Abstract of the Modern Works on Menstruation and Fecundation. By Dr Louis Mandl. (Archives Generales de Medecine, May 1845.)

Menstruation and fecundation have of late years been the subject of very important researches which disencumber the history of these two functions from a number of vague hypotheses. They give besides a new explanation, which appears to have a value so much the greater that it places under the dependence of a general law a fact which was usually regarded as an exception.

It is long since the existence of a spontaneous deposition of ova has been generally recognised in all classes of animals, with the exception of the mammalia and the human species. For long it has been recognised that the ovaries, as part of their natural function, formed ova in these animals, and that they were expelled without being fecundated, or requiring the participation of the male. Nevertheless human physiology had not profited by these researches, and fecundation was regarded as a particular function beyond the control of general laws. But after the discovery of ova in woman and the mammalia, it was only one step more to admit the spontaneous deposition of ova by women. Nothing was consequently more natural than the direction of the minds of the learned to this new field of research, in which MM. Negrier, Gendrin, Pouchet, Duvernoy, Raciborski, Bischoff, &c., have signalized themselves.

We shall soon have to expose the order of publication of each of their works; but we may remark in passing, without diminishing the merit of him who first announced the new theory, that new and interesting discoveries in science are never suddenly made. The history of the sciences shows that new ideas are formed by little and little.

It is M. Pouchet, we think, who has the honour of having most distinctly announced the laws which regulate the spontaneous deposition of ova by the mammalia. In his work he compares with logical acumen, the analogies which exist between women and the mammiferous females in so far as generation is concerned, and quotes the observations and experiments which support his opinion either in this work,* or, and indeed chiefly in a manu-

* Theorie positive de la Fecundation des Mammiferes, basee sur l'observation de toute la serie animale; Par F. A. Pouchet. Paris, 1842.

script memoir accompanied by an atlas, presented to the Academy of Sciences, and crowned by them on its last public meeting this year.

To make known to our readers these new researches on menstruation and fecundation we shall give an analysis of the work of M. Pouchet, without intending thereby to prejudge the merits of the other writers on this subject. But we have preferred this work, because it exposes in the most complete manner the new theory, and because it serves as a text for the observations of others.

M. Pouchet promulgates his researches under the form of ten fundamental laws, and of three accessary ones; and these we shall examine in succession.

First fundamental Law.—*In the phenomena of generation the human race forms no exception, but are subject to laws analogous to those observed in the lower animals; they are even perfectly identical with those of the mammalia.*

In all the higher animals the fundamental phenomenon of generation consists in the production of a certain number of ovules in the interior of the ovary, which ovules are afterwards fecundated by the male sperm.

The ovules produced in the ovary do not produce fœtuses unless they are first brought into contact with the prolific semen of the male; if this does not occur after a certain time they become altered and decomposed. It is generally during its passage into the sexual canal that the ovule is fecundated; but very often also the impregnation by the seminal fluid takes place after it has escaped from the body of the female, as we shall show by and bye.

No doubt can exist as to the identity of the generative phenomena in the immense legion of animals purely oviparous; while, on the contrary, with the mammalia, it was undecided by what process generation was affected, and it was believed that with them it followed a special law. Modern research has, however, proved that these animals form no exception to the general law; that they also produce ova; and that their minuteness alone had caused them to escape the research of inquirers. Thus was found demonstrated the co-relation which exists between the whole animal creation, a co-relation to which the human species forms no exception.

This fact admitted, there exists a great presumption that the fecundation and development of the ovum in woman take place according to the same laws which regulate those of the mammalia; for why (exclaims M. Pouchet) should generation in the human species be produced with a modification different from that which affects the higher mammalia.

Second fundamental Law.—*Generation among all animals takes*

place through the instrumentality of ova; some of the lower orders alone forming exceptions.

It is actually demonstrated that in almost all animals generation takes place by means of ova; and it was with good reason that Harvey advanced the celebrated aphorism, "omne vivum ex ovo,"—a fact afterwards proved by De Graaf.

For a long time it was believed that the mammalia were not reproduced by means of ova, and this idea was the cause of the true laws of the generation of these animals being misunderstood. Now it is no longer possible to admit this exception. The honour of demonstrating this fact is due to Baër.* This discovery was afterwards authenticated by Coste,† and by the researches which Valentin undertook in concert with Bernhardt.‡

The identity of the ova, in so far as the minute structure of their fundamental parts are concerned, is no less demonstrated than their existence in the whole animal series and in woman, as we can see from the works of Purkinje§ crowned by the Institute, from those of Coste,‖ John, Wagner, &c.¶

Third fundamental Law.—*In the whole animal creation the ova exist previous to fecundation.*

By means of a scrupulous and attentive inspection, it is positively ascertained, that in the whole animal creation, from zoophytes to man, the ova exist previous to fecundation, and that they become developed in succession and at different epochs. In fact, when we examine the female organs of all the invertebrated animals, we clearly discover ova previous to fecundation. With regard to insects this is easily proved, and has been long known. In so far as the vertebrata are concerned, we know that most fishes and reptiles even deposit their ova before they have been fecundated; and that it is either only at the moment when the female deposits them, or some time after that they are vivified by the male pouring over them the seminal fluid. We know also that birds during their love season bear in their ovaries a certain number of eggs before they are approached by the males.

All these facts are positively demonstrated, and no objection has ever been raised as to their correctness; nevertheless the mammalia, on account of the minuteness of their ova, which had caused them to escape observation, were considered as forming an exception to the general law.

Modern investigators, however, have recognised that the ovaries of virgin mammalia also contained ova in different degrees of

* Baer, De ovi mammalium et hominis generi. Leipsic, 1827.

† Coste, Recherches sur la generation des mammiferes. Paris, 1834.

‡ Valentin, Symbolæ ad ovi mammalium historiam ante impregnationem. Breslau, 1834.

§ Memoire présenté a l'Institut en 1835.

‖ Embryogenie Comparée. Paris, 1837.

¶ Physiologie, Leipsik, 1839. Trad. par Habets. Paris, 1841.

development, and M. Carus has even recently demonstrated the existence of ovules in the embryo. Ollivier of Angers* may therefore reasonably assert, that since the researches of Home, Baër, and Plagge, it has been demonstrated that the ovum is found in the ovary of the mammalia before fecundation.

Fourth fundamental Law.—*In the mammalia physical obstacles oppose the contact of the seminal fluid with the ovules still contained in the Graafian vesicles.*

"Whatever be the place where fecundation is effected, it is certain," says M. Pouchet, "that it is necessary that the products of the two sexes be put in immediate contact. But almost all authors admit that the contact of the seminal fluid invigorates the Graafian vesicles, then causes their development, from which result, according to them, the production and the deposition of ova." This opinion M. Pouchet combats by the following considerations.

In order to prove that the seminal fluid determines the evolution of the ova which the ovaries elaborate, it is necessary that these ova should all be found in the same condition in the ovary. It is far otherwise, however, for they are found in very different stages of organization and size.

Besides, in order that fecundation occur at the ovary, it is necessary that the seminal fluid should get access to the ova themselves; for Spallanzani, and MM. Prevost and Dumas have demonstrated that it is not an *aura seminalis* which fecundates the ova, but the most consistent part of the seminal fluid. They found that when the seminal fluid of the frog was repeatedly filtered, the filtered liquid contained no zoosperms and failed to vivify the ova; whilst the thick portion of the fluid, which remained on the surface of the filter, contained the animalcules and vivified all the ova with which it came in contact.

This proposition once established, it follows that the ova cannot be fecundated in the interior of the Graafian vesicles; for if the seminal fluid loses its properties by passing through coarse filters, much more would it lose them by traversing the tunics which envelope the ova.

To these arguments deduced from observation and reasoning may be added those of experiment. Different physiologists, among whom may be cited Spallanzani, Prevost, and Dumas, have attempted to fecundate ova still situated within the ovary, and they constantly failed; but they always succeeded in producing the evolution of those which in the same animals they met with in the uterus. But this last fact explains itself, in our opinion, by the circumstance, that the ova still situated within the ovary were not sufficiently developed to be fecundated by the

* Dictionnaire de Medecine, 1st edition, vol. xv. p. 291.

seminal fluid. We do not then see any argument from this in favour of the views of M. Pouchet. On the other arguments adduced by the author we shall make a few remarks.

That the law established by M. Pouchet have all its force it would be requisite to prove the necessity of the immediate contact of the seminal fluid with the ovule at each fecundation. But this necessity of immediate contact has not been absolutely demonstrated. It is true that the filtered seminal fluid does not fecundate; but what analogy is there between a filter and the membranes of the Graafian vesicle? The semen contains fatty matters. May not therefore the differences of temperature, density, atmospheric pressure, &c. cause very different results? The physiologist filters; nature operates by means of endosmosis and exosmosis. The production of fat in the animal body proves that substances do not make their way through the tissues as through paper filters. An atom of sperm arrived by means of endosmosis into the interior of the vesicle, may it not act in determining the development of the ovum, like leaven in fermentation,—a comparison which we have heard made by two distinguished chemists?

It is not our intention to combat M. Pouchet's opinion further; we are simply of opinion that it will still require for its support some further experiments. But at present his theory is at least probably correct, for the necessity of spermatic animalculæ for fecundation supports M. Pouchet's theory, a fact proved by Spallanzani, Prevost, and Dumas, not even yet denied, and which of itself excludes the idea of fecundation being possible by endosmosis. The periodic development of ova over the whole animal creation also speaks in its favour; a circumstance, however, which does not exclude a development hastened by the presence of seminal fluid. In fine, the spontaneous deposition of ova in the whole animal series and in woman, as we shall show in the following paragraphs, also speaks in favour of his theory.

Fifth fundamental Law.—*In the whole animal series the ovary unquestionably developes its ova independent of fecundation.*

Naturalists have satisfactorily proved that with insects, mollusca, fishes, amphibia, and birds,

1*st.* The ova precede fecundation.

2*d.* The ova increase and undergo different degrees of development independent of fecundation.

3*d.* And lastly, that the developed ova are deposited spontaneously by the females, even though fecundation has not taken place.

It only remains to prove, then, that the mammalia are subject to the same laws, and the author calls to his aid reasoning, observation, and experiment.

Let us first consider the considerations founded on reason.

Since the observations of Haller and Malpighi it can no longer

be denied, says M. Pouchet, that the yolk of the egg forms an essential part of the embryo. But this portion existing already in the ovaries of virgins, we must admit that after being developed to a certain extent it is destroyed. In fact, we cannot conceive, adds the author, that these same ovules could afterwards be absorbed and destroyed by the agency of that very organ whose sole end is to secrete them, and that this absorption occurs in all cases in which no fecundation takes place. The mammalia are in the same situation as the birds, reptiles, &c., as experiment and observation have shown.

But before consulting observation and experiment let us first examine the force of M. Pouchet's arguments. The ovules, says he, cannot be absorbed and destroyed by the operations of that same organ whose sole end is to secrete them. We shall demand, then, what becomes of the sperm, a product analogous to the ovule, in those cases where it is not emitted? Is it absorbed and destroyed by the agency of the very organ whose sole function is to secrete it? I know not; but if any one endeavoured to advance this opinion, it could not be combated, so far as I am aware, by any positive facts. What becomes of the bile, if we consider it as a product of secretion, in those cases in which the biliary duct is obstructed by a calculus?

We come now to the observations.

By arranging the facts cited by M. Pouchet we may classify the observations concerning the mammalia and women under three heads, analogous to those already exposed, and which have reference to the rest of the animal creation. The object then is to prove for the mammalia, 1*st*, That the ovules exist previous to fecundation—a fact already evidenced in the preceding paragraphs. 2*d*, That they develop themselves independent of fecundation; and 3*d*, That the developed ovule separates spontaneously. Let us therefore examine these latter points.

Modern anatomists and physiologists (Prevost and Dumas, Baër, Coste,) have distinctly recognized that the ovaries of virgin mammalia contained not only ovules, but that these existed in different degrees of development. Thus we see the second point proved.

Analogy alone allows, or rather forces the conclusion, that in the mammalia, as in other vertebrata, when the development of the ovum has arrived at its maximum, they are expelled spontaneously from the ovaries. Already M. Coste says that whilst bitches are in heat we can distinguish those ovules which are destined to be cast off, they exceed the others so much in dimensions. M. Pouchet cites also several observations made on the cat, cow, and on a young girl of 20 years, in support of this opinion.

But the direct proof of the emission of the ovules may be given in two different manners. The first would be the discovery of the ovule itself in the Fallopian tubes. M. Bischoff, professor at Giessen, has made on this subject a number of observations which establish the spontaneous deposition of the ovule at fixed periods—observations which are published in a memoir presented to the Academy of Sciences in 1843.

A second series of proofs for the spontaneous deposition of ova is furnished by the existence of *corpora lutea* in the ovaries. In fact, since we have made observations on the generation of the mammalia, we have always considered the *corpora lutea* as incontestable evidence of the rupture of Graafian vesicles, and of the extrusion of the ova which had been produced by these organs. But if it is determined that we have discovered *corpora lutea* in mammalia and in virgin women, it also becomes logically incontestable that in these animals, as in the human species, the ovary casts off its ova independent of fecundation.

Very many observers have ascertained the presence of *corpora lutea* in very young females of mammalia. Valisnieri, Bertrandi, Brugnone, Santorini, Meckel, Home, Blundell, Velpeau, and others, have also discovered *corpora lutea* in virgins of the human race. M. Gendrin* endeavoured to give anatomical proofs of the spontaneous deposition of ova by women, but his proofs were not satisfactory. M. Negrier† first accurately described the true anatomical characters of the deposition of ova by women, and the successive evolutions of the Graafian vesicles from their formation till the moment when they burst to give passage to the ovum. However, as none of the observations related by M. Negrier were made on the bodies of females whose virginal state was undoubted, the commission of the Academy of Sciences did not consider the point settled.

Almost at the same time that M. Negrier published his memoir in France, Drs Jones, Paterson, Montgomery, &c., promulgated similar opinions in England. It even appears that Dr Power, in a work published in 1821, under the title of "Essay on the Economy of Women," has stated with much clearness, and supported by numerous facts, the theory that menstruation is owing to the successive rupture of the ovarian vesicles. Ollivier of Angers‡ might then state, in speaking of the formation of *corpora lutea*, "these phenomena occur whether there is fecundation or not."

M. Pouchet, for his own part, having long since noticed the

* Archives Generales de Medecine, vols. vi. and ix.

† Recherches Anatomiques et Physiologiques sur les ovaires de l'espece humaine. Paris, 1840.

‡ Dictionnaire de Medecine, 1st Edition. Paris, 1826. Vol. xv. p. 292.

presence of *corpora lutea* in virgin mammalia and women, has stated since 1835, in his course of lectures at the Museum of Natural History at Rouen, and has since published (in March 1842), in the work now under consideration, that the increase of the Graafian vesicles in the mammalia, and the deposition of ova, are not determined by the action of the seminal fluid, and, moreover, that the ova are naturally deposited at fixed epochs. M. Coste, in 1837, published similar views, but without expressing them so strongly. More recently, in the autumn of 1842, M. Duvernoy advanced similar views at the Scientific Congress of France, at its sittings at Strasbourg.* On the 2d of December 1842 M. Raciborski wrote to the Academy of Medicine a letter, in which he spoke in a clear and precise manner of the spontaneous rupture of the Graafian vesicle at the menstrual period; and since then he has published memoirs and a work in which are narrated a series of observations in support of his opinion.

It follows, then, from all these undoubted facts, that the perfectly developed ovule of mammalia and of women escapes spontaneously in consequence of the rupture of the Graafian vesicle, independently of fecundation.

Sixth law.—*In all animals the ovules are deposited at fixed periods, determined by the periodic excitation of the genital organs.*

We shall return to this subject in the eighth and ninth paragraphs. It is proper, however, to mention, that this law has been proved chiefly by the observations of M. Negrier. In fact, all his work rests on the demonstration of this important fact, that the vesicular evolution is the cause of menstruation; and he says, (p. 71,) "the ovaries of a menstruating female, of whatever age she be, never want vesicular cicatrices."

Seventh law.—*In the mammalia fecundation never takes place but when the emission of the ovules corresponds with access to the male semen.*

It is beyond dispute that the male semen can only fecundate ovules already developed; but the development of these coinciding with the rutting period, explains why it is vain to couple animals excepting at that period. Another question is, whether the presence of the male semen hastens the emission of the ovule already developed, or hastens the development of the ovule itself. The observations yet made do not seem to be complete on this point, and in the opinion of the author still want demonstration.

Eighth law.—*The catamenial flux in women corresponds with the phenomena of venereal excitement observed at fixed periods among the different classes of animals, but especially in the females of the mammalia.*

* Comptes Rendus de l'Academie des Sciences, Vol. xvii.

An attentive comparison of all the phenomena which accompany the menstruation of women with those which attend the rutting epochs of the mammalia, demonstrates that there is a perfect identity between them. Many observers have already noticed the analogies between these phenomena. M. Pouchet, in his printed work, is forced to prove this identity by physiological inductions; but the most conclusive proofs rest on observations made on the development of the ovules and *corpora lutea*,—observations which the author has detailed in a manuscript paper and atlas, addressed to the Academy of Sciences, and which we shall notice in the next paragraph.

Ninth law.—*Fecundation has a constant relation to the secretion of the menstrual fluid. Thus in the human species it is easy to determine with exactness the inter-menstrual period, during which conception is physically impossible, and that during which it may take place.*

Many authors, even the most ancient, agreed that conception occurs with greater facility immediately after the menstrual period; but no one had reduced this fact to a positive law previous to M. Pouchet. Let us, however, leave this subject for a moment, and turn to another very important point, that of the coincidence of the spontaneous deposition of ova with the occurrence of menstruation.

It has been proved above that the ovules are spontaneously developed, and that, quitting the Graafian vesicles, they give rise to the *corpora lutea*. These *corpora lutea* themselves present different degrees of development. But if it be proved that these bodies are so much the less developed the nearer the menstrual or parturient period be, and that, on the other hand, at a more distant period, they are more developed, and at length end by becoming atrophied, it is evident that the *corpora lutea* are in intimate relation with menstruation. If, on the other hand, each menstruation be accompanied with the production of *corpora lutea*, as these bodies are themselves the traces of the escape of ovules, we cannot doubt that one or more ovules are expelled at each menstrual period. These different facts have been established by the observations we have above cited from MM. Negrier, Raciborski, &c. and exposed more in detail by M. Pouchet, in the manuscript memoir formerly noticed.

M. Pouchet has followed from day to day and from moment to moment all the phases of development of the Graafian vesicles; he has also ascertained that in the mammalia the ova are developed in these vesicles, and that they are expelled, without the concourse of the male, at fixed epochs, which corresponds to the rutting time of animals, and the menstrual period of women.

His memoir contains, besides, detailed descriptions of the ori-

gin, formation, and development of the *corpora lutea.* Drs Paterson, Lee, Montgomery, Negrier, &c. have established that these bodies are the result of the deposit of a particular yellow matter between the two membranes of the follicle. According to M. Raciborski this aspect results solely from the folding of the internal membrane, and from the extravasation of a certain quantity of blood, which, in women, forms a pretty large clot which fills the whole of the vesicular clot. M. Pouchet, on the other hand, affirms that the *corpora lutea* are produced by the developement of the proper membrane of the Graafian vesicle. The following are some details which M. Pouchet has communicated to us.

The proper membrane of the Graafian vesicle is formed of isolated vesicles similar to those of vegetable tissue, and the transformation into *corpus luteum* is due not to an augmentation in number of these cells, but to the increasing diameter of those already existing.

These cells have only the 0·01 of a millimeter in diameter when the Graafian capsule is about to open; and when the *corpus luteum* is formed and has filled the cavity, these cells offer a diameter of from 0·04th to 0·05th part of a millimeter, or even to that of 0·06 or 0·07.

A few months later, in November 1844, M. Raciborski presented to the Academy of Sciences the following results of his new researches relative to the *corpora lutea:*—"We have no doubt," says he, "that the *corpora lutea* are the result of modifications which the internal membrane of the follicle undergoes. We are disposed to regard them, according to our new researches, (the results of which closely correspond with those of M. Wagner,) as being due in a great part to a true concentric hypertrophy of the granular layer which covers the internal tunic. As soon as the follicle is ruptured, whether the female has had connection with the male or not, the expulsion of the ovules is always followed by the formation of complete *corpora lutea.* With woman the phenomena do not occur in exactly the same manner. Whenever the expulsion of the ovule is not followed by conception, the hypertrophy of the granular layer ceases to go on, and it remains as a membrane below the clot of blood. On the other hand, whenever the expulsion of the ovule coincides with impregnation, the elements of the granular layer multiply with such rapidity that in a very short time they form a voluminous body, which entirely fills the vesicular cavity. A most remarkable circumstance is the rapidity with which the *corpora lutea* are absorbed as soon as the woman is delivered. The coloration of the membrane which constitutes the *corpus luteum* is owing to the presence of yellow oily globules which are seen among the granulations.

Tenth law.—*There undoubtedly exist no ovarian pregnancies properly so called.*

M. Velpeau has said that until modern writers with scalpel in hand actually demonstrate that the ovum is situated within the ovary and not on its surface, reason forbids us admitting the possibility of ovarian pregnancy. M. Pouchet, relying on what he had previously stated relative to the impossibility of the fecundation of the ovule so long as it remains within the Graafian vesicle, positively denies the possibility of ovarian pregnancy; nevertheless, he does not deny that in certain extraordinary cases the ovule may be fecundated within its torn vesicle, and there grow and become developed on the surface of the ovary. The so-called ovarian pregnancies would in that case be only abdominal ones. But, according to M. Pouchet, the fecundating fluid never in the normal state passes to the ovary; it only enters for a very short distance the Fallopian tubes. This opinion, however, is opposed to that of M. Bischoff,* who considers it to be demonstrated by his experiments that, with the mammalia, the semen, after a fruitful coition, penetrates through the uterus and Fallopian tubes even to the ovaries before the ova have escaped from them, and fecundates them there.

In this manner we can easily explain extra-uterine pregnancies; for if the fecundation occurs at the ovaries, or between the fringes of the tubes, certain external impressions, as for example fright, which is cited as one of the causes of extra-uterine pregnancy, may cause such a perturbed motion of the fimbriated extremities as to destroy the organic relations which exist between these last and the ovaries.

To these ten fundamental laws M. Pouchet adds yet three paragraphs, which he entitles accessory laws, the first two of which have reference to his opinion expressed in the tenth law. The third states, that in their normal state the Fallopian tubes contract from their interior towards their exterior, and thus transport the ovule. M. Bischoff as well as Dr Blundell affirm that in bitches and rabbits which have been fecundated, they have seen the uterus and tubes agitated by lively motions which would contribute to the passage of the semen. These movements in that case occur in the direction from the vagina to the ovaries. On the other hand, the movements of the spermatic animalculi themselves, says Bischoff, contribute essentially to the progressive movement of the seminal fluid.

The observations of M. Bischoff on the motion of the semen explain how sexual connection one or two days before the menstrual period may produce the fecundation of the ovules. In this case two hypotheses are admissible; either the coitus hastens by a few days the rupture of the vesicles, or the fecundating fluid preserves

* Developpement de l'homme et des mammiferes. Paris, 1843, p. 561.

its prolific qualities in the Fallopian tubes or upon the ovary for a few days, until it comes in contact with the detached ovule.

We may here add one word on superfœtation, with which M. Raciborski* alone has occupied his attention. The object of this inquiry is to ascertain if a woman who has already conceived can be fecundated a second time, in the interval between the first conception and the period for delivery. To determine this question accurately, it is important to note the time to which the second conception is referred, or rather the period of time which intervenes between the first and the second conception.

We do not call that a case of superfœtation when two fœtuses, both arrived at term, are born the same day; for in that case two perfectly developed ova have been fecundated the same day by one or more individuals. Thus the birth of twins of the same colour, or one white and the other a mulatto or negro, is easily explained. But the facts which have been published most commonly as instances of superfœtation are of a quite different nature; they are for the most part instances of the birth of a child bearing all the marks of a fœtus at term, from two to five months after the birth of a first child, which appeared also to be born at the full term.

M. Raciborski denies the possibility of superfœtation; he affirms that all the cases as yet related in support of the possibility of superfœtation are only cases of twins in which the second child had for a time suffered an arrest of development without ceasing to live. "Whenever the instinct of reproduction," says he, "is completely satisfied, the function which has devolved on the ovaries, that of fabricating ova, and preparing them for deposition, is suspended, whatever be the place then occupied by the fœtus, whether the cavity of the uterus or any other part external to this organ."

We regret we are not able to participate in M. Raciborski's opinion. In the first place, we cannot comprehend this forced explanation, which consists in the supposition of an arrest in the development of the fœtus. That is quite inadmissible. In fact, during all the time of the supposed arrestment, the fœtus continues its relations with the mother. The blood forms, circulates, in fact nutrition goes on, since new aliments for the development of the tissues are always produced. And yet the development, the increase of the tissues is stopped! Why? Truly I see no grounds for admitting such an hypothesis.

Another reason of M. Raciborski is the cessation of the functions of the ovary, consecutive on the presence of a fœtus. "Consequently," says he, "the semen finding no more ovules developed, cannot two or three months after the first fecundation fecun-

* De la puberté et de l'age critique chez la femme. Paris, 1844, p. 487.

date other germs." But nothing proves this supposed cessation. In the first place, examples abound of women continuing to menstruate during the continuance of pregnancy; the ovaries, consequently, have not ceased to perform their functions. And, on the other hand, researches have established, I think, the presence of ovules more or less developed, or ready to detach themselves, in animals heavy with young, or immediately after parturition. We see, then, the ovaries continuing to perform their functions. Superfœtation, then, does not seem to us impossible, provided the position of the fœtus in the uterus, or the structure of the uterus, (a double uterus for instance), allows the seminal fluid to arrive at the tubes or ovaries.

In analysing all the works published to the present time, we see that the propositions which the writers have had in view to demonstrate may be reduced to the three following, which form the basis of the new theory of menstruation and fecundation:—

1*st*, The ovules are developed and expelled independent of fecundation.

2*d*, The perfectly developed ovules are expelled at determinate periods—periods corresponding to the rutting season in animals, and to that of menstruation in women.

3*d*, Fecundation alone occurs in the mammalia when perfectly developed ovules meet the fecundating fluid in their passage through the sexual organs.

On this last point there is still some difference of opinion between M. Pouchet and M. Bischoff; the first affirming that fecundation occurs in the uterine canal; the latter stating that he has discovered the presence of semen in the Fallopian tubes and on the ovaries.