcal arthritis was seen, in a patient who had an acute reinfection with gonorrhoea.

One patient had an artificial limb - the left leg had been amputated above the knee on account of tuberculosis. There was no sign of articular tuberculosis at examination, though there was an active pulmonary lesion present.

Two cases had fibrositis.

(iii) Integumentary. The condition of the skin in this series of cases varied considerably, from the waxy pallor of the anaemic blonde to the dark cyanotic tint of cardiac failure. In some a

cold, moist clammy skin was noted - particularly in the two cases of arthritis (gonococcal and rheumatoid) and also in a case of mitral incompetence associated with nervous and emotional disturbances. On the whole, however, this cold clammy skin considered to be characteristic of the rheumatic type was not frequently encountered in this series. No special investigation of capillary form or reaction was made. In the whole series only one subcutaneous nodule was felt: this was in a patient of thirty-eight years of age who had had painful nodules in the legs for a year. There was tuberculosis in her family. One patient had psoriasis and one showed extensive scarring of the body as a result of burns.

(iv) Cardiac. Evidence of organic heart disease was found in 24 cases, on 29% of all. 9 had mitral stenosis, 13 mitral incompetence, and 2 mitral stenosis combined with incompetence. Of these 24 there were signs of cardiac failure in 8 - from dyspnoea, tachycardia and fainting to oedema of the feet and albuminuria. Other abnormalities found were slight cardiac dilatation (3 cases) and pulmonary systolic murmurs (10 cases).

(v) Ear, Nose and Throat. Evidence of diseased or infected tonsils was found in 23 cases. Some showed hypertrophy and pus in the crypts;

others were congested and traced over with dilated blood-vessels; others pitted and scarred. In one case there was obvious sepsis of a stump left from operation.

Besides these there were 10 cases of chronic pharyngitis, in most of whom tonsillectomy had been performed previously. In these the appearance of the posterior pharyngeal wall was characteristically that of a hypertrophied and granular mucous membrane, usually of a dark crimson colour, and at times streaked with a purulent discharge.

Simple nasal catarrh was seen in one case.

3 patients had enlarged cervical lymph-glands without any obvious focus of infection in the throat.

There were 2 cases of chronic laryngitis, 1 of deafness and 1 of simple goitre.

(vi) Pulmonary. 1 case of active pulmonary tuberculosis with haemoptysis was seen, and 1 where a tentative diagnosis of early pulmonary tuberculosis was made. There were 3 cases of chronic bronchitis.

(vii) Alimentary. The condition of the mouths of these patients was generally good. Simple dental caries was found in 12 cases, and gingivitis in 2 cases. Gross oral sepsis (pyorrhoea and alveolar abscesses) was present in 5 cases only. Total

extractions for pyorrhoea had been carried out in 2 cases. There was only 1 case in which much conservative dentistry had been done: a patient suffering from mitral incompetence who had a number of gold crowns. (The rheumatic condition had evidently preceded the dental treatment by many years.) One patient suffered from ulceration of the tongue. She was not anaemic and had no gastric symptoms. A diagnosis of hypochlorhydria was made in 1 case. Two patients complaining of indigestion were found to have dilated, atonic stomachs.

(viii) Urinary. One case of acute cystitis was found. This was due to a coliform bacillus and was associated with oxaluria. One patient had a mobile kidney for which she wore a special belt. Albuminuria following puerperal fever was discovered in one case. Others having albuminuria were cases of cardiac failure.

(ix) Genital. This is a difficult summary to present. It may clear the ground a little to take the cases of gonorrhoea first.

(a) There were 4 cases of acute gonorrhoea and 3 cases of subacute gonorrhoea. The diagnosis was plain clinically and confirmed by the presence of gonococci in smears taken from urethra and cervix, and by a positive gonococcal complement-fixation test (G.C.F.T.) in every case.

Of the acute cases one was a patient who had a long history of tuberculosis (bone and lung) from childhood. Two had had chorea in childhood and one had had rheumatism in childhood.

Of the subacute cases one, who had suffered from rheumatism since childhood, developed a subacute gonococcal arthritis of the ankle during treatment as a result of an acute re-infection with gonorrhoea. The other two had both had juvenile rheumatism.

While it is impossible to say that these 7 cases had not had a gonococcal infection in childhood or adolescence, all the evidence seemed to show that their gonococcal infection was comparatively recent and was superimposed upon a pre-existing rheumatic or tuberculous condition.

It is interesting to note that only one of these rheumatic subjects developed a gonococcal arthritis.

In 6 other cases the G.C.F.T. was found to be positive without any confirmatory clinical signs. Repeated smears in these cases showed normal appearances. One may presume that in these cases there had been gonococcal infections which had subsided, leaving as their only trace the specific antibodies in the blood. (That is, if one does not hold the opinion that a positive G.C.F.T. must indicate an

existing gonococcal focus in every case. The recent views upon the significance of the G.C.F.T. in rheumatism are succinctly propounded by Hench in the second and third Annual Reports on the Chronic Rheumatic Diseases, 1936 and 1937.)

Thus in 13 cases altogether a gonococcal infection is known to have occurred and the clinical findings in them will not be discussed further.

(b) Of the 69 remaining cases there were 12 women who had never been pregnant, which simplified the assessment of the clinical condition. 9 of these were married women who gave sterility as their chief complaint, and three were unmarried girls whose main symptom was vaginal discharge.

Considering the nine cases of sterility first of all, I do not think that the presence of a discharge was responsible for the sterility in any of them. In the first place it seemed insufficient in amount, and in the second place there were other conditions present in most of them which might more readily explain the sterility, viz. retroverted uterus in 4 cases, and infantile uterus in 3 cases. In the eighth case there was latent syphilis, which might explain the sterility in a wide view of the case.

Considering the 12 cases all together, there were 5 in whom the genital tract appeared perfectly*

* Please turn back. Page 58 is bound between pp. 52 & 53.

with one or two pus-cells. The bacteria seen were normal vaginal bacilli. In one case (showing no clinical signs of syphilis) there was found a strongly positive blood Wassermann-reaction. This was the only positive Wassermann in the whole series investigated.

(c) In the remaining 57 cases the clinical appearances were varied. Pregnancy in various stages complicated the picture in 41 of them. The effect of this will be discussed later. These 57 cases fall into five groups:

Group (i). 7 cases. Those in which the genital apparatus looked perfectly healthy. The discharge complained of varied in amount from one case to another, but was evidently the normal content of the vagina. Smears showed only epithelial cells and normal vaginal bacilli.

Group (ii). 9 cases. Those in which the only abnormality noted was a simple cervical erosion. In these the vulva and vagina appeared healthy. Examination of the uterus and adnexa bimanually revealed nothing abnormal. The erosions were more or less superficial and regular in outline. The endocervical secretion consisted of mucus, and the vaginal contents therefore consisted of a mixture of this mucus with the white or creamy fluid formed in the vagina itself. Microscopically this was

chiefly epithelial cells with a few pus-cells and the usual vaginal bacilli. In one case diphtheroid bacilli were numerous.

Group (iii). 12 cases. Those in which the main feature was a cervicitis. In these cases there were cervical lacerations, cervical polyps, Nabothian follicles, etc., with frank inflammation of the endocervix. In some cases the cervix was soft and mushy and bled at a touch, and in all there was a thick mucopurulent cervical discharge, which moistened and irritated the surfaces of the vagina and vulva. The smears taken from the endocervix showed pus, some red blood corpuscles and a variety of organisms, which were not identified by cultural methods.

Group (iv). 2 cases. Those in which the main feature was a vaginitis. The vaginal mucous membrane was angry and granular and turgid. The fornices contained a thin, copious, frothy, offensive pus, suggestive of a *Trichomonas* vaginitis. Many Gram-positive cocci were present in the cervical smear of one case.

Group (v). 27 cases. The rest. These had various features in common by which they could be grouped together. In none was the appearance of the genital tract exactly normal, though there were no naked-eye signs of inflammation of urethra,

Bartholinian glands, Skene's ducts, vagina or cervix. In fact there was no gross abnormality evident in any of them. In each one, however, there was found this roughening or finely granular appearance of the mucous membrane of vulva or vagina described already in some of the nulliparous patients above. In every case where the vulvar surface was thus roughened the vaginal walls were found to be granular, but in some cases the vaginal walls were granular whilst the vulva appeared normal. Pregnancy accentuated these appearances, and more so as the months advanced. In every case there was a tiny superficial cervical erosion and in the pregnant patients there was a free mucoid secretion from the os. The vaginal discharge in some of these cases was milky and inoffensive, but in the pregnant patients it was more often creamy or pale yellow in colour. The discharge was most copious and least milky in the late stages of pregnancy and particularly in the few cases of cardiac failure. It should be emphasised again that even in these there were none of the usual signs of inflammation of the tissues - no heat, turgidity or tenderness of the mucous membranes.

The bacteriological findings bore this out. Epithelial cells were seen in large numbers in the vaginal smears with one or two pus-cells. In

two cases only were pus-cells present in any number - both cases of cardiac failure with intense venous congestion of the vaginal walls. In all the 27 cases the preponderating organism in the smears was the usual Döderlein's bacillus, though in one case numerous Gram-positive cocci were seen.

The conclusions arrived at after clinical and bacteriological examination of these 82 cases was that among a variety of more or less serious complaints in their past histories rheumatic ailments were reported by the majority (66%). A rheumatic history and/or clinical signs of rheumatism were present in 76%. The incidence of rheumatism among the relatives of these patients was high (46%). A family history of tuberculosis was elicited in 23%. Clinical evidence of anaemia was found in 37%. Foci of sepsis in the nose and throat were found in 45%. Examination of the genital tract revealed that except in 13 cases which had been infected with gonorrhoea and 15 other cases of genitourinary infection the leucorrhoea present was non-infective and might be described as a mild vaginal catarrh.

GROUP C.

This control group did not produce such a catalogue of ailments as Group A. For comparison some figures are given below.

	Group A	Group B
Personal history of rheumatism	54	25
Clinical signs of rheumatism	29	8
Rheumatic family history	38	20
Personal history and/or clinical signs of rheumatism	62	27
Personal history of tuberculosis	7	5
Family history of tuberculosis	19	7
Anaemia	30	15

Rheumatic History	Rheumatism, Muscular Rheumatism & Lumbago	Rheumatic Fever	Growing-pains & Sore Throats	Chorea	Rheumatoid Arthritis	Neuritis & Sciatica	Nodules	Heart-Disease
Group A	26	8	29	9	2	4	2	6
Group B	14	3	12	3	-	-	-	-

Clinical Signs of Rheumatism	Organic Heart-Disease	Gonococcal Arthritis	Rheumatoid Arthritis	Arthritis of Temporomandibular Joint	Sciatica	Chorea	Nodules
Group A	24	1	1	1	1	1	1
Group B	6	-	-	1	-	-	-

It is therefore evident that while the histories and clinical findings in Group C were more favourable altogether than in Group A, the preponderance of rheumatic complaints in Group A is worthy of note. Is it justifiable to conclude from the comparison that because rheumatism in one or more of its forms was more frequently encountered in those patients who complained of adolescent leucorrhoea than in the female population generally, therefore the two conditions were related? Might it not simply be that Group A represented a poorer soil and that the members of that group had sustained all manner of infections and illnesses which had contributed to the development of a symptomatic leucorrhoea?

It may be worth while to consider the rheumatic cases in Group C. 27 gave a personal history or had clinical signs of rheumatism: of these 15 had had adolescent leucorrhoea. In all the 82 controls there were only two other cases of adolescent leucorrhoea. One may therefore infer from a survey of the control cases alone (if one may draw any conclusion from such a small series) that among rheumatic women of child-bearing age in the area and social stratum concerned a history of adolescent leucorrhoea is likely to be obtained in about 50% of cases. But among women of child-bearing

ages (in the same area and social stratum) who have had adolescent leucorrhoea, 87% will be rheumatic.

CASE-REPORTS. 1

No. 4952. Age: 12 years Seen 14.2.35.

Referred by school medical officer on account of vaginal discharge.

History. The discharge began in December 1934 during a febrile illness characterised by headache, numerous joint-pains, low abdominal pain and dysuria. (No sore throat.) Since then the child has been "jumpy".

No menstrual periods.

No constipation. Worms some years ago.

Mumps. Measles. Chicken-pox. Whooping-cough.

Tonsillitis. Tonsillectomy aged 7 years.

Family History. Two brothers have rheumatic heart-disease and have been admitted to the Fairwood Hospital (for school-children suffering from chorea, rheumatism and endocarditis.) No. T.B.

O.E. Patient looks healthy. Nervous, bright type. No sign of chorea.

Teeth. N.A.D. Tongue slightly furred.

Throat generally slightly red. Small tonsil-stump right side. No adenitis.

Heart: presystolic mitral murmur.

Lungs: N.A.D. Urine: N.A.D.

Vulva: moist and slightly red. Vagina: do.

Cervix: looks healthy. A little milky vaginal discharge.

Smear: Vagina: few leucocytes. Epithelium: Normal vaginal bacilli.

CASE-REPORTS. 2.

No. 5304.

Age: $12\frac{1}{2}$ years

Seen 23.11.35.

Referred by school medical officer on account of vaginal discharge.

History. The discharge began at $10\frac{11}{12}$ years, very gradually, slight at first but gradually increasing. It was white at first, becoming yellow later. No urinary symptoms.

Menarché $11\frac{11}{12}$ years. Menstruation $\frac{7}{21}$. Loss very bright red and profuse and contains clots. Severe abdominal pain associated with the periods - sometimes before and sometimes after. L.M.P. 14.11.35

Roundworms aged 4 years. (None since.) Constipated from infancy. Whooping-cough aged 4 years. Running ears 4-5 years. Measles 5-7 years. Urticaria often troublesome. Jaundice aged 9 years. Tonsillectomy aged 10 years. Used to run high temperatures for no apparent reason - up to 104°F . - but not so much since tonsillectomy. Has always had severe growing-pains in elbows and knees. Occasional sore throats. Nervous. Only Child. Comfortable home.

Family History. Mother had rheumatic fever. Phthisis in father's family.

O.E. Tall, well-developed brunette. No anaemia. Intelligent.

CASE-REPORTS. 2. (contd.)

Teeth excellent. Throat tonsillectomised, looks healthy.

Ears both discharging slightly. No cervical adenitis.

Skin: no nodules. No sign of urticaria.

Heart: N.A.D. Lungs: N.A.D. Urine: N.A.D.

Vulva: moist and bright pink. Vagina: do.

Cervix: small erosion. Whitish, semi-solid vaginal discharge.

Smear: Vagina: Epithelium. Few pus-cells. Gram-positive bacilli. Normal vag. bacilli.

Culture: Diphtheroid bacilli.

CASE-REPORTS. 3.

No. 5469. Married. Age: 28 years. Seen 6.5.36.

Referred from ante-natal clinic for treatment of leucorrhoea. Pregnant.

History. Patient has always had a slight white discharge since the menarché at the age of 17. It appeared irregularly at first, but became constant during her first pregnancy. After her confinement it became less and again irregular. It has been constant during the last two months. It has been slightly irritating lately, but patient has never had any urinary complaints. No constipation.

Menarché 17 years. Menstrual periods always irregular ⁷/28-42. Heavy loss first 3 days of period. L.M.P. 5.2.36.

Para 1. Mis 0. Boy born 26.10.33. Full-time. Spontaneous. After confinement patient had acute mastitis with abscess-formation which her doctor said was "from the teeth".

Measles in childhood. No history of sore throats or growing-pains. Pyorrhoea from age of 20. (All teeth extracted on that account in February 1936.) After her confinement, when she had a severe breast-abscess, she developed a cough, and her weight went down to 5 stone 13 lbs. She

CASE-REPORTS. 3. (contd.)

was examined by the T.B.O. but no tuberculosis was found. Patient has always had "shaky fingers".

Family History. Mother has sciatica. No tuberculosis.

O.E. Dark, gaunt, thin, hollow-eyed type. Skin dark and dry. Pupils widely dilated. Fine tremor of fingers. Slight myotatic irritability.

Teeth: all false.

Tonsils: enormous. No adenitis.

Heart: tachycardia. Apex-beat 5th left intercostal space, $\frac{1}{4}$ inch out from mid-clavicular line. Systolic mitral murmur conducted into the axilla. Systolic tricuspid murmur.

Lungs: N.A.D. Urine: N.A.D.

Vulva: healthy appearance. Urethral lining slightly congested. Bartholinian glands not palpable.

Uterus: size 7 weeks pregnancy.

Appendages: N.A.D.

Cervix: small erosion. Mucus in os.

Smears: Urethra: epithelium and normal vaginal bacilli.

Cervix: epithelium and a few pus cells and normal vag. bacilli.

W.R. - ve.

G.C.F.T. - ve.

CASE-REPORTS. 4.

No. 5325. Married. Age: 23 years. Seen 18.12.35.

Referred from post-natal clinic on account of debility and backache and discharge.

History. Patient has had a white discharge since a severe illness at the age of 11 years.

(Rheumatic fever and chorea with heart-disease.)

The discharge has become yellow since the birth of her baby seven months ago. She has occasional pain on micturition. Constipation intermittent since childhood.

Menarché 12 years. Menstruation regular 6/30-32. L.M.P. 19.11.35. Menstrual loss is not free and she passes some sticky clots.

Para 1. Mis. 0. Boy born 17.5.35. Full-time. Instrumental. Very difficult delivery.

Rheumatic fever and chorea at age of 11 years. Heart was affected and eyesight also. Patient is accustomed to get "flu" every year and is troubled by frequent colds but no sore throats. She says her teeth were "very bad". She still gets rheumatic pains. She is also troubled by excessive sweating of the palms and soles.

Family History. One brother and two sisters have had rheumatic fever and one of these sisters died from valvular heart-disease. No tuberculosis.

O.E. Thin, slight, pale, dark-haired creature. Obviously anaemic.

CASE-REPORTS. 4. (contd.)

Teeth: several carious. No gingivitis or pyorrhoea.

Throat: anterior pillars of fauces congested.
Tonsils slightly enlarged.

Heart: not dilated. Rhythm regular. Good response to effort. Very slight roughening of the first mitral sound.

Lungs: N.A.D.

Skin: healthy. Some myotatic irritability.
No nodules.

Vulva: pale, and finely granular.

Urethra and Bartholinian glands: N.A.D.

Uterus: lying to left

Appendages: N.A.D.

Rectum: loaded.

Cervix: small erosion. Mucus in os.

Vagina contains a little whitish mucoid material.

Smears: urethra: epithelium and normal vaginal bacilli.

Cervix: a few pus-cells. Normal vaginal bacilli.

W.R. - ve.

G.C.F.T. - ve.

It was not thought advisable to give local treatment for the gynecological condition. Bland's pills and cod-liver-oil and malt were recommended, and treatment for the constipation. General hygienic measures - fresh air, extra sleep, etc.

CASE-REPORTS. 5.

No. 5250. Married. Age: 21 years. Seen 11.10.35.

Referred from ante-natal clinic, $5\frac{1}{2}$ months pregnant, on account of dysuria and discharge.

History. Patient has always had a slight white discharge since the age of 13 years when it appeared immediately after an attack of chorea. It was never troublesome until her first pregnancy when it became profuse and caused some soreness.

Menarché aged 9 years, when patient had one menstrual period. None thereafter till the age of 13 years, since when they have been regular $10/30$, and without symptoms. L.M.P. 10.5.35.

Para 1. Mis. 0. Boy born 24.5.35. Premature baby - died after a few hours.

Measles and whooping-cough in early childhood. "Lung" was said to be "affected" by the latter. Chorea off and on from 9 years to 13 years of age. Legs were paralysed. Patient has always had breathlessness on exertion from that time.

Family History. Sister aged 11 years has had chorea for two years.

O.E. Pale, dark woman. No anaemia. No myotatic irritability.

Teeth: excellent. Tonsils: healthy.

Heart: tachycardia. Presystolic mitral murmur. Pulmonary systolic murmur.

CASE-REPORTS. 5. (contd.)

Vulva: slightly moist and "granular".

Urethra and Bartholinian glands N.A.D.

Uterus: size of 5 months pregnancy.

Appendages: N.A.D.

Vagina: spotty. Cervix: small erosion posterior lip. Mucus in os.

Smears: Urethra) Epithelium. A few pus-
) cells. Normal vaginal
 Cervix)
 bacilli.

W.R. - ve.

G.C.F.T. - ve.

Urine: (catheter specimen): amphoteric. Very faint trace albumen. Phosphates + . Sugar 0.4 mgms.%. Ketosis nil. Culture sterile.

CASE-REPORTS. 6. (contd.)

Family History. Mother has had chorea and rheumatic fever and now suffers with her heart. No tuberculosis.

O.E. Healthy, reddish-haired woman. Good colour.

Teeth: all false.

Throat: tonsils small but adenoids ++ .

No cervical adenitis.

Tongue: fissured.

Heart: N.A.D. Lungs: N.A.D. Urine: N.A.D.

Vulva: healthy appearance.

Urethra and Bartholinian glands N.A.D.

Uterus: size of two months pregnancy.

Appendages: N.A.D.

Cervix: tiny erosion. Mucus in os.

Vagina: congested and granular. No discharge.

Smears: Urethra: Epithelium. No. pus.

Cervix: Few pus-cells. Normal vaginal bacilli.

W.R. - ve.

G.C.F.T. - ve.

Patient had hyperemesis during the pregnancy and felt very faint and weak. She was troubled by constipation, heartburn and distension. Later she had troublesome varicose veins of vulva and

CASE-REPORTS. 6. (contd.)

haemorrhoids. She was treated with local applications of mercurochrome to the cervix twice weekly, and given ostocalcium with vitamin D, and Agarol. Also a potassium citrate mixture. Patient had a normal confinement in hospital on 20.1.36 at full-time. Spontaneous delivery. All parts appeared healthy two months after confinement.

VISUMMARY.

A clinical investigation was made into 92 cases giving a history of leucorrhoea commencing between the ages of 11 years and 20 years, viz. Group A, 82 cases, who were women of child-bearing age, and Group B, 10 cases, who were school-girls. A control series for Group A, Group C (82 cases), was also examined.

As a result the following conclusions were drawn:

- (i) This form of leucorrhoea is not primarily caused by local genital-tract infections, though these may be superimposed upon it.
- (ii) The discharge arises in the vagina as a result of some alteration in the "trophicity" of its lining mucous membrane and consists chiefly of desquamated vaginal epithelium.
- (iii) The occurrence of one or more of the manifestations of rheumatism is seen in over 75% of patients complaining of this symptom.
- (iv) Other debilitating or toxic conditions, such as tuberculosis, chronic tonsillar sepsis, and extensive burns, may be associated with it.