ends thus diverge like two valves, stretching the roof of the vagina, and giving an excellent view of the vaginal portion.

The withdrawal of the instrument is very simple. The two blades are removed separately, the anterior one first. The gentlest traction in a curved sweep following the curve of the blade will bring the instrument out, the contraction of the vagina helping to expel it.

CHAPTER VI.

THE PATHOLOGY OF THE OVARIES.—THE HISTORY OF MENSTRUATION AND ITS DISORDERS.

The relation of the ovary to the function of menstruation has been referred to when describing the anatomy of this organ. A few further observations upon this subject are necessary to serve as an introduction to the study of the disorders of menstruation, and of the organic diseases of the ovary.

The most important laws in this application to pathology are illustrated in the following facts:—

The *catamenia*, the name given by Aristotle to the monthly discharge from the uterus, indicates the periodicity of menstruation. In all languages, and throughout all ages, names indicating this periodicity have been adopted. The "menses," "menstruation," "les mois," "les règles," are examples.

But this character of periodicity, so striking, was not traced to its true cause or connection until the present century. It was scarcely suspected, certainly not demonstrated, that the periodical monthly flow was dependent upon another periodical act, the ripening of ova. Dr. Power, a man of singular sagacity, seems to have been the first to seize upon this great fundamental fact. In 1821 he distinctly enunciated the theory. Girdwood, in 1826, brought new observations in proof. It was, however, warmly disputed in this country, especially by Dr. Robert Lee, whose authority probably retarded its general acceptance, so that it was not until Négrier,[1] in 1831, working as it appears independently, proved by adequate researches and anatomical preparations, that the outward and visible periodical discharge of menstruation was the expression, the consequence of an internal and hidden, but superior function. Gendrin, Paterson, Raciborski, Bischoff, and others followed with fresh proofs which are generally held to have established the theory. The preparations of Coste, preserved in the College of France, show the following

[1] Recueil de faits pour servir à l'Histoire des Ovaires. Angers, 1858.

points: A Graafian vesicle, the ripening of which always coincides with the turgescence of the genital organs, pursues the course of its development during the various phases of menstruation; and, according as the circumstances are more or less favorable, it may burst at the commencement, or towards the end, or at any moment of this periodical discharge. In a woman who died on the first day of the appearance of the menses, the ovarian vesicle was manifestly ruptured. In another, who died four or five days after the cessation of the menses, the right ovary presented a vesicle still intact, but so distended that the slightest pressure made it burst. Lastly, in a young virgin, who died fifteen days after menstruation, there was no recent trace of a yellow body, and it could not be doubted that the Graafian vesicle had been arrested in its development. The subjects of these observations had all died a violent death in the midst of health.

Thus, we may conclude that at each menstruation a Graafian vesicle assumes a marked preponderance over the rest, arrives spontaneously at maturity, and, generally, bursts at an indeterminate moment of this period, in order to expel the ovum it contains. But, nevertheless, in certain cases this vesicle may also remain stationary, or be totally absorbed. The double phenomenon is analogous to what is observed in other mammifera, during the rut.

Rœderer[1] observed that the ovaries grew towards the epoch of commencing menstrual life, and became atrophied at the menopause. He distinctly found that the atrophy of the ovaries was more marked and more closely associated with the cessation of menstruation than was the atrophy of the uterus.

If the ovaries are absent or ill-developed, girls do not menstruate, the breasts are flaccid or defective in development; the characters of womanhood do not become manifest. This may be said to be experimentally proved by the celebrated case of Pott. A girl, aged 23, of good constitution, went to Bartholomew's Hospital, in consequence of two tumors situated in the groins, which had for several months caused her so much pain that she could not attend to her work. She was healthy, and menstruated regularly. The tumors were soft, uneven, easily movable, and lay externally to the tendinous apertures of the inferior abdominal wall. Pott determined to remove them. After dividing the skin, a thin membranous sac was found, in which a body was inclosed that was taken to be the ovary. It was removed, and the same operation was repeated on the other side. From this time forth she never menstruated, her breasts fell away, and the muscular system became developed as in man. Since ovariotomy has been so widely practised several cases have been observed in which both ovaries have been removed. In some of these menstruation has continued to recur. Still it may be affirmed as a general law that when the ovaries are extirpated or become atrophied, menstruation does not reappear. Raciborski says the menses may be a little postponed, but that this does not always prevent the follicles from pursuing their regular course, and from accomplishing dehiscence. He has seen on ovaries of young girls one or two cicatrices, although they had never

[1] Icones Uteri Humani, 1779.

menstruated. Thus also women who had never menstruated have conceived. Whitehead relates cases. But these cases are rare. Conception during lactation whilst menstruation is suspended is not uncommon.

The first dehiscence corresponds with the first appearance of the menses.

Dr. Ritchie[1] also adduced evidence to show that ovulation may go on although there is no menstrual discharge. Negative observations, then, as to the menstrual flow do not prove that ovulation is also suspended; and ovulation is obviously the condition of impregnation.

Objections, however, to this theory have been urged by W. B. Kesteven[2] who may be said to have led a reaction against it. He insists that: "1. Menstruation is a *periodical* function of the uterus; 2. That ovulation is the *constant* function of the ovaries; 3. That ova are discharged at all periods of female life, in the intervals of, as well as at the time of, menstruation; 4. That ovulation and menstruation being often concurrent, indicates that they are both the result of the attainment of a certain point in the development of the female economy; 5. That the law of periodicity in the one not obtaining in the other, leaves still wanting the link in the chain of causation, whereby menstruation can be shown to be the effect of ovulation; 6. That at the menstrual periods the ovaries experience an extension of the uterine congestion, and become, equally with the uterus, the seat of increased functional activity."

These objections have been taken up by several German writers. The only fact of importance added to Mr. Kesteven's argument is, that several women have continued to menstruate after the extirpation of both ovaries. We are probably not yet in a position to set forth absolutely the relations of these functions to each other, and to other processes in the economy. That the relation is intimate is certain; the order of occurrence or precedence is uncertain. But the objections cited are less weighty than may be supposed. That ovulation should sometimes fail to evoke menstrual discharge does not prove that it is not the normal efficient factor; and the recurrence of menstruation after removal of the ovaries, is explained by the habit of periodicity acquired during the ovarian activity. This habit is seen in climacteric women who often have periodical hemorrhages long after the atrophy of the ovaries and uterus. There is one remarkable circumstance which has not attracted the weight it merits in this discussion. It is this: Menstruation, the uterine function, is almost peculiar to woman; but ovulation is the universal law throughout the animal and vegetable world. The presumption is therefore overwhelming that it is the essential, the primary phenomenon. Another fact upon which I would insist is that in numerous cases pregnancy occurs at an early age, before the uterus, the nidus, is sufficiently developed for the accommodation of the ovum; and that in such cases abortion is the common issue. Analogous cases occur at the other extreme of sexual life; conception occurs when the uterus is undergoing the atrophy of reproductive extinction. Here again abortion is the frequent issue. Here we have evidence of attempted response of the infantile or the senile uterus to the ovarian

[1] Ovulation during Amenorrhœa. Ed. M. & S. J., 1845.
[2] London Medical Gazette, 1849.

stimulus. Since then, the ovary begins to act before, and continues to act after, the uterus is fit for its share in the work of reproduction, the presumption is strong that the ovary is the initiative organ, the *primum mobile* in generation. This view is further strengthened by the following observations of Professor Laycock: "When we remember the influence of the ovaria in exciting abnormal development of other structures connected with them, as the larynx, mammæ, and thyroid body, the changes which they undergo often resembling those consequent on pregnancy, we may hypothetically infer that similar changes may occur in an appendage having so close a connection with the ovaria as the uterus, and that an hypertrophy of that viscus may be produced, giving rise to all the phenomena of pregnancy, and originating in ovarian irritation."[1] Of so little importance indeed is the uterus that reproduction may be successfully carried through without a uterus. There are many examples of this in the animal kingdom; and the history of extra-uterine gestation proves the same proposition in woman.

Nor must it be supposed that the phenomena of ovulation and menstruation are strictly local. In my Lumleian Lectures, and in various other writings, I have pointed out that menstruation, and probably ovulation also, are, like pregnancy, preceded and accompanied by, 1. Increased central nerve-irritability; 2. Increased vascular tension. There are three associated phenomena which strike the observer. A general increase of nervous and vascular tension; ovulation or the enlargement of the ovary; the development of the uterine mucous membrane and the menstrual flow. Do these phenomena, essentially concurring as they do in the accomplishment of one definite purpose, arise simultaneously; do they arise successively; and if they arise successively, what is the order of succession? Upon this question I am in a position to throw light. I have had the opportunity of observing in my ward at St. George's Hospital a case in which there was hernia of the left ovary. Thus the organ, naturally removed from direct observation, offered itself to continuous inspection. Observations were made—1. Of the vascular tension as tested by the sphygmograph; 2. Of the temperature; 3. Of the size, and other conditions of the ovary; 4. Of the appearance of the menstrual flow. The vascular tension was noted first; then the flow and the swelling of the ovary nearly simultaneously.

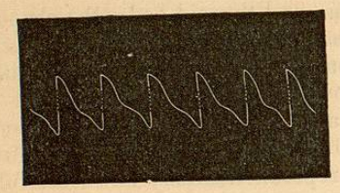
The following tracings (Figs. 59, 60, 61) are taken by Dr. Fancourt Barnes: Fig. 59 shows the high tension preceding the menstrual flow, Fig. 60 shows the extreme high tension at the end of gestation. It is comparable to the high tension of chronic Bright's disease. Fig. 61 shows the ordinary tension after menstruation. The fall quickly follows the menstrual flow.

Amongst the lastest investigations that have attracted attention are those of Kundrat and Engelmann.[2] These authors consider that the menstrual hemorrhage is a retrogressive process, under which the superficial layers of the mucous membrane, having undergone fatty degeneration, are being exfoliated. It would follow from this view that with the ap-

[1] Nervous Diseases of Women.
[2] Stricker's Med. Jahrb., 1873.

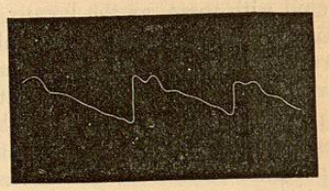
pearance of the menstrual hemorrhage the generative processes of the period are brought to a close, and that a conception occurring at any moment after this time, must be due to a newly-discharged ovum which imbeds itself in the mucous membrane as it is newly formed. They,

Fig. 59.



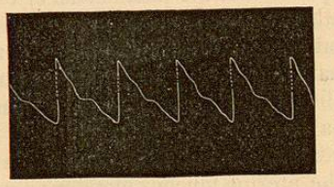
High Tension preceding Menstruation.

Fig. 60.



High Tension in Ninth Month of Gestation.

Fig. 61.



After Menstruation; Tension fallen (after Fancourt Barnes).

however, appear to overlook the general nervous and vascular tension, an essential factor in the process. And the analogy they assume between fatty degeneration of the mucous membrane in connection with menstruation and fatty degeneration of the placenta at the end of gestation fails, by the fact that the placenta does not, under normal conditions, undergo fatty degeneration. The theory that the placenta underwent fatty degeneration preparatory to labor was started by Druitt whilst studying my original researches. It is disproved by observation, and is at variance with physiology, since vessels in degeneration would become unfit for their function, and this at a time when the function is at its highest pitch, and calling for perfect integrity of tissue.

Menstruation, then, is the natural epoch for the escape of ova; and, consequently, it is the most favorable to conception. But a question of great interest is attached to this conclusion. Do the epochs of ripening and of the natural fall of the ova always and of necessity return in a regular manner? That is, are there not other influences besides the rut and menstruation, capable of hastening the epochs of maturation and fall of the ova? This must be answered in the affirmative. Thus, the pigeon in its wild state lays eggs only once or twice a year, whilst in our pigeon-houses it lays seven or eight times. Hens, whose eggs are taken away from them to prevent their sitting, lay almost every day for eight months in the year. The rabbit, which in a state of liberty has only one or two litters a year, has perhaps seven when its young are taken away at a suitable time. The period of maturation, then, far from being

immutable, appears to depend upon certain conditions which may accelerate or retard it. Similar conditions exert similar influences in woman; and there is reason to believe that sexual intercourse may hasten the maturation of ova, and especially their escape from the ovary.

Admitting, however, as we must, the occasional operation of disturbing circumstances, the general law is that these phenomena are reproduced periodically; and that during the periods when they are mainifested certain signs attend, which in the aggregate bear the name of *menstruation*. Consequently the ripening of ova, and most frequently their dehiscence, are revealed outwardly by the *appearance of the catamenia*.

We may now conveniently study this function from a clinical point of view, fixing our attention mainly upon those phenomena which are open to direct observation. Pouchet[1] has distinguished the different phases of menstruation with great precision, by defining its different periods, and by comparing, by help of the microscope, the discharges attending it with those of the intermenstrual period.

Characters of the Menstrual Discharge.—The *first* sign of the advent of the menses is the manifestation of a particular odor imparted to the mucus secreted by the sexual organs. The second sign is a change of color of the utero-vaginal mucus; at first, dull white, it becomes brownish; some blood-disks, mingled with numerous mucous globules and fragments of epithelium, floating in the liquid account for this change of color. The first period lasts one or two days. Sometimes it immediately precedes the flow of blood; sometimes the mucus becomes normal again; then, after an interval of a day, blood, almost pure, suddenly escapes from the vulva.

The flow of ruddy blood constitutes the *second period*. The fluid secreted is composed of blood, not differing from arterial, mixed with vaginal mucus. By the microscope we find mucous globules in various stages of development, thin fragments of transparent epithelial scales, mixed with innumerable blood-disks. This flow usually ceases in three or four days; but in some women it is continued for seven or eight days, without obvious departure from the physiological condition.

The menstrual blood differs from pure blood, in not coagulating; that is under ordinary conditions. Dr. Whitehead explained this by showing that the vaginal mucus has an acid reaction, and that contact of the blood with this acid prevented its coagulation. Donné also says that menstrual blood is acid, containing phosphoric and lactic acids. Mandl, however, showed that the smallest quantity of pus or mucus stopped blood from coagulating. Now, the menstrual discharge is blood mixed with mucus. That admixture with mucus accounts for the fluidity of the menstrual discharge may be admitted; and so long as the quantity of blood is within normal bounds, the proportion of mucus supplied is sufficient; but if the blood be in excess, and if it be retained a little while, it will coagulate. Thus it is that in menorrhagia clots are frequently passed.

The quantity of the blood exhaled becoming less and less abundant, its color changes from red to brown, the proportion of blood-disks diminishes, whilst that of the mucous elements increases: at length the

[1] Théorie Positive de l'Ovulation Spontanée. Paris, 1847.

mucus itself becomes thinner. It is especially at the end of this period that the Graafian vesicles may burst spontaneously.

When the menstrual discharge has ceased, the internal surface of the uterus, and also that of the vagina, cast off numerous epithelial scales, at first nearly entire, but soon reduced to fragments of more or less tenuity. These scales or *débris* constitute during the first intermenstrual days the greater part of the solid elements contained in the excretions by the vulva; the rest is composed of a variable number of mucous globules. Virchow insists that the detachment of the uterine mucous membrane is more complete than is generally supposed, and that in normal menstrual blood heaps of cells are often met with, which by their structure reveal their origin in the uterine glands.

As in women who have already menstruated, the menses are preceded by a modification in the quantity and color of the normal secretions; so in the girl, who, having not yet menstruated, has arrived at puberty, the menstrual hemorrhage is often preceded by a serous whitish or brownish discharge. This discharge may anticipate by several months the appearance of the blood, and may recur several times before this makes its appearance. Often also after the first sanguineous discharge in a young girl, several months may intervene before the menses set in.

The similarity of the phenomena attending the first advent and the climacteric cessation of menstruation is especially deserving of note. There is, 1. Irregularity as to periodicity. 2. Occasional excess of blood-loss, amounting to hemorrhage. 3. Alternate enlargement and subsidence of the abdomen. 4. Pain and induration of the breasts.

The quantity of blood discharged at each epoch varies in different women, and in the same woman under different circumstances. It usually ranges from three to four ounces. Generally it is more abundant in women living in luxury. And, according to Burdach and Brierre de Boismont,[1] it is more copious in hot than in cold countries. Our countrywomen in India are more subject to menorrhagia that when in England.

A vulgar error still prevails that the menstrual blood has fetid or even poisonous properties. This is only true under the conditions of retention, of uncleanliness, or admixture with the products of disease.

The Source of the Menstrual Blood.—Haller was aware that it came from the womb. Observations in point have been made under two different conditions; that is, in the living and in the dead. First, the uterus examined in cases of complete prolapsus, and where there is no prolapsus, by the speculum, blood is seen to issue from the os uteri; and in cases where the uterus is turned inside out the menstrual blood is seen directly oozing from the mucous membrane of the body of the uterus. Secondly, on examining the bodies of women who have died during menstruation, Coste and others, myself among them, have seen the vascular apparatus of the uterus developed and injected in an extraordinary manner. The vascular structure of the mucous membrane, in particular, forms on the surface, under the fine layer of epithelium which covers it, a beautiful network, each mesh of which incloses a glandular tube. This vascular

[1] De la Menstruation dans ses Rapports Physiologique et Pathologique. Paris, 1842.

reticulation is so marked and rich that it gives a more or less deep violet tint to the inner surface of the uterus. According to all probability it is through the walls of these ramuscules that the menstrual blood oozes. "In one case," says Coste, "death took place exactly at the moment when the blood began to ooze through the engorged vessels. There were seen in the course of these vessels an innumerable multitude of small red points, as if the mucous membrane had been pricked with a fine needle, each prick giving issue to a minute droplet of blood. Here and there, under the epithelium, were small ecchymoses, indicating that the hemorrhage, suspended by death, had not yet made a complete escape. In other women the phenomenon being more advanced, the cavity of the uterus was found filled with red fluid blood, about to escape by the neck."

Some experiments made by Matthews Duncan to determine "the power of the uterus to resist a bursting pressure" (1868), seem to me to find application here. Air was forcibly driven by a pump against a piece of uterus stretched over a tube. "It was curious," he says, "to observe the permeability of all the unruptured tissues to this fluid." The experiments being performed under water, the air bubbled up, or effervesced from the peritoneal surface by innumerable minute points. In all probability the mucous membrane of the uterus and the delicate coats of the bloodvessels offer even less resistance under the hydraulic pressure to which they are subjected by the increased local turgescence and general vascular tension attending menstruation. This oozing from a free surface is a protection against extravasation in closed cavities or tissues, which could not fail to be injurious.

This intense vascular engorgement involves the ovaries and Fallopian tubes as well as the uterus; and there is no doubt that blood is effused from the whole tract of the tubo-uterine mucous membrane. Dr. Letheby (*Phil. Trans.*, 1852) describes the microscopical characters of the menstrual fluid found in the tubes in the bodies of two young women who died whilst menstruating. The preparations are in the London Hospital.

Periodicity.—The typical periodicity is every twenty-eight days. In many women the return is exact to the day. There is, however, a range of variation in different women; in some the interval from the commencement of one menstruation to the return of the next is less than twenty-eight days, in others more rarely exceeding thirty days; that is, if strict periodicity be observed. In women whose intervals vary, being sometimes more, sometimes less than twenty-eight days, some pathological element probably exists.

The Age at which Menstruation begins.—In temperate climates, between the ages of thirteen and fifteen, concurrently with the appearance of other signs of puberty, as the growth of hair on the genital parts, and the swelling of the breasts, the menses begin to flow. Here, again, there are considerable variations. Cases are recorded of menstruation beginning at ten, and even as early as seven or six years of age. These must be regarded as instances of quite exceptional precocity. Retardation is more common; cases are not infrequent of the first appearance, or at least, of the fair establishment of menstruation, at sixteen or seventeen. In these there is mostly some pathological condition. Since the outbreak of this function of the uterus is a symptom or consequence of the entry

into active function of the ovary, it may be concluded that whatever causes hasten or retard the evolution or ripening of the ova, will have a corresponding effect upon menstruation.

Hence luxurious living and libidinous excitement tend to forestall the ordinary period, whilst the contrary conditions of hard living and freedom from sexual emotion tend to postpone it.

Climate has been said to have a powerful influence. The observations of Brierre de Boismont and others seem to have proved that the advent of menstruation is decidedly earlier in hot climates than in cold. And common observation proves that, tested by their physical and intellectual characters, girls pass into womanhood at a somewhat later age in cold and temperate climates; whilst the women in hot climates fall at an earlier age into sexual decrepitude.

In Siam, according to Dr. Campbell (*Edin. Med. Journ.*, 1862), some girls arrive at puberty at twelve, but the more usual ages are fourteen, fifteen, and sixteen. Dr. Goodeve gives about twelve as the mean, and Dr. Leith, of Bombay, twelve and a half. But of a series of cases tabulated by him, the largest number menstruated after fourteen. In Germany Schroeder says menstruation generally begins at fifteen, and ends at forty-five. According to Louis Mayer, brunettes begin earlier than blondes.

The influence of cold is further seen in the character of the menstruation. Thus, Dr. McDiarmid, surgeon to Sir John Ross's Arctic Expedition, says that amongst the Esquimaux, menstruation is often delayed until the twenty-third year, and then only appears scantily during the summer. I also know women of feeble sexual development who menstruate in the summer only; and others who menstruate in India and not in England.

Probably, *race* may have as much to do with the period of advent of menstruation as climate. Observation of the Jews, who are to be found in almost every climate, might determine this question, and thus enable us to appreciate more accurately the influence of climate. Is the first appearance of menstruation amongst the Jews inhabiting different countries uniform or not?

Many cases of *precocious menstruation* are recorded. In some, the common signs of puberty appear to have been almost congenital. These cases form a class distinct in some features from the premature menstruation which appears at from nine to twelve years of age. Dr. Harris, of Washington (*American Journal of Obstetrics*, 1871), discusses the subject. Sir Astley Cooper narrates the history of a child which commenced to menstruate at three years old, and was last noticed by him when seven years and five months old; at this early age she had all the appearance of a thick-set stunted woman; she measured four feet one inch, and had so large a pelvis that she could no doubt have given birth to a child (*Lond. Med. and Phys. Journ.*, 1810). Le Beau mentions a similar case (*Annales d'Hygiène*, vol. x.). In the case of infantile puberty, the ribs and pelvis are excessively developed, and shortness of stature results. Where menstruation begins at eight or afterwards, the growth of the body is not usually interfered with. Bouchut adds a more recent observation:[1]

[1] Paris Médical, 1876.

N. O., born on 27th January, 1872, in London. Menses appeared at twenty-two months, and since every four weeks, equal in amount to that of adults. The appearance is preceded by *malaise;* she says "the abscess is going to burst." On the 16th April, 1876, the breasts are large, completely formed; there is a marked increase in their size at every menstrual epoch. There is down on the pubes, and there are other marks of development. A similar case is related by O. Wachs.[1] He also gives a fairly complete summary of the cases recorded by others.

That early menstruation depends upon early ovulation is further proved by the occasional occurrence of very early pregnancy. Several well-authenticated cases of girls being mothers at thirteen, or even twelve years old, are recorded. Dr. Roberton tells of a girl, working in a cotton factory, who was delivered of a full-grown child when only a few months advanced in her twelfth year. She had menstruated before falling pregnant. Mr. Smith, of Coventry, relates (*Record of Obstetric Medicine*, vol. i.) the case of a girl who at twelve years and seven months gave birth to a full-grown healthy child. She began to menstruate at the age of ten. Dr. J. G. Wilson reports (*Edin. Med. Journ.*, 1861) the case of a girl who began to menstruate when twelve years and six months old in January and until April. She was delivered of a full-grown child at thirteen years and six months.

In several cases of premature menstruation, exhaustion and death have occurred (Clifford Allbutt, *Med.-Chir. Trans.*, 1866). But this is not the rule. Kussmaul says precocious menstruation is sometimes the result of disease, especially of new growths in the ovary.

The period of disappearance of menstruation is more uncertain than that of its commencement. Usually about the age of forty to forty-five some irregularity begins. But the function often continues with complete regularity until forty-five and sometimes fifty, and even beyond. The instances, not infrequent, in which periodical discharges of blood, not distinguished by the subject from ordinary menstruation, are continued much beyond fifty, may, with considerable confidence, be suspected to be due to some abnormal condition. This is especially true when the issue of blood is greater in quantity and lasting longer than the subject had been accustomed to observe; and the presumption that some disease, local or remote, is present, is very great when profuse losses of blood, periodical or not, break out after the menstruation has ceased for some months.

It is a popular belief that, if a woman begins her menstrual life at an early age, she will cease to menstruate at an earlier age than those who begin later. Another mode of expressing this theory is to say that the epoch of menstrual life, that is, of active ovulation, and hence, of aptitude for conception, lasts for thirty or thirty-five years. Négrier's observations, however, seem to prove the reverse. He says: "It seems well proven that the ovarian function, creative of germs, is prolonged in life in direct ratio of the volume of the ovaries and of the precocity of ovulation; thus, the girl, nubile at twelve, will continue menstruating until fifty, or even fifty-five; whilst the girl who did not menstruate until

[1] Zeitschrift für Geburtsh. u. Gynäk. 1877.

eighteen or twenty, a fact which reveals feeble development and small energy of the organ, will cease to menstruate at forty, an early age." Considerable departures from this limit are probably due to some morbid disturbing element; and in many cases the departures are more apparent than real. For example, at the commencement, although no sanguineous discharge may mark the onset or establisment of menstruation for several months, or a year or two, there is no doubt that ovulation, the essential motive of menstruation, goes on. This is proved by cases in which pregnancy has occurred without menstruation. In other cases, a leucorrhœal discharge, "white menstruation" it might be called, returns periodically, attended by the usual indications of menstruation. In a third series of cases, even the white discharge may be wanting, and still a sluggish kind of ovulation may occur. This is observed in some forms of amenorrhœa.

At the other end of the history we sometimes find menstruation ceasing at a comparatively early age; that is, before forty, even at thirty-seven or thirty-six. These can hardly be instances where the allotted thirty years have run out, from having begun prematurely. Most frequently the explanation is that ovulation, or its exponent, menstruation, has been prematurely arrested by some intercurrent condition of the ovaries or of the uterus. Sir James Simpson described a condition in which the ordinary involution of the uterus which follows delivery, seems to pass the physiological bounds, and to proceed to positive atrophy, thus ushering in a premature senility. Whatever the explanation, I can attest the fact that women who have borne a child at thirty-six or thirty-seven have henceforth never menstruated or conceived again. In most of these women I have found the uterus reduced below its normal bulk, and presenting the other features of the senile uterus, whilst the breasts also, which obey so closely the impulse of the ovaries, have shrunk; these women are overtaken by an early climacteric.

In not a few instances, however, the explanation of Négrier holds good, namely, that the early cessation of menstruation is due to original feeble ovarian development. In these women the menstrual excretion is scanty and appears late; their languid genital capacity is exhausted long before the normal epoch.

In other instances the premature failure is due to the exhausting influences of disease.

The most distinct evidence that healthy menstruation may be protracted beyond the age of forty-five is drawn from the fact that pregnancy occasionally takes place after that age. But many of the cases of alleged child-bearing at advanced age are apocryphal. My own observation is in accord with the conclusions of Fordyce Barker.[1] He met in his own practice a lady born May 5th, 1801, who was delivered May 6th, 1852, and again in June, 1853. He knows two other women over fifty who became mothers. Dr. Barker says: "After the most careful and laborious research, I can find but one authentic case, based on the evidence of a reputable medical man, who carefully investigated the documentary proof, where a woman who had reached the age of fifty-five has

[1] Philadelphia Medical Times, 1874.

given birth to a child. This case is recorded by Dr. Davies, Hertford, England (*Lond. Med. Gazette*, vol. xxxix.). I feel warranted in stating the proposition that the laws of physiology, the experience of mankind, and the decisions of courts of law justify a medical man in declaring that a woman over fifty-five years of age is past the period of child-bearing."

Vicarious or ectopic menstruation occurs when hæmorrhagic discharges take place periodically from other organs than the uterus. The occurrence of this remarkable phenomenon is evidence of the force of the periodical habit. It seems as if every month a state analogous to plethora, or an accumulation of blood, arose, which must be relieved by evacuation. It is evidence of the high arterial tension attending menstruation. The active physiological process going on in the ovaries naturally determines the blood-current in especial force to the pelvic organs; hence the uterus is the natural evacuant organ. It is a remark made by Trousseau, that all the physiological discharges of blood take place from mucous membranes. A happy provision, for mucous membranes all lead to external outlets. It will generally happen, then, when the mucous membrane of the uterus is not disposed to execute its functions, that some other mucous membrane will supplant it. The most frequent seat of vicarious menstruation is the Schneiderian membrane. In young people especially, epistaxis is easily excited. Certainly *menstrual epistaxis* is a quasi-physiological phenomenon, which should be checked only with great circumspection. In some cases I have known epistaxis to accompany the ordinary menstrual discharge from the uterus; thus supplementing, not supplanting it.

Various parts of the alimentary canal may assume the work of the uterus. The stomach is perhaps the most frequently called upon. Thus we have *menstrual hæmatemesis*.

Hæmoptysis is occasionally a manifestation of vicarious menstruation. The right appreciation of this condition is obviously of great importance, lest it be misinterpreted as a symptom of tubercular mischief.

Other parts may, however, do similar duty. Thus we occasionally see *hemorrhage from the rectum*. And towards middle age, when hemorrhoids are not uncommon, these bleed more freely at the menstrual periods.

I have notes of cases in which menstrual hæmatemesis seemed to be hereditary. In some there is a distinctly hemorrhagic diathesis, as in the following instance: A young lady, aged twenty-four, had several attacks of hæmatemesis more or less profuse, and at last one which was so severe and protracted that she made a very narrow escape with her life. It appeared to be connected with menstrual deviation. She recovered fairly; but six months later, just when menstruation was due, having felt sick, and oppression at the stomach, she vomited a small quantity of dark blood, the menses appearing at the same time scantily. She never suffers dysmenorrhœa. A sister, when sixteen, who had hitherto menstruated scantily, had hæmatemesis at her periods. A brother, aged five, died of epistaxis after purpura. The father died of epistaxis at fifty-six, caused, his wife says, by intemperance, which produced epilepsy. Whenever he had a fit he had hemorrhage.

The *conjunctiva* is another mucous membrane which evinces a particular