secretion of creamy consistency, occupying the bag of the fundus and furrows of the vagina. This secretion also consists chiefly of epithelium scales. If the vaginal mucous membrane exhibit with this secretion a deep violet-red or purple color, and prominent rugæ or brain-like corrugations, the presumption in favor of pregnancy is great.

This form of leucorrhœa requires no treatment.

Another form of leucorrhœa which may be called physiological, is that pale mucous discharge which precedes and follows, but chiefly follows, the proper menstrual flow. The first effect of the flux which takes place under the ovarian nisus, is to stimulate the glands of the uterus to increased activity. Hence the secretion of mucus in larger quantity, which sometimes appears externally before the proper menstrual blood exudes and mixes with it. This increased secretion of mucus goes on all through the stages of menstruation, and persists for a while after the exudation of blood has ceased. This post-menstrual leucorrhœa may be likened to the so-called "green-waters" of childbed. It flows from the uterine cavity, as does the proper menstrual discharge.

An allied variety of this form of leucorrhœa is that which is often witnessed in girls who do not menstruate properly. In these cases, leucorrhœa is the substitute for the healthy menstrual sanguineous flow. It is evidently the result of an imperfect menstrual molimen. It is provoked by ovulation more or less perfect. It may, therefore, with strict justice be called *menstrual leucorrhœa*. It is more especially prevalent in chlorotic girls, and then may degenerate into a morbid flux.

What has been said about physiological leucorrhœa sufficiently proves that inflammation is not a necessary factor. Indeed, inflammation may exist without leucorrhœa, and leucorrhœa without inflammation. In the great majority of cases of leucorrhœa, uterine, vaginal, or vulvar, there has been no history of inflammation. Those forms which are more directly traced to inflammatory conditions, as acute and chronic catarrhal metritis, will be more conveniently discussed when describing the pathology of the uterus.

Leucorrhœa may be the expression of a constitutional diathesis. Thus the strumous diathesis is known to be commonly attended by a tumid development of the mucous membranes generally, and a disposition to glandular engorgements. Girls and women possessing this diathesis are frequently the subjects of leucorrhœa without showing any special alteration of the genital mucous membrane. But occasionally there is a distinct tuberculous condition of the mucous membrane. When this is the case, the attendant leucorrhœa is peculiarly intractable, even incurable.

Leucorrhœa is not uncommon in women suffering from tubercular disease of the lungs.

The syphilitic diathesis produces analogous effects; and that not only when the diathesis has been acquired by primary infection, or through the gestation of an infected ovum, but also when the diathesis has been transmitted hereditarily.

The gouty and the rheumatismal diatheses are described by some writers as disposing to leucorrhœa, and that of a very obstinate form.

In certain states of great debility, marked by anæmia and defective nutrition of the tissues, mucous fluxes are easily excited, and the genital



mucous tract is especially prone to be so affected. In such cases there need be no inflammation, no breach of surface, no abnormal growth. The coats of the vessels, the tissues of the mucous membrane, the muscular structure of the uterus are all so deficient in tone and contractility, and the blood is so wanting in plasticity, that an exudation of the watery element, mingled with mucous secretion, readily takes place. This state of anæmia may be induced by various causes, as acute or chronic disease, hemorrhages, or by over-suckling. It may also be induced by town-life and unhealthy occupations pursued in bad hygienic conditions. Accordingly, leucorrhœa is believed to be more frequent in towns than in the country, although the statistics cited to prove this position are by no means free from fallacy. The feeble, relaxed state of health induced in Europeans living in tropical climates, is certainly often attended by leucorrhœa; and in this we see another example of the relationship between leucorrhœa and hemorrhage. Thus, I have known instances of women who always suffered from leucorrhœa whilst in India, remain free whilst staying in England.

Diet has been supposed to have some influence in the production or promotion of leucorrhœa. No doubt a diet deficient in nutritive power may, by inducing general debility, favor the occurrence of leucorrhœa; and it is equally certain that a good nutritive diet, by imparting tone and general health, will tend to prevent or cure leucorrhœa; but I am not aware of any precise observations to prove that any particular articles of food have a distinct or specific action in promoting leucorrhœa.

Leucorrhœa is common in association with disorder of the digestive organs. Dyspepsia, flatulence, distension of the stomach and abdomen, constipation or diarrhœa are frequently observed. To determine which was the antecedent disorder is not always easy; but this much is certain: almost all the dyspeptic women who have copious leucorrhœa, and in whom physicians are so ready to explain the leucorrhœa by the disorders of digestion, have uterine disease. Leucorrhœa rarely lasts any considerable time without entailing dyspepsia and mal-nutrition. Leucorrhœa may, however, be an expression of vascular turgescence, the result of difficulties associated with the liver, kidney, or heart. How local hyperæmia, depending upon remote or general causes, may give rise to leucorrhœa, is well illustrated in the hypersecretion of pregnancy.

Leucorrhœa is frequent among women who follow sedentary occupations, and in whom the bowels are habitually loaded. I have known women who were leading a fairly active life always subject to leucorrhœa when their bowels were constipated. The same condition favors menorrhagia.

But after making every allowance for the influence of disordered digestion, and of other distant or indirect factors in producing leucorrhœa, the fact remains that in the great majority of instances, after childhood, leucorrhœa is dependent upon some uterine abnormality. I may repeat what I have already said that almost every morbid condition of the uterus is liable to be attended by discharge. When there is acute or chronic endometritis, abrasion, tumor, polypus, or displacement, leucorrhœa is rarely absent. Hence the significance of leucorrhœa as a symptom pointing to uterine disease. Generally it may be stated that *when leucor-*

*rhœa is constant it is* significant of uterine disease, that is, of a persistent cause; and that *when intermittent*, that is, ceasing between the menstrual epochs, it is of purer physiological import.

In women who are in any way constitutionally predisposed to leucorrhœa slight causes will provoke it. Excessive exercise, as in walking, excess in sexual indulgence, the wearing a pessary, in short, almost any local irritation is sufficient. When there is no special predisposition, the like causes long acting may provoke leucorrhœa. The presence of a tumor in the wall of the uterus attracting an undue quantity of blood, the chafing of a polypus against the walls of the cervix or vagina, or even the presence of a hypertrophied vaginal portion will seldom fail to produce leucorrhœa.

The division of leucorrhœa into *uterine*, *vaginal*, and *vulvar*, as propounded by Donné and Tyler Smith, is based not less on clinical than on anatomical foundation. As we have seen, the microscopical and chemical analysis exhibits distinctive characters, and the pathological history too is often different. It may be stated as a general proposition, one admitting, indeed, of numerous exceptions, that vulvar leucorrhœa is more peculiar to childhood, vaginal to young women, and cervical and uterine to middle and advanced age. All the forms may coexist in the same patient, but in many one may exist alone. This is especially the case with the vulvar leucorrhœa of children. It is also often true of the vulvar leucorrhœa attending pruritus in aged women. The characters of the discharge in vulvar leucorrhœa are different at different ages. Thus in children in whom the sebaceous glands are not yet developed the discharge is serous or sero-purulent, resembling that which results from eczema of the skin. At puberty, and during the child-bearing epoch, the same kind of sero-purulent secretion may exist, but it is commonly mingled with the proper secretions of the vulvo-vaginal glands and of the sebaceous glands which are at the acme of their development at this time. The secretion will be viscid, unctuous, giving a characteristic cheesy or fishy odor. The vulvar leucorrhœa of advanced age reverts to the characters of infancy, the sebaceous follicles having in great measure disappeared from atrophy.

*Vaginal leucorrhœa* at all ages consists essentially of an exaggerated formation and shedding of pavement epithelium scales (see Fig. 37). In many instances a great part of the fluid element of the vaginal discharge arises from the cervical cavity.

*Cervical leucorrhœa* is most frequent in the child-bearing period. It is chiefly mucous; it exhibits the characters seen in Figs. 35, 36.

*Uterine leucorrhœa* or catarrh will vary in character according to age. During the child-bearing epoch the uterine glands contribute a quantity of mucus to mix with the epithelial *débris*. At a later period the epithelial *débris* assumes a creamy or milky consistence from fatty metamorphosis and the admixture with a serous exudation. In all the cases pus may be found if there is breach of surface, as from ulceration and granulation. Uterine and cervical leucorrhœa is a frequent attendant upon dysmenorrhœa, especially of that form which is characterized by partial retention. If there be atresia or narrowing at the os externum, the congestion consequent on the futile attempts of the uterus to expel its contents



excites to increased activity of the uterine and cervical glands. And the product of this increased activity finding in its turn difficult escape, tends to accumulate, and to dilate the cavities of the cervix and body of the uterus. Thus spasm or colic is excited, and the mucous accumulation may be expelled *en masse*. It is in this way we account for the frequently intermittent character of leucorrhœal discharges.

If called upon to describe summarily the distinguishing characters of uterine, vaginal, and vulvar leucorrhœa, we might say that the first is mucous, the second epithelial, and the last sebaceous. The somewhat greasy character of vaginal leucorrhœa is mainly attributable to the fatty metamorphosis of the epithelial scales.

*The leucorrhœa of children* deserves careful attention. The occurrence of a discharge being often attended with local irritation, the child is likely to resort to friction or scratching for relief. The redness and tumefaction thus added to the discharge are very apt to excite suspicions of foul play, and thus to lead to false accusations. It is therefore in the last degree important to bear in mind the conditions under which leucorrhœa in children may arise, lest we too hastily adopt the suspicions that may be suggested to us by others.

Many years ago[1] I made the observation that acute exanthemata, as smallpox and scarlatina, which we know affect the whole mucous tract, as well as the skin, occasionally left, as sequelæ, vaginitis and leucorrhœa even in children. Graves, Scanzoni, and others have confirmed this observation.

Strumous children are especially subject to vaginal and vulvar leucorrhœa. Irritation of the rectum as from ascarides, commonly produces it. In children of this taint it alternates with, or accompanies crusta lactea or impetigo, herpes, eczema. It is said to be due to the irritation of teething, but this I have not noticed, except in cases where a strumous diathesis offered a sufficient explanation.

In many cases the vulvar leucorrhœa in children is kept up by neglect of cleanliness.

The principal features which would favor the conclusion that leucorrhœa observed in a child is due to a criminal attempt, are: marks of contusion, swelling, ecchymosis, turgescence of the vessels of the vulva and vagina; extreme rapidity and intensity of the disease. If there was gonorrhœal infection, then there will be a purulent discharge, greenish-yellow in color, copious enough to bathe the external parts and to stain the linen, thick enough when drying to glue together the lips of the vulva, and flowing equally from the vagina and urethra. This urethral complication is especially important, for according to Tardieu, violence done to the sexual organs of a child by a healthy man may produce an inflammation as acute, and a discharge as copious and thick, as that done by a man affected with gonorrhœa.

It is obvious from the foregoing considerations that the greatest possible circumspection is necessary before committing one's self to the expression of a positive opinion as to the origin of an apparently virulent discharge in a child.

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[1] Medical Gazette, 1850.

A question which has attracted some attention is this: Does the leucorrhœal discharge by contact with the mucous membrane, on whose surface it is retained or over which it flows, exert any irritating or injurious action? We frequently find associated with leucorrhœa patches of the surface of the vaginal portion denuded of epithelium, small ulcerations they may be called, a state of tumefaction, even redness. Are these caused by the leucorrhœa? In the majority of cases they assuredly are not. They mostly take their origin in those processes which produced the leucorrhœa as well. They are frequently the consequence of labor or abortion, during which processes the cervix uteri undergoes severe injury. It is conceivable, however, that long-continued maceration of a mucous membrane in leucorrhœal fluid may effect some alteration, as softening of its tissue, and this, leading to excessive exfoliation of its epithelial layer, may facilitate the denudation of the basement layer. This would be especially likely to happen under the influence of any unusual accidental irritation, as excessive walking or sexual indulgence. Dr. Tyler Smith, however, submitted that sometimes the discharge possessed decided acrid or irritating properties, capable of directly inducing ulcerations, granulations, follicular cysts, and other disorders. That is, he looked upon leucorrhœa as a primary disease. This opinion appears to me to want confirmation. It is intelligible that the permanent increased turgidity of vessels, and the consequent altered condition of the tissues attending habitual leucorrhœa, may in the end entail the alterations named. But this is a different thing from their direct production by the irritating property of the discharges.

If fluid be retained inside the cavity of the uterus, then it will act mechanically according to hydrostatic laws. It then excites contractile efforts of the uterus, and as the fluid does not escape, or only partially, the equal eccentric pressure of the fluid against the walls of the containing cavity leads to the dilatation of this cavity. Its retention on the surface of the mucous membrane would also interfere materially with the performance of some at least of the functions of this membrane, as, for example, the healthy course of menstruation and the carrying of spermatozoa.

There is, however, reason to believe that the sebaceous secretion of vulvar leucorrhœa, if retained, may become especially offensive and acrid, and keep up or produce an inflammatory state of the tissues bathed by it. Another question has been started: Can the secretions classed as leucorrhœa be absorbed, and give rise to constitutional toxæmia? I content myself with citing the question. I know of no precise evidence to support an affirmative answer. There is, however, evidence to show that such poisons as lead, carbolic acid, chromic acid, used to vaginal surfaces bared of epithelium, may be absorbed, and produce their specific toxical effects on the system.

It is also certain that foul secretions retained *in utero* may be taken up into the uterine veins and lymphatics, and give rise to inflammation of the broad ligaments, peritonitis, and general septicæmia. This is especially the case in the puerperal state after childbirth at term and after abortion, and also from cancerous ulceration.

But these facts, although proving that the way is open to invasion, do not prove that the system is ever so invaded by the matter of ordinary leucorrhœa.



The *diagnosis* of the kinds of leucorrhœa from each other is sometimes presumptive, sometimes almost absolute. It is generally presumptive in cases of constitutional disorder, as in strumous or chlorotic girls, in whom it may be reasonably inferred that there is no uterine lesion, and in whom physical exploration is not pursued. Diagnosis is still presumptive, even in married women who have had children, until local examination is made. The sources of the discharge may be demonstrated by the speculum. We may actually see the viscid albuminous secretion coming out of the cervix. So again in the chronic uterine catarrh of old age, with atresia of the os externum, and in that form which is associated with dysmenorrhœa from retention, we may by dilating the os uteri give vent to the retained secretion.

Not rarely, leucorrhœa exists to a very considerable degree, and yet escapes the observation or attention of the subject. Women not seldom, when questioned as to the existence of discharge, say they have none, whilst examination shows copious collection of mucous fluids in the vagina, and issuing from the cervix uteri. This arises from the patient either not being conscious of the escape of discharge, or being careless about it. Sometimes the uterine viscid secretion is expelled in a mass during defecation, and thus is not noticed.

This unobserved leucorrhœa might be called "occult leucorrhœa." As a general rule, wherever leucorrhœa exists, other subjective symptoms are present, and indicate the expediency of examination.

*Treatment.*—The principle in therapeutics should be, first, to determine whether the leucorrhœa depend upon or be complicated with any constitutional diathesis or disorder. If this be determined in the affirmative, our treatment should first be directed to the correction of this complication.

The treatment, even when the leucorrhœa depends upon a morbid diathesis, is general and local. We may, for example, accomplish a certain amount of good by internal remedies and hygienic means, in producing improved general nutrition, and thus in improving the condition of the tissues, including the affected mucous membrane. And in some cases, perhaps in many, these general measures may be successful. This is especially true of the strumous and chlorotic cases. But in others, topical applications to bring about a healthier tone of the mucous membrane will be extremely useful, if not indispensable. We must not then too hastily assume that the treatment of strumous or of syphilitic leucorrhœa resolves itself into the constitutional treatment of the struma or the syphilis. When the conjunctiva is affected with catarrh or other form of inflammation which takes its rise in, or some of its characters from a strumous or syphlitic taint, we find the most precious adjuvant in topical applications to the eye. So of the skin. No less so is this the case with uterine and vaginal leucorrhœa. It would unnecessarily encumber this work to enter with any degree of detail into the general treatment of scrofula or syphilis. If I pass this by, it is not because I in any way undervalue its importance. General treatment is indispensable.

Before topical treatment is adopted, we ought to form a fairly precise

diagnosis as to the source of the leucorrhœa, that is, whether it be uterine, vaginal, or vulvar. It is for want of attention to this point that vaginal injections are found to be so often useless. Vaginal injections fail, because they do not touch the main seat of the disorder, which, in the majority of cases, is in the uterus itself. But although they fail to cure, they may be useful as far as they go. In constitutional leucorrhœa, the vaginal mucous membrane as well as the uterine is commonly involved; and something is gained if we improve the condition of a part of the affected tract. There is, therefore, sufficient reason to prescribe them, and thus to enlist the patient in her own service. She may herself mangage the vaginal injection. For the topical treatment of the uterine mucous membrane she must have recourse to her physician.

The most useful and convenient topical applications in strumous and most other forms of leucorrhœa are astringent liquids. Amongst these, acetate of lead, sulphate of zinc, sulphate of alumina, decoction of oak-bark, solutions of tannin are the best.

The topical applications best suited for the interior of the uterus are sulphate of zinc, nitrate of silver, sulphate of alumina, iodine. The best mode of applying these will be described hereafter. Emmet[1] extols hot vaginal injections. Their first effect is dilatation; secondly, contraction. The hips must be raised, and a properly-shaped bed-pan be placed underneath. A gallon of water at 98° F. must then be slowly injected. This must be done by a nurse. It allays local irritation, and soothes in less time than any drug.

In the case of syphilitic taint the same means are useful, but in addition I commonly use the iodide of mercury ointment, introduced by means of the ointment-carrier, I have contrived for the purpose.

In the strumous leucorrhœa of children, cod-liver oil and iron are of signal service.

2d

The second indication is, if we discover any local disease, as a tumor, a polypus, displacement, abrasion, congestion, hypertrophy, to endeavor to remove this cause or complication.

3rd

The third indication is, in the event of our detecting no constitutional diathesis or local disease, to treat the leucorrhœa as an independent disease, if the discharge be excessive or entailing obvious local distress or general weakness. In this class of cases we should begin by correcting any disorder of the digestive organs. We should be especially careful to regulate the action of the bowels, to remove and to prevent the accumulation of feces in the lower bowel. We should then endeavor to restore the general tone and strength by good diet, tonics, and exercise. Amongst the remedies most useful are strychnine, iron, quinine, and arsenic. The last is often remarkably efficacious in leucorrhœa depending upon debility. Local remedies, as alum or zinc injections, are often useful adjuncts; but in young women, in whom the presumption is against any morbid condition of the mucous membrane, they will be generally unnecessary, and for other reasons it is desirable to avoid them.

Balsamic medicines, especially turpentine, are often very useful, and now that they can be given in capsules, or "pearls," the chief objection

[1] New York Med. Journal, 1874.



to their use is overcome. Courty speaks highly of the advantage to be derived from tar-water mixed with the wine drunk at meals. It is made palatable at first by mixing with seltzer-water. The same excellent author extols hydro-therapeutics. In the chronic forms of leucorrhœa cold water in every form, as full baths or hip baths, produces the best results. It is, at the same time, the best revulsive and the best tonic.

In this chapter I have attempted to give merely a general account of leucorrhœa, regarding it, as for practical purposes it often is regarded, as a distinct pathological condition. Leucorrhœa, as a symptom dependent upon morbid conditions of the uterus and vagina, will be incidentally described as a part of the history of these several morbid conditions.

The watery and purulent discharges might not inaccurately be included under the common head of "Leucorrhœa." It will be useful, at any rate, to study them in this connection.

### THE WATERY DISCHARGES.

When these occur, we must first of all determine the presence or absence of pregnancy. It is no uncommon thing that discharges of water, more or less profuse, take place in pregnant women. This is the "*hydrorrhœa gravidarum.*" Gushes of water, quite clear, may occur at almost any time during pregnancy; but they are more frequent in the latter months, and especially in the last month. Happening at this time, they are commonly taken as an indication of commencing labor, and many are the false alarms which patient and doctor have to suffer from this cause. "The waters have broke," says the nurse. You go, as in duty bound, and find probably the os uteri closed, nothing resembling active labor pains. What are you to do? If you wait for labor, you may wait for a week, or two or three weeks. If, on examination, by ballottement, you find the child still floats in the uterus, the os uteri not open, and no active pains, you may go home and wait in peace for another summons.

What is the source and nature of this hydrorrhœa gravidarum? Several theories have been expounded. The character of the fluid differs in some respects from that of liquor amnii. It is odorless and resembles blood-serum or the serous fluid effused in the peritoneal sac. Ruysch and Rœderer thought it came from rupture of lymphatic vessels, or of hydatids of the uterus; Böhmer thought it escaped from a second abortive ovum; Delamotte and Cruveilhier that it came from a cyst near the ovum; Deleurye, Puzos, Naegele, and Dubois that it came from the inner surface of the uterus, being secreted externally to the ovum. Dubois says it is the result of loosening of the membranes from the uterus when the vessels pour out serum. Hegar says the source is the uterine glands of the decidua. Thus he describes[1] the glands of the mucous membrane as being found in decidua at the sixth month of gestation, and argues that their sudden disappearance in the subsequent months is improbable. In a case of hydrorrhœa he found in the decidua vera, at the beginning of the eighth month, an enormously developed glandular body. At the bottom of this morbid growth was a general hypertrophic condition of the

[1] Monatsschrift für Geburtskunde, 1863.