

The diseases of the foetus in utero : not including malformations; with an outline of foetal development.

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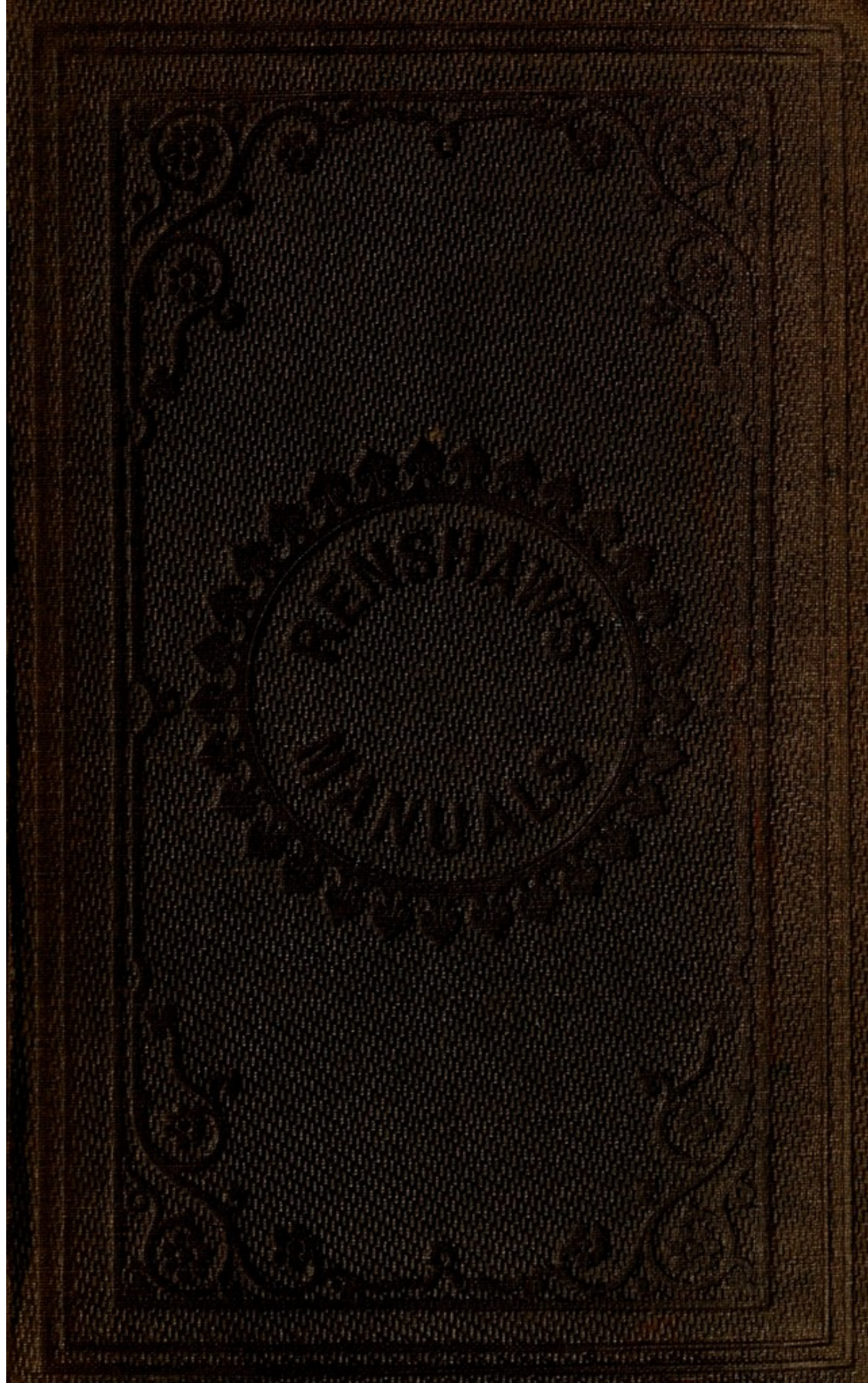
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THE DISEASES
OF
THE FŒTUS IN UTERO,
(NOT INCLUDING MALFORMATIONS.)

THE HISTORY OF

THE DISCOVERY

OF GOLD

IN CALIFORNIA

(NOT INCLUDING THE DISCOVERY OF GOLD)

THE DISEASES
OF
THE FŒTUS IN UTERO,

(NOT INCLUDING MALFORMATIONS.)

WITH
AN OUTLINE OF FŒTAL DEVELOPMENT.

BY

HENRY MADGE, M.D.

MEMBER OF THE ROYAL COLLEGE OF SURGEONS; LICENTIATE OF THE
APOTHECARIES' SOCIETY;

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J. C. W. LEVER, Esq., M.D.

AND

HENRY OLDHAM, Esq., M.D.

OBSTETRIC PHYSICIANS TO GUY'S HOSPITAL, AND PROFESSORS OF MIDWIFERY,
ETC. AT THE GUY'S HOSPITAL SCHOOL,

The Author Dedicates this Little Work,

WITH THE GREATEST RESPECT FOR THEIR PROFESSIONAL
ATTAINMENTS AND HIGH POSITIONS,
AND IN GRATITUDE FOR FORMER INSTRUCTIONS.

J. C. W. LUTHER, M.D.

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P R E F A C E.

I BELIEVE, in English medical literature, this is the first attempt to bring together materials under the title "Diseases of the Fœtus in Utero, with an Outline of Fœtal Development." In the first instance, those I have collected were not intended for publication, therefore I hope allowances will be made for deficiencies in arrangement, references, and due acknowledgments to various authors,—not having access to my former sources of information, I am unable at present to repair these defects. Care has been taken that the opinions and statements quoted in the work come from authors whose names entitle them to credence and respect. The plan and a portion of the first part,

on Fœtal Development, are taken from the Dictionnaire de Médecine, article Œuf, by Ollivier. This part will be found useful, not only as a prelude to the second, but also, as the subject is not one of general study, it will probably prove acceptable to those who wish to acquire or revive a little knowledge of fœtal development, apart from much abstruse speculation, or too many microscopical and physiological details.

The second part, on Diseases of the Fœtus, is made up to some extent of translations from French authors. For the sake of conciseness I have not hesitated to blend with these translations observations from other sources, where they have tended to make the subject more intelligible or complete.

The nature of the work and the unsatisfactory way in which many points of interest are dismissed, will doubtless afford those who are disposed to criticise, ample scope for their abilities. Judging, however, from the pleasure and profit I have experienced in collecting the materials, it is possible, I think, that their arrangement—though defective

—may answer some of the purposes for which books are usually written, namely, those of conveying information, exciting inquiry, and affording pleasurable employment for the minds of readers.

H. M.

54, *Howland Street,*
Fitzroy Square.

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INTRODUCTION.

THE few who have attempted to grapple with the difficulties of the subject of this Essay, have not sufficiently overcome them to satisfy themselves as to the correctness of their conclusions, or even to set the inquiry forth in a sufficiently attractive and encouraging form to awaken curiosity and to stimulate research in others. It is thus that, whilst a few eminent men have made valuable and original communications on some parts of the subject, nothing has yet appeared having any pretensions to an elucidation of the whole, or to an arrangement of what is already known. As yet we have had no clear and concise *resumé* of the important researches made by modern pathologists, and particularly by our continental brethren, on the diseases of the foetus in utero. Beyond the sphere of physiological and pathological investigations, the subject is unknown. Medical periodicals teem with communications on almost every disease, but I think it may be safely stated that of all pathological inquiries, that of foetal diseases must be con-

sidered as the least followed, and consequently the least understood.

It is a little wonderful that the very difficulties and obscurities of so important and interesting a subject should not, up to this moment, have attracted the energies of some vigorous mind to sound its depths, to master its details, and to show its utility. Even speculative genius, so prolific in every other department, has been comparatively silent on the diseases and dangers which threatened its own embryotic existence. This, however, ought not to be considered a serious loss to science, seeing we have a great deal more to expect from patient investigation and deductions drawn from indisputable facts, than from the mere speculations of superficial observers. No speculation, however ingenious, can be safely used as a substitute for sound anatomical and physiological knowledge. All theories which have not this essential foundation will be the first to fall to the ground. The more this is kept in view, the less likely are we to fall into error, or even, guided by such knowledge, if we fall into error, that itself would act as an auxiliary in finding out the truth, and thus facilitate and render more valuable the studies of future inquirers.

Dr. Holland, speaking of physiological studies, says—"We have here a new world of relations, occult and complex in their nature, to be reasoned

upon and resolved, with a principle of change, moreover, ever operating among them, which makes all conclusions liable to a new source of error." Perhaps it will not generally be admitted, and indeed it would be very unsatisfactory to admit, that all conclusions are liable to a new source of error; but we know too well that medicine is very far from belonging to the exact sciences; in it, theories are easy to invent, but difficult to apply; the theories of to-day are replaced by others of to-morrow, and hence the unfortunate vacillation and instability of the opinions on which many of our studies are founded, and hence also might be derived a very humiliating but useful lesson to those who force their pretended discoveries on the world as infallible, and nothing but the truth.

Some of the stated reasons why "diseases of the foetus" are not better understood, are the very unpalatable ones, that few have thought it worth their study—that in a practical point of view the knowledge would be useless and theoretically dry and unprofitable. In the present state of science there is no doubt a glimmering of truth in these objections; but they certainly are not in accordance with the inquiring spirit of the present day. Their advocates lose sight of the great principles of scientific research. Its true aim in medicine is to discover facts and use them as guides to the hidden principles and laws of nature in health and

disease ; therefore we are not warranted in rejecting any investigation as useless which might ultimately throw additional light on those laws. We must wait upon science, with all her train of the wild and extravagant, medleys of truth and error, before we can enter the simple sanctuary of nature, or before we can hope to reduce theories to practice.

That practice has benefited so little by theories must be a subject of regret and humiliation to every one engaged in medical pursuits ; strictly speaking, the value of pathological and physiological inquiries should be measured by the value of their practical applications in medicine ; but it must be confessed that comparatively few have as yet been subservient to the useful ends hoped for, and their tendency has been rather to provide materials for discussions and speculations, than to cure diseases, and rather to gratify the curiosity of pathologists, than to introduce any beneficial changes into practice.

With regard to our present subject. Simpson and Graetzer have remarked, that the indifference to the study might arise from the difficulty of diagnosing foetal diseases ; these are generally only revealed at birth ; but, they add, if it is impossible to become acquainted with the actual condition of the foetus in utero, or the effect of medicines upon it, by post-mortem examinations of the still-born, we are often made aware of latent disease in the

parents which would otherwise have been unsuspected, and thus a new road might be opened to therapeutics. It will be seen that not only the latter, but also the impossibilities alluded to are likely to become a part of medical practice and observation.

Since, in pathology, so much time has been expended, perhaps often with no other view than that of gratifying a very laudable kind of scientific curiosity, it seems still more remarkable that foetal diseases should have received so small a share of attention. In point of interest, it certainly yields to no other subject: here we retrace our own development into existence, microscopical germinal spots, swelling their proportions and budding into life; the vital spark instilling itself into organized matter, and conducting it with a flickering flame through the period of gestation, and all this amidst accidents and impending causes of dissolution which very often deprive the new being of its precarious existence.

The few foregoing remarks, together with a great deal that might be said about the anxieties of the mother and the solicitude of friends for the welfare of the unborn child, are quite sufficient, I think, to show the strong claims the subject has, both on the inquiring pathologist, and the practical physician. The former may pursue it with much interest to himself; the latter, possibly, with some benefit to his patient.

It will be my object, in the following pages, to point out the nature, causes, and consequences of the “diseases of the foetus in utero” in as intelligible a form as the scattered writings of others, and my own necessarily limited observations, will admit of. Should the Essay possess any merit, I may, perhaps, be allowed to say, that it will be found,—1st. In the systematic form in which I have arranged my materials, and which, I think, cannot fail to bring the whole subject, as far as it is known, clearly before the mind. 2ndly. In my having had, in several instances, the advantage of conversing with the authors I have quoted, and of hearing confirmed by them the facts and opinions recorded in their writings; and although I shall not be able to boast of much original investigation, the numerous abstracts which I have collected from English and foreign Authors, and the convenient order in which I have endeavoured to place them, together with what my own experience has suggested, lead me to hope that, if I am not actually contributing something towards the great end of all medical studies—that of warding off the diseases and dangers which threaten human life—at least, I shall be the humble means of guiding the energies of some original and brighter genius into the right direction, and of drawing into a neglected field of inquiry an amount of attention equal to the importance of the subject.

DEVELOPMENT AND DISEASES
OF
THE FŒTUS IN UTERO,

NOT INCLUDING MALFORMATIONS.

PART I.

HISTORY furnishes us with the fact, that nearly two centuries ago Mauriceau published opinions on diseases of the foetus in utero in some respects similar to those of the present day. If we go farther back—namely, to the early part of the sixteenth century, when learning had already done much to emancipate itself from the mental inactivity of the middle ages, we find a few taking up the subject with much zeal. This zeal, however, having very crude notions of anatomy and pathology to direct it, was chiefly expended in observing and recording cases, in which, as might be expected, we find both the symptoms and sequelæ obscure and ill-defined: therefore, except in an historical point of view, it would be uninteresting and unprofitable to notice those labours to any extent. It appears to me more useful to bring

together, as much as possible, what is known, apart from conjecture and surmise; and, as a good deal of the latter is found even in the most recent medical works, and must, necessarily, mix itself up more or less with the contents of the following pages, I have thought it inadvisable to increase the web of difficulties by calling up the more ill-founded conjectures and surmises of the old writers.

The ancients, Hippocrates, Aristotle, Galen, and Celsus, did not overlook the diseases and deformities of the human foetus. Its diseases, however, received from them but little attention apart from malformations; whilst on the latter they have dwelt at some length, and, for the most part, refer their occurrence to the influence of the mother's imagination. The labours of these ancient writers having slept through the dark ages, or perhaps, more correctly, receiving at very distant intervals a slight re-echo in the Arabian or Roman schools, we find, on the regeneration of the latter, and when already a few works had been published on the anatomy of the foetus in utero, a work published at Jena, in 1658, by Joan Armand Fredericus, entitled, "*Γυμνασµα ιατρικον*, foetus quoad principia partes communes et proprias, differentias, morbos et symptomata eorundemque curationem offerens atque exponens." Since this period several works bearing on the question have been published, chiefly in the Latin, German, and French lan-

guages.* For reasons previously stated, I shall refrain from taking much notice of any except Mauriceau's work. It is entitled, "*Mal des Femmes Grosses*," and gives a great deal of curious and useful information, evidently the result of extensive observation. These labours will be noticed in their proper place.

As it is almost impossible to enter upon the consideration of the diseases of the human foetus without a previous study of its anatomy and physiology, I have thought proper to divide my subject into two parts. The first will embrace a general view of foetal development. The second, a consideration of its pathology, and as much as can be reasonably advanced on its diseases, diagnostic and curative. In the first division there has been no lack of labourers. Perhaps no branch of study has received so much attention, or been the subject of so much recent investigation, as that of foetal development. These investigations, however, have done but little towards explaining away the obscurities which have long surrounded many parts of embryology. On many points opinions are still divided; and what some hold to be "the truth," others as boldly denounce as "delusions." It remains for us to glance at some of these opinions, so as to arrive at those which seem the most rational.

* Most of these may be seen in the splendid library of the *École de Médecine*, Paris.

In considering foetal development in connexion with our subject, it will only be necessary to give such a general outline as will enable us to identify certain conditions of the foetus and its membranes with certain morbid changes, and to make ourselves sufficiently familiar with its metamorphoses, nutrition, and growth, and the laws by which these are governed, to be able to understand the modifications and deviations from health which happen when those laws are suspended or interfered with.

To begin with the commencement of life, it may be observed that we cannot pursue with much profit the interesting question of generation in man; it is not sufficiently understood to explain the mysterious agency which fixes on the minute contents of the graafian vesicle certain indelible characters. At an early period, with the naked eye, or even with the aid of the microscope, we can perceive no difference between the ovum destined to become a healthy human being, perfect in mental constitution and bodily configuration, free from morbid taints and predispositions to disease, and one which carries with it the poisonous elements of syphilis, gout, scrofula, and all those scourges of the human race which arrest development, prostrate the powers of the new being at the very threshold of life, and if it does not destroy altogether, stamps upon its victim deformity and disease.

Although it will be easily seen that in studying

the germ of the future being there is no hope of unravelling the mysteries of hereditary peculiarities, it may be of some use in aiding us to understand the ulterior anatomical dispositions of the ovum.

According to Valentin, Purkunjé, Owen, and others, the ovum is ready formed in the ovary, where it awaits impregnation. As to the mode of the latter, although research has been active and conjecture busy, nothing is known with certainty. Valentin maintains that the germinal or ovarian vesicle, whilst yet in the ovary, contains both the germinal membrane and germinal disk, that at the time of impregnation the latter bursts, and mingling with the fecundating principle of the male semen, the embryo is constituted. One theory is, that the germ of the human embryo is contained in the male semen, and the office of the female organs is to provide a bed and provisions for its development. Whether this is true or not, from the fact that the male characteristics often predominate in the offspring, it seems likely that the semen is something more than a stimulus to the ready-formed ovum. Owen says, "the seminal animalcule of animals penetrates to the surface of the vitelline membrane, spreads out upon it in the same manner as the gemmules of porifera on the surfaces of submarine bodies to which they attach themselves, and thus become united to the ovule

forming the cushion-like eminence observed on impregnated ovules, this being the first rudiment of the embryo." According to Martin Barry, at the moment of fecundation, the ovum approaches the ovisac, and gradually presses against it, the germinal vesicle reaches the surface of the membrana vitelli at the same point, and the germinal spot slightly projects; at this period the zona pellucida and membrana vitelli become fissured, and a small opening is formed. It is obvious that this cannot take place without some wise intention. After remaining open for a short time, the germinal vesicle returns to the centre of the vitellus, and the opening closes.* This is the point to which our knowledge of the phenomena attendant upon the fecundation of animals has at present arrived.† Owen and Martin Barry thus support the theory of actual contact between the male and female procreating principles, and they further maintain that the male semen is conducted through the uterus and Fallopian tubes by the ciliary movements which take place on their mucous surfaces. This, however, is disputed by Valentin and many

* On one occasion M. Barry was privileged with a view of a spermatozoon entering this opening; but, as the observation stands alone, it is not known whether this situation of the animalcule was accidental or natural.

† Additional observations on this subject have been published in Phil. Mag. vol. vi. Oct. 1853.

other eminent physiologists. If it admits of being reasoned upon at all, we certainly can better understand by Owen and Barry's theory the powers of the male in transmitting hereditary blessings or evils to the offspring, than by the theory maintained by others, of impregnation of the ovum by means of an "aura" or sympathetic influence independent of contact with the male semen. There are, however, numerous opinions and experiments on record in support of both sides of the question,* and when we consider that more than 2000 years ago Hippocrates and Aristotle speculated upon it with almost as much success as our modern philosophers, it at least seems likely long to remain undecided.

What we know with some degree of certainty is, that generally eight or ten days after impregnation, the ovum has left the ovary, and is found in the uterus, where at first it is free and unattached. A short notice of the changes which the ovum undergoes will be given in another place; we shall here advert to the simultaneous and more active changes going on in the uterus, and which are destined to aid in the development of the foetus.

In birds, when the ovum leaves the ovary, it passes into the oviduct and cloaque, where it

* See the works of Harvey, Haighton, Blundell, Montgomery, Allen Thompson, and several German and French authors.

becomes enveloped with albumen and a cretaceous coat; whether the human ovum in its passage through the Fallopian tube obtains a muco-albuminous covering, has not been satisfactorily made out. In many other respects, the analogy between the development of the ovum in birds and mammalia has been established by Valentin, Coste, Owen, and many others. The two Hunters, Ruisch, Haller, and most modern anatomists and physiologists, have supposed that a fruitful coition determines in the mucous coat of the uterus a peculiar irritation, which gives rise to an effusion of coagulable lymph or a sero-albuminous tissue, which some authors have compared to the albumen which in birds envelops the yolk of the egg in the oviduct, or the viscous substance which envelops the membranes of the ovum in certain reptiles. M. Coste believes that this lymph exists in the uterus before the descent of the ovum, but instead of pushing it on, and so forming the decidua reflexa of our authors, the ovum passes through it, and fixes itself on what he terms an hypertrophied part of the mucous membrane, and prolongations of the latter around the embryo form the decidua reflexa,—that which lines the uterine cavity we commonly call the decidua vera. In French works, the two taken together are known by the name “membrane caduque.”*

* This name was originally given to it by Dr. Hunter.

“caduque uterine” and “caduque réfléchié.” It exists even in extra uterine foetation, and is analogous to the concretions observed in cases of dysmenorrhœa. At first it is no other than sero-albuminous matter, semi-fluid, partly concrete, and fills the uterine cavity. At the end of six weeks, it is still a soft, pulpy substance, without any very appreciable traces of organization, — in fact, resembling a decolorized clot of blood with membranous flakes and filaments adhering to its surface.* These flakes have been considered by Osiander to be the remains of a false membrane habitually formed in the uterus around unimpregnated or abortive ova, and which belong less to the ovum than to the uterus. Dr. Lee considers that the decidua reflexa is formed from the flocculent matter thrown out into the uterus around, and under the influence of the ovum. Hence the name “ovuline decidua.” Chaussier says that at the sixth week the more fluid parts of this coagulable matter, which is generally found in its interior, or rather between the true and reflected decidua, has been absorbed by the uterus and ovum to contribute to the nourishment of the embryo. At a later period, the decidua envelops the chorion, even to the border of the placenta, to which it becomes intimately

* In the Anatomical Museum of the École de Médecine, Paris, there are excellent wax models showing the decidua at different stages of its development.

adherent. It does not, as Haller has supposed, double or divide itself so as to form two layers, the one passing before, the other behind the placenta, for the membrane which invests the uterine surface of the placenta is much thinner, more transparent, and much more adherent than the decidua membrane. According to Velpeau, at the moment of accouchment the decidua appears simple, of a yellowish white colour, thicker than the other membranes, of a soft pulpy consistence, and its cohesion analogous to that of membranous concretions.* Chaussier, Meckel, and others have entertained other opinions regarding the formation of the decidua. According to them, when the ovum passes into the middle of the coagulable lymph with which the uterus is filled, the density of the lymph becomes immediately augmented, and progressively acquires a membranous appearance, both on the surface of the ovum and on the internal face of the uterus, thus giving rise to an appearance of two coats. They also consider that the intervening membrane between the placenta and uterus is the remains of the decidua which covered that part of the surface of the ovum. Velpeau, however, by numerous researches, seems to have established the truth of the theory, that the decidua reflexa is formed by the entrance of the ovum into the uterus, and that the decidua

* *Ovologie Humaine.*

vera does not cover the uterine surface of the placenta. The decidua appears reticulated and pierced with holes and oblique canals, which, examined under the microscope, appear to be venous sinuses. Its vessels are very numerous, and become apparent about the end of the second month. They are then easily seen without the aid of injections, and are always more abundant in the thicker portions of the membrane. Hunter has observed that they are very abundant where the membrane approaches the placenta, that the veins are more numerous than the arteries, the walls of the vessels very thin, and their calibre unequal and irregular, like those of accidental membranes. The vessels of the uterus and chorion also send prolongations into the decidua, and Chaussier says perhaps also the uterine nerves may be distributed to it. With regard to the functions of this membrane, whatever may be the intention of its early appearance, it does not seem indispensable to the development of the embryo, because the latter becomes developed in extra-uterine foetation without its aid. Some time ago M. Lauth published a paper in the "*Répertoire d'Anatomie*" on the membrane caduque, containing rather ingenious views, and although that writer has since seen reason to modify his opinions, the paper deserves notice here, inasmuch as it gives a plausible theory of utero-placental communication, and also because the views it sets

forth are still entertained by many eminent men : he says, " It was formerly thought that in the uterus a thin membrane marked the termination of the uterine arteries and the commencement of the placental veins ; but as this was not supported by analogy, as this membrane through which the blood was supposed to filter itself was not found in other parts of the body, it was agreed that the arteries of the uterus terminated in the veins of the placenta, and the veins of the placenta in the arteries of the uterus. When, however, it was shown that the vessels of one of these organs could not be injected by fluids thrown into the vessels of the other, it was admitted that no direct vascular communication existed between the mother and child. The next theory was, that the arteries terminated in orifices opening into cells situated between the placenta and uterus in a structure named the maternal portion of the placenta ; that the blood effused into these cells was absorbed by veins, those of the uterus for the mother, and those of the placenta for the foetus." He remarks, " In the researches I have made I have not discovered this maternal portion, unless the name be given to that part of the decidua to which the placenta becomes adherent, and which covers its uterine surface. The decidua, like other false membranes, becomes organized ; it receives numerous vessels which are continuations of the uterine, and conse-

quently are in direct communication with them. In it the arterial extremities are observed to turn abruptly upon themselves, to constitute the commencement of the veins. This abrupt termination of the arteries in the veins is also found in what is termed the foetal portion of the placenta; when injections have been employed I have often observed it without the microscope both in the human placenta and in those of some of the higher animals. It is easy to demonstrate the easy passage between the two sets of vessels, arteries, and veins, by using an injection of coloured water. The vessels of the placenta have no direct communication with those of the decidual membrane, and it is impossible to inject the one by the other. These experiments prove that the passage of the blood from the mother to the foetus cannot take place by means of the '*radicules absorbantes des veines*,' because these would be torn in a placenta detached from the uterus, and would give exit to fluids injected into the placenta—a circumstance which does not happen. An exit, however, may be effected by means of particular vessels provided with valves, and which do not afford passage to the fluids, except under certain conditions and under the influence of vital laws. On examining carefully a placenta still covered by the decidual membrane, they are found united by a multitude of little transparent vessels passing in all directions; these intervening vessels

cannot be injected by those of the placenta, nor by those of the membrane; but a fine tube inserted into one of the largest allows an injection to pass first into the vessels of the membrane, and then immediately into those of the placenta. The conclusions are—first, that the vessels alluded to are of two orders, one belonging to the decidual membrane, and therefore to the uterus, and the other to the placenta; second, they are not blood vessels; third, that some terminate in the vessels of the membrane, and the others in those of the placenta, and that they terminate in orifices guarded by valves which prevent their being injected by a retrograde course. They are evidently the ‘*radicules lymphatiques*,’ of which they present all the characters, although they do not appear to belong to the general lymphatic system, because they are grafted on a temporary organ with which they are expelled at the time of parturition. The only communication, therefore, between the mother and child is by lymphatic vessels; some of these spring from the maternal parts, and are implanted into the foetal, no doubt for the purpose of extracting from the blood of the mother the proper materials for forming foetal blood. This blood is elaborated and accommodated to the wants of the foetal system by traversing the liver, where it appears to put on more of an arterial character. On the other hand, those lymphatics which are grafted upon the

placental vessels, and terminate in the uterine, serve to separate from the blood of the foetus materials which are no longer of use, and instead of being retained in the foetal circulation, where they might become injurious, they pass into the venous circulation of the mother. The difference which exists between the movement of the blood in the mother and in the foetus proves that their vascular systems are connected by a distinct order of vessels. We are also led to believe this from a consideration of their mutual independence with regard to health and disease. We find that an unhealthy parent can send into the world a healthy child—that the mother can be affected with syphilis or small-pox without affecting the foetus in utero, and that infants are born with various maladies without the mother having the least symptom of disease. It must therefore be admitted that the blood which has passed from one individual to the other has undergone essential modifications, and it seems pretty evident that these modifications are due to the absorbent or lymphatic vessels by a mechanism analogous to that by which one portion of the chymous mass is converted into chyle, and passes into the chyloferous vessels.”

Hunter, Owen, Sharpey, Allen Thompson, and Simpson have stated that not only do small tortuous arterial branches pass across from the inner surface of the uterus to the placenta, but that

venous branches also, or hollow canals continuous with the venous sinuses of the uterus, run through the decidual membrane covering the uterine surface of the placenta. Dr. Simpson considers that Dr. Lee and Velpeau have deceived themselves in considering the placental decidua an imperforated membrane, by not attending sufficiently to the circumstance that the utero-placental vessels pass through it in a very oblique direction, and that the coats of the venous canals are extremely thin and slender, composed of a tissue endowed with little elasticity, and resembling the proper tissue of the decidua. It seems very probable that the vessels which the foregoing eminent men have considered arteries and veins are, for the most part, the lymphatics of M. Lauth. The question, however, must be left for discussion in another place.

Having perhaps said enough in connexion with the decidua, we now come to the next membrane, the chorion—the “membrane moyenne” of Haller. Externally it is covered by the decidua reflexa, and internally by the amnion. Martin Barry considers that the chorion is formed in the Fallopian tube, and corresponds to the *membrana testæ* of birds. At first it is opaque, thick, and resisting, larger than the amnion, which it encloses, and from which it is separated in the early months of gestation by an interval which contains the “false waters of the amnion.” It is but feebly united to the

decidua. As to the villosities which are found on its external surface, Velpeau says they are little glandiform organs which probably contain the rudiments of the placental vessels. They become more apparent where the ovum is in contact with the uterus, while those on other parts of the membrane, and which are in contact with the decidua, cease to develop themselves, and at length disappear. Meckel, Hewson, and Bojamus supposed the chorion to be formed of two layers, having between them vascular trunks communicating with the villosities; Velpeau, however, has pointed out the source of error to be a prolongation of a membraniform concretion formed between the placenta and chorion. The microscopical researches of Breschet and Gluge have shown that the chorion has no traces of fibres—that it is made up of little molecules, in the middle of which are found white corpuscles, larger than those of the maternal blood. According to Beclard, about the end of the first or commencement of the second month, the chorion is seen to increase in density in that part of its surface which corresponds to the abdomen of the embryo, and which subsequently becomes the point of insertion of the umbilical cord. The rudiments of the placental vessels, occupying at first the whole surface of the chorion, gradually occupy a less and less proportion as the ovum develops itself; the vessels moreover becoming more apparent, increas-

ing rapidly in size, and having a branching aspect, advance towards the walls of the uterus, and thus constitute the commencement of the placenta. These changes generally take place at the superior part of the ovum. Towards the end of gestation, the chorion is thin, more delicate and less resisting than the amnion, and united to it as well as to the decidua by a filamentous tissue. In that part which corresponds to the placenta, the chorion is not in connexion with the decidua, and here also it is much thicker, and the more so the nearer it is traced to the umbilical cord, upon which it is reflected. The uses of this membrane seem pretty evident, the most striking being that of forming a nidus for the development of the placental vessels, and at an early period absorbing, by its villi, nutriment from the decidua for the use of the embryo.

The next membrane is the amnion, the internal membrane of the ovum. Owen says, "The amnion is first formed immediately beneath the membrana vitelli, as the most superficial—the serous layer of the germinal membrane. As the embryotic trace gradually rises above the surface of the germinal membrane it becomes invested in this amniotic covering, and sinking, after a time, into the yolk, becomes surrounded by an additional or reflected covering. The edges of this reflected portion gradually coalesce over the dorsal surface of the embryo, and the amnion is then converted

into a shut sac. We have now only to suppose the endosmoze of the surrounding fluids into this cavity to produce the expansion of the amnion which is found in man, but which is much less in the inferior mammifera and in birds." During the earlier periods of gestation the amnion is extremely thin, soft, analogous to the retina, and forms a little sac suspended to the superior part of the chorion. The point of union of these two membranes corresponds to the abdomen of the embryo ; but the amnion is not concentric with the chorion up to the second, and sometimes even to the fifth month. According to Dr. W. Hunter, the space between the two membranes for the "false waters" is always found, but is only temporary. Towards the end of the third month the two envelopes are generally united to each other by a very delicate cellular tissue. At the "terme" of gestation they are intimately adherent, and this seems to be kept up by means of loose and indistinct vascular prolongations. Their adherence is more intimate where they are in contact with the placenta, and becomes still more so on the surface of the umbilical cord. Arriving at the umbilicus, Velpeau says the amnion becomes continuous with the epiderm. Meckel says, it becomes continuous with the projecting portion of the cutis vera forming the umbilicus. The amnion is considered by some authors as an integral part of the embryo, and that, in the earliest periods, it is continuous with the peritoneal cavity of the

abdomen, but, subsequently, becomes more and more isolated as the ovum develops itself. The internal surface of the membrane is smooth, polished, and in contact with the water which fills its cavity. The membrane itself is very thin, almost transparent, whitish, elastic, and more resisting than the chorion. Its anatomical structure is little known—the same as with the chorion. Neither nerves nor lymphatics have yet been discovered in it, and the existence of bloodvessels has not been perfectly demonstrated. Small branches of the umbilical arteries ramify between the membranes, but cannot be said to belong to either. If a small portion of the amnion be macerated in water, ramifying filaments, like bloodvessels, are observed in its substance, but their real nature is not known. The growth of the membrane, however, the opacities which it sometimes presents, and the active inflammatory action of which it is occasionally the seat, render it probable that they are bloodvessels. According to Munro and Wrisberg, an injection forced into the umbilical artery effuses itself in little drops on the surface of the amnion, and may be arrested between it and the chorion. Chaussier has observed the same phenomenon on injecting the vessels of the uterus.

The liquor amnii is at first limpid, more or less transparent, and with little density. At the “terme” of gestation, it has become milky, viscous,

mingled with albuminous flakes, and gives out a peculiar odour. Ruisch, Harvey, and Haller have considered that the liquor amnii contains more animal matter near the commencement than towards the end of gestation. The fluid itself is also in greater quantity in the early periods, and keeps gradually increasing to between the fourth and fifth months, when it gradually diminishes. M. Vauquelin found it to consist of water, 98·8; albumen, hydrochlorate of soda, soda, phosphate of lime, and lime, 1·2. Scheele stated that it contained free oxygen; and Lassaigne thought he discovered in it a gas composed of azote, 98·3, and oxygen, 21·7; but the experiments made afterwards by the same chemist, and by Chevreuil, have only proved the existence of a gas composed of carbonic acid and azote. The source of the liquor amnii has given rise to various opinions, none of which are very satisfactory. Some consider it to be derived from the mother; others from the foetus. Most physiologists, following the example of Haller, hold the first opinion, and chiefly because his experiments prove that the liquor amnii partakes of the same alterations as the fluids of the mother. Mercury, saffron, and other substances given to the mother have been found in the liquor amnii. According to Haller, the amniotic fluid is transuded through the pores of the amnion, where it is nearly in connexion with the uterus and uterine vessels. Scheele be-

believes that the umbilical arteries are the source of the "fluide amniotique," particularly in that part where the amnion covers the placenta, and in the rest of its extent the membrane exhales another portion of fluid derived from the uterine arteries, which he considers are distributed to all the membranes, and after supplying them, open upon the internal surface of the amnion. Lobstein has proposed an hypothesis similar to Scheele's, and which attributes the production of the liquor amnii to both mother and child. This theory has been supported by the experiments of Chaussier, who found, on injecting fluid, whether by the umbilical or uterine arteries, that both entered the cavity of the amnion. According to Meckel, the liquor amnii is principally furnished by the mother, but towards the later periods of pregnancy it is partly supplied by the foetus. The uses of this fluid are that it moistens and preserves the external parts of the child before the skin has obtained its proper sebaceous coating, it favours foetal movements and foetal development, and is a security against shocks from the exterior. It also secures the regular dilatation of the uterus around the foetus, and thus the latter, from the commencement, obeying the laws of gravitation, is generally found with an inferior presentation of the head. Also, it facilitates parturition by its gentle and efficacious dilatation of the os uteri, and by its lubricating the vagina and

vulvæ. Dr. Murphy, in his Lectures on Parturition, says, "As a means, therefore, of conveying the whole muscular power of the uterus upon the os uteri, of moderating and equalizing the force employed, of dilating the mouth of the uterus without exciting irritation, the liquor amnii is of essential importance." What, however, has the most important bearing on our subject, and which will be inquired into in another place, is whether the liquor amnii contributes to the nourishment of the fœtus.

The *placenta* is a soft, spongy mass, formed essentially by the vessels of the chorion, and constitutes the principal connexion between the ovum and the uterus. At a very early period of pregnancy, the placenta does not exist. Its rudiments appear towards the end of the first month, and according to most authors, they appear at that part of the ovum which corresponds to the abdomen of the embryo or the future insertion of the umbilical cord. Velpeau thinks their first appearance is at that part which is not covered by the decidua, and which, therefore, is in contiguity with the uterus; but however this may be, it is agreed that at a certain point of the ovum, and generally at its superior part, are observed vascular granulations distinctly separated from each other, and which seem to send out ramifications which may be either single or double. These branching vessels appear at first to be no other than veins; later, very deli-

cate arteries are also observed. In a short time these rudimentary arteries and veins become more developed, their ramifications less distinct, more tufted, and soon form a dense tissue, which constitutes the placenta. Subsequently, the placenta diminishes in size, relatively to the size of the foetus and extent of its membranes; and although at first it nearly covers the whole surface of the ovum, at the full period of its development it does not cover more than a third or quarter. Towards the end of pregnancy, the placenta becomes less vascular, less heavy, and smaller, but more dense. Its vessels are progressively obliterated, and a large proportion are converted into calcareous, fibrous filaments, particularly on its inner surface. At this epoch its form is oval, slightly convex on its foetal and concave on its uterine surface. Its diameter is from six to eight inches, and in the centre from twelve to fifteen lines in thickness. It may be found attached to any part of the internal surface of the uterus, but generally to the fundus, a fact that is dwelt upon by those who contend that the ovum is attached to that part of the uterus not covered by the decidua. The uterine surface of the placenta exhibits a variable number of lobes or cotyledons, irregularly rounded and united by a slightly vascular cellular tissue, which seems to form the membrane covering the whole surface. The nature of this membrane, as we have already

seen, is a disputed point. According to Hunter, the vessels which supply it come from the uterus. Haller regards it as one of the layers of the decidua. This is also Chaussier's opinion, but Wrisberg, Lobstein, and Desormeaux consider that it differs essentially from that membrane, and cannot be a continuation of it, because it is not often found before the second month of gestation. According to these observers, a special irritation is set up in that part of the uterine surface which is in apposition with the ovum. This irritation leads to a plastic exudation which progressively extends itself as the placenta becomes developed. Whatever may be its nature, it is always found uniting the placenta to the uterus, and more intimately around its circumference than in the rest of its extent. The foetal surface of the placenta presents the numerous ramifications of the umbilical arteries and veins uniting to form the umbilical cord. The edges of this vascular organ are thin, unequal, and confounded insensibly with the intermediate tissue of the chorion and amnion, and, according to some anatomists, with the chorion itself. In general appearance, it is reddish, soft, spongy, and easily torn, the lobes or cotyledons of which it is formed having their own particular vascular trunks, the ramifications of which do not communicate. Sometimes the lobes are distinct and isolated; in certain animals, this is invariably their disposition. The

placenta, therefore, consists of vessels, the larger sometimes forming irregular or circular sinuses, tissue resembling cellular tissue, processes of the chorion, and strong whitish filaments. Each lobe receives an artery and a vein, which subdivide to the minuteness of capillaries. The placental vessels have numerous nodosities and enlargements in their course: more marked, however, in the earlier than in the later periods of gestation, and which constitute them perfectly analogous to the vessels of new formations or accidental membranes. The arteries structurally are not easily distinguished from the veins. Hewson says the chorion penetrates the substance of the placenta, and divides itself into cellular sheaths, which receive the vascular ramifications, and accompany them to their terminations. Velpeau, however, considers that these processes spring from a membraniform concretion formed between the chorion and placenta. Wrisberg, Chaussier, Ribes, Home, and Bauer state that the placenta receives nerves from the foetus, and Home says it is not difficult, with the microscope, to trace the nervous filaments distributed to the walls of the umbilical arteries. There is still great doubt on this point. Many close observers have failed to discover the nervous filaments spoken of, nor have they been more successful in looking for the placental glands reported by Littré nor the lymphatic vessels of Cruik-

shank, Mascagni, and Lauth. Besides the ramifications of the umbilical vessels, which are said to form the foetal portions of the placenta, there are the ramifications of the uterine vessels upon the intervening membrane already alluded to, and which is usually termed the maternal portion. This membrane is considered by some to be the base of the maternal portion. It sends processes between the lobes and lobules, and everywhere surrounds the minute divisions of the umbilical vessels. The utero-placental vessels noticed when speaking of the decidua, were known to Albinus, and have been repeatedly injected by Dubois. Some are said to be tortuous or curling arteries about a line in diameter, some veins rather larger. Some of the veins are directed obliquely into the uterus, and others open into the venous canals in the membrane. The vessels of the membrane itself have all the characters of those which belong to accidental membranes. The maternal and foetal portions of the placenta are distinct in the early months, but at a later period unite, and towards the end of pregnancy become somewhat blended. Notwithstanding this intimate connexion, it is generally believed that their vessels do not communicate, and that anastomoses exist only between vessels of the same portion. The following reasons have been given for believing that a direct communication exists:—
1st. The flow of blood after accouchments and

abortions. 2nd. The exsanguine condition of the foetus when the mother has died of hæmorrhage. 3rd. The hæmorrhage which takes place by the cord when divided in accouchment. 4th. The injection of the vessels of the foetus by those of the uterus, and *vice versa*. 5th. The absence of the heart in certain monstrosities. Most of these arguments, however, are answerable. After delivery, the great dilatation of the uterine vessels would necessarily lead to a tendency to hæmorrhage. In many instances, children have been born vigorous and full of blood when the parents have died of hæmorrhage. Hæmorrhage by the cord is very rare. The results of injections have been too varied to enable us to found upon them any correct conclusions; and lastly, it is very probable that in a foetus unprovided with a heart, circulation goes on by the contractility of its own vessels. As a proof that the systems of the mother and child are to a great extent independent, Wrisberg and Osiander stated that they had seen the foetus and membranes come away intact, and the circulation of the foetus was observed to continue for about a quarter of an hour. The experiments of Vesale, Beclard, and others, would lead us to believe that the foetus performs respiratory movements in the liquor amnii. Vesale removed from the uterus of a bitch a foetus inclosed in its membranes, and distinctly saw the opening of the mouth, and the regular respiratory

movements of the chest. He also observed that the respiratory movements were kept up so long as the utero-placental circulation was uninterrupted. Beclard found it possible to quicken, lessen, or arrest altogether the foetal respiratory movements by various degrees of pressure on the umbilical cord. Hunter, Lobstein, Chaussier, Ribes, and Beclard have found that an injection by the uterine arteries returns by the uterine veins. Sometimes a little of the injected fluid was, probably from rupture of small vessels, effused on the surface or between the lobes of the placenta. When injected by the umbilical arteries the fluid returned by the corresponding veins. Notwithstanding the apparently isolated condition of the maternal and foetal portions of the placenta with regard to each other, a communication of some kind must exist; otherwise, how can we explain the development and growth of the foetus? Some physiologists have endeavoured to explain this communication by supposing that the two portions of the placenta exercise upon each other a reciprocal influence, and that in each is effected a double absorption and a double respiration. They have compared this mutual action to that which takes place between the blood and air in the lungs, and between the food and the chyloferous vessels in the intestines, and therefore make it probable that at this point is effected the nutrition and oxygenation of

the blood of the foetus at the expense of the mother. They have also compared the mode of union of the two portions of the placenta to the grafting of trees or the rooting of parasitic plants. These explanations and comparisons, however, do not altogether remove the doubts and difficulties which surround this part of embryology. The experiments of Dr. Williams of Liverpool seemed to have thrown a little light on the subject, and, indeed, made it appear probable that the utero-foetal communication was kept up by non-interrupted vessels. It was found on injecting coloured linseed oil into the abdominal aorta of dogs six or seven weeks with young, and, shortly after delivery, killing the puppies, that the oil had permeated their structures, and little drops were easily seen where incisions were made in different parts of their bodies and umbilical cords. It would seem from this, the passage of oil through the utero-placental vessels, that they are not secreting, that they are uninterrupted, and large enough to convey the red globules of the mother's blood. We may also conclude, says one author, that the analogies observed in all viviparous animals hold good in the utero-foetal communication. Chaussier and Ribes have demonstrated the connexion of uterine veins with the placental sufficiently clear to show the danger of hæmorrhage to which the mother is exposed by an abrupt detachment of the placenta. The most

minute account, however, of this subject has been given by Dr. John Reid, who had the rare opportunity of examining the placenta still attached to the uterus very shortly after death. This account will be found in the "Edinburgh Medical and Surgical Journal" for 1845,* "On the Anatomical Relations between the Mother and Fœtus." The tufts of placental vessels are shown to penetrate the decidua and enter the open mouths of the uterine sinuses. These tufts are described as consisting of an artery and vein, terminating in a blunt point, and continuous. A number of them, not bound together by cellular tissue, form each tuft which is continually immersed in the maternal blood poured into the sinuses by the tortuous uterine arteries, whose lining membrane expands into the sinuses, and is continuous with the uterine veins after being reflected on the tufts of the placental vessels, forming sheaths for them, these tufts resembling the branchial vessels of aquatic animals covered by a prolongation of the inner coat of the vascular system of the mother. The Hunters believed that the cellular tissue which occupies the intervals between the placental vessels is always filled with the maternal blood; an opinion which has recently been adopted by Owen. Dr. Reid, however, further believed that the intervals

* See also Mr. Dalrymple On the Structure of the Placenta, Med. Chir. Trans. Lond. vol. xxv.

into which the maternal blood is received are lined and formed into sacs by prolongations of the inner coat of the uterine vessels. Dr. Biancini, in a lecture on the vascular connexions between the mother and foetus, published at Pisa in 1833, mentions a case of adherent placenta. A woman who had suffered greatly during parturition, died eight days after delivery. The attempts made to bring away the placenta had occasioned a profuse and alarming hæmorrhage. After death, an injection of glue and vermilion thrown into the uterine veins filled the uterine arteries, and also passed into the vessels of a considerable portion of the placenta, which was still adherent. The only circumstance which makes this case inapplicable to the present question is the abnormal inflammatory connexion between the two organs, in which, as in all inflammatory products, numerous bloodvessels might have been formed.

The anatomy of utero-foetal communication being thus in an unsatisfactory condition, we can hardly expect anything more satisfactory in its physiology. Liebig considers that the dis-oxygenated blood of the umbilical arteries arriving at the extremities of those vessels which are in close juxtaposition and parallelism with the minute rami of the uterine arteries is aerated by means of the per-oxydized corpuscles of the maternal fluids, by depriving them of their superabundant oxygen;

this permeating the thin coats of the two sets of vessels, as air in the lungs from the bronchi to the arteries, renovates the foetal blood, which thence passes directly into the umbilical vein, as in the lungs from the pulmonary artery to the vein, and thus returns into the foetal circulation.

The analogies furnished by an examination of incubated ova in birds prove that the new being is not developed by the successive additions of blood already formed, but that it is elaborated in the embryo itself, and this has been further proved by recent microscopical researches, which inform us that the blood corpuscles of the mother do not resemble those of the foetus, neither can blood from the one be received by transfusion into the blood-vessels of the other with impunity. The deterioration which a body sustains by loss of blood cannot be repaired by the simple addition of a certain quantity of that fluid. For this purpose it is necessary that the mass of fluids be augmented by materials elaborated by vessels peculiar to the body that it is intended to nourish. These vessels may be of the lymphatic order, which according to M. Lauth are found in the placenta, and according to others in the liver, spleen, thymus gland, &c. Dr. Simpson remarks:—"Mr. Goodsir's examination of the secreting cells of the placenta seems to prove that the foetus is nourished by a milk-like secretion from the uterine element of the

placenta, and that the secretion is imbibed by the looped and terminal capillaries of the placental tufts of the umbilical circulation—the true foetal element—and therefore it is very easy to see how a local error in the secretion would affect the child.”*

The placenta has been supposed to have another use besides producing changes in the blood, namely, that of propelling it onwards. A few years ago Mr. Jackson, of London, endeavoured to establish an analogy between the functions of the placenta and those of the spleen.† The spleen was stated to be an assistant circulatory organ, and its particular office was to effect certain changes in the blood previous to propelling it through the liver, just in the same way as it was assumed the placenta effects changes in the blood received by the uterine and umbilical vessels, and propels it along the umbilical vein to the same organ. It was considered that the impulsive force of the heart was not sufficient to reach the whole capillary circulation—hence the necessity of the spleen and placenta. Kolliker has discovered muscular fibres, and described minutely Malpighian bodies in the spleen, which would seem to countenance Mr. Jackson’s views with regard to that organ; but no such

* For an account of Professor Goodsir’s views, see his “Anatomical and Pathological Observations.”

† See various papers published in the *Lancet* for 1838.

discovery has yet been made in the placenta. In general appearance, structure, and other respects the two organs are somewhat similar.

I shall here give a short resumé of some of the opinions entertained as to the functions of the placenta. It will be necessary to add a little more on the subject when we come to speak more particularly of the nourishment of the foetus. "The analogies of early development between the embryo of the mammalia and other vertebrated animals cannot be denied. Some, however, are more fanciful than correct; for instance, comparative anatomists tell us that the human placenta is an organ for the transfusion of blood from the mother to the foetus. This is certainly not true. The placenta should rather be considered as a reservoir of nourishment supplied by the mother, from which the vessels of the foetus absorb certain matters, and form foetal blood, specifically differing from that of the adult. The existence of secreting cells in the placenta is not admitted by all observers, and it is probable that for the most part it is by transudation, or endosmose, that the contents of the uterine vessels destined for the foetus pass into the minute branches of the umbilical vessels. It seems pretty certain that no entire blood globules pass from one set of vessels to the other, because the globules of foetal blood appear, from the observations of Paget and others, to be

differently shaped, and larger than those of the adult. Other inquirers, among whom are Prevost and Dumas, have stated the reverse, and say they are smaller. The former, however, is now generally believed, and it is stated that the blood-globules are larger in the foetus because of the greater activity of nutrition going on at this period. In the experiments of Majendie and Williams it appeared that camphor and oil injected into the blood of pregnant animals were soon detected in the blood of the foetus; but poison injected into the umbilical arteries, although mixing with the blood on its way from the foetus to the placenta, did not affect the mother. Neither does fatal hæmorrhage in the mother apparently diminish the fulness of the vessels of the foetus, so that it would seem that the transmission of fluids in the placenta is almost entirely from the mother to the child. The placenta must answer in some measure the purpose of arterializing as well as supplying the foetal blood, but the difference between the blood in the umbilical arteries coming from the foetus and that in the umbilical vein passing to it is never so great as that between the venous and arterial blood in the adult, and to this it may be partly owing that all the functions of the nervous system are nearly at a stand in the foetus, but are excited into action immediately after birth."

It will not be necessary to follow minutely the early and gradual development of the embryo and other parts of the ovum—a subject which has lately received considerable attention, and must greatly assist those who are making inquiries into the nature and causes of monstrosities. These are, no doubt, often produced by disease, but more frequently from original malformation of the germ, interrupted nutrition, abnormal growths, and by accidents and violent mechanical changes of position when the formative process is in active operation: these set up inflammation, and unite parts which arrest development and produce all the ugly phenomena which nurses and often scientific men believe to be the effect of the mother's imagination. What are more properly called diseases of the foetus belong to an advanced period of pregnancy; we shall therefore require but a short account of the cord and other appendages, or even of the foetus itself, until it has arrived at maturity. It was necessary to dwell at some length on the placenta and membranes, because on their integrity depends in a great measure the health of the child; and it will also enable us to speculate perhaps more successfully on the general features of intra-uterine life.

Towards the end of gestation the umbilical cord is composed of the umbilical vein and arteries, cellular tissue, a soft gelatinous substance which

surrounds the vessels, and an envelope formed, according to some, of the amnion alone, but others state that the chorion also enters into its formation. Up to the third month the cord contains a part or whole of the umbilical vesicle, the omphalo-mesenteric vessels, and the urachus. These disappear, or are obliterated, as the cord becomes elongated. At the commencement, the embryo is applied against the membranes at that part which becomes the point of insertion of the cord; therefore it is for a considerable time in apposition with the rudimentary placenta. As the foetus grows, the cord becomes more and more developed, and at the ninth month they are each about the same length. The tissue which surrounds the vessels of the cord is analogous to cellular tissue—very thick, and usually infiltrated with an albuminous fluid, constituting Wharton's gelatine. It may be displaced by pressure, and being permeable, is capable of being distended by air or liquids. It seems to be continuous with the sub-peritoneal cellular tissue of the foetus, and is also continuous with and forms a covering for the placental vessels.

The umbilical vesicle, the omphalo-mesenteric arteries, the allantoid and urachus, are temporary foetal appendages, the last being more persistent than the others.

At a very early period the umbilical vesicle is found adhering to the foetal surface of the pla-

centa, sometimes enclosed in the envelopes of the rudimentary cord. It is supplied by branches from the superior mesenteric artery and portal vein, which branches take the name of omphalo-mesenteric vessels. The office of the umbilical vesicle is rather obscure, but it probably has something to do with the nutrition of the embryo before the functions of the placenta are established. In oviparous animals the umbilical vesicle or yolk bag is received into the abdomen, but in mammalia its cavity is separated from the embryo at an early period by the contraction of the orifice of communication. It then shrinks, recedes from the body of the embryo, gives place to the umbilical vessels and placenta, and is finally thrown off.

The allantoid is a membranous vesicle, also found at an early period, near the insertion of the cord between the chorion and placenta, and many suppose that it receives the urine of the embryo through the urachus, and subsequently empties itself into the cavity between the chorion and amnion, thus constituting the false waters. Meckel is the chief supporter of this opinion; the greater number of physiologists are opposed to it, and seem to regard all the embryotic appendages as agents in nutrition and development, but are uncertain as to the office assigned to each.

Having said so much of its appendages, we have now to speak of the embryo itself. I have stated

that in a short time after impregnation the ovum is found in the uterus. Physiologists, considering it to be now nothing more than a cell containing nuclei, apply to it, as to all other living forms, the laws of cell development. With regard to these laws we are utterly ignorant of the agency which determines the present assimilative or the ulterior properties of a cell; we do not know why one generates a colouring, another an odoriferous matter, or what confers on the cells in different parts of the body the property of selecting from the blood, elements adapted to the tissues to which they belong. This is also true of the embryotic cell; there is nothing about it perceptibly differing from others; it appears in the most simple form, and the first step towards development seems to be an opacity in its contents, probably from the assimilation of new matter and aggregation of cells. Owen, speaking of cell-growth, says: "Botanists have observed a parallel change in the growing sporules of cryptogamic plants, the production by this means of a primitive and formative tissue, and the after-development of the vegetable tissues from this original structure. In the ovum of animals, these cells constitute an elementary tissue out of which the various systems, — the osseous, the muscular, the nervous, &c., are produced." It is the vital power, according to Tiedemann,* which in

* Comparative Physiology, p. 185.

the fecundated germinative liquid brings the molecules of the organic combinations to the solid form, and calls the first lineaments of the vegetable and animal embryo into existence. All the parts and tissues that are formed in it according to a definite order of succession, are products of the formative power, and on this they depend in all that relates to their first appearance, their development, aggregation, configuration, and arrangement. The phenomena exhibited in the act of formation of an embryo, are placed far above all the mechanical and chemical acts we observe in bodies not endowed with life. Müller says, "The creative force exists already in the germ, and creates in it the essential parts of the future animal. During the development of the germ, the essential parts which constitute the actual whole are produced. The entire vital principle of the egg resides in the germinal disk alone, and since the external influences which act on the germs of the most different organic beings are the same, we must regard the simple germinal disk, consisting of granular amorphous matter, as the active whole of the future animal, endowed with the essential and specific force or principle of its future being, and capable of increasing the very small amount of this specific force and matter which it already possesses by the assimilation of new matter. The formative or organizing principle is a 'creative power,' modifying

matter blindly and unconsciously, yet with such wonderful precision, that it is exerted in every animal strictly in accordance with what the nature of each requires." He also says in another place, "The vital principle is in a quiescent state in the egg before incubation; whether this principle is to be considered as imponderable matter, or as a force or energy, is just as uncertain as the same question in reference to several important phenomena in physics. Physiology in this instance is not behind the other natural sciences, for the properties of the vital force in the functions of the nerves are nearly as well known as those of light, caloric, and electricity in physics." Dr. Roget says, "The utmost solicitude has been shown in every part of living nature to secure the perpetuity of the race by the establishment of laws, of which the operation is certain in all contingent circumstances. A portion of the vital power of the parent is employed to give origin and birth to the offspring, and certainly no part of the economy of animated nature is more calculated to impress us with exalted ideas of the immensity of the scheme of Providence. Nothing can be more admirable than the progressive architecture of the human frame. The foundations of the edifice are laid in the homogeneous jelly by the efforts of the vital powers, and at first all the energies of vitality are directed to raising the fabric, and to the extension of

those organs which are of greatest immediate utility."

It is believed by some, and, among others, Orlando and Owen, that the opacity which takes place in the middle of the homogeneous contents of the ovarian vesicle, is the commencement of the nervous system. Desormeaux, Carpenter, and other physiologists, believe that the vascular system is first formed. After the first appearance of this opacity, the rapidity of its metamorphoses and speedy augmentation in volume and weight, evidently proves that nutrition is a most energetic function of the fecundated germ, and that it takes place at the expense of all those parts by which it is surrounded. Absorption and assimilation are followed by circulation, and thus from the first the human embryo enjoys an independent existence. Its surface, like the surfaces of the sponge tribe, is endowed with the power of appropriating to itself the nutritious materials contained in the fluids with which it is in apposition. Dr. Allen Thompson remarks:—"In the early stages of development there appears to be what may be called a general interstitial respiration, or a change essential to life, produced by oxygen in all the substance of the embryo or of its accessory parts, which as the foetus becomes more perfectly formed, takes place in particular organs only. As soon as a peculiar nutritive fluid and a central propelling organ are produced,

this fluid is exposed on the expanded surface of the yolk to the influence of the respiratory medium, either directly or through the coverings of the ovum." The relationship of the embryo to the mother during gestation seems to be analogous to that which it bears to the external world after birth, seeing that from both it draws the necessary elements for the support of life.

Instead of following minutely the weekly or monthly changes which the human embryo undergoes, it will be sufficient for present purposes to give Professor Owen's outline of the early development of the chick in ovo. The analogy is sufficiently close to enable us to understand many of the changes which are more slowly brought about in the human subject, some of which, however, will receive particular notice. "When eggs have been incubated by the parent hen, or have been subjected to the regulated temperature of artificial heat, the cicatrix is observed to increase in size and present a whitish opaque disk upon the surface of the vitellus and immediately beneath the vitelline membrane. This enlargement takes place by the increase in numbers round the circumference of the disk of the nucleated cells. In the centre of the cicatrix is a clear space, which is called the area transparens, and the opaque disk surrounding the area transparens is the area opaca. Beyond the area opaca the opacity gradually dimi-

nishes, and a number of concentric circles or halones are perceived. At the eleventh or twelfth hour of incubation a stratum of nucleated cells is found over the surface of the cicatricula and immediately beneath the membrana vitelli. This is the commencement of the amnion, or, as it has been termed by German writers, the serous layer of the germinal membrane. A similar stratum is then produced upon the under-surface of the cicatricula in contact with the yolk. This is the mucous layer of the germinal membrane, and between these two layers the common embryonic cells are collected. Very soon an opaque linear streak may be observed, traversing the area transparens; this streak is shortly discovered to be composed of two white and opaque parallel lines, which represent the two lateral halves of the spinal cord. Immediately external to this primitive trace a parallel line may be soon seen on either side, and immediately beneath it, that is, upon its vitelline surface, a third line, which represents the chorda dorsalis. In the two lateral striæ or laminæ vertebrales, at about the eighteenth or twentieth hour, a double row of opaque points may be discovered; this is the first step towards the ossification of the vertebral column, and the parts in which the ossific deposit commences are the rudiments of the superior arches of the vertebræ. The chorda dorsalis is afterwards transformed into the bodies of the vertebræ. The

next changes which occur are the divergence and approximation of the two parallel cords near to one extremity, so as to include between them three unoccupied spaces. The first corresponds to the future position of the olfactory ganglia; second, the optic; third, the medulla oblongata. On the second or third day, two small capsules are developed from the sides of the medulla oblongata at its upper part; these are the rudiments of the organ of hearing. Another pair of vesicles are soon after produced from the sides of the middle ganglia, which soon indicate, by the collection of pigment which ensues, the formation of eyes; and a third pair from the anterior ganglia become developed into the nasal fossæ. Near the posterior part of the primitive trace a space exists, which remains permanently in birds under the name of sinus rhomboidalis; this point corresponds with the numerous nerves which are intended to supply the lower extremities." In another place the same observer remarks, "In tracing the modifications which the mucous layer of the germinal membrane undergoes, it will first be seen that immediately after the appearance of the primitive cumuli the mucous layer dips down at each side, and forms two parallel longitudinal folds, including between them a groove. The colour of the yolk in contact with this membrane becomes of a lighter colour, and more fluid; the groove then progresses into

the anterior and posterior parts of the curved lineaments of the embryo and forms two cæcal pouches. In the next place, the two cæcal pouches elongate partly by their own growth and the increase of the cavity, and partly by the contraction of the opening of communication with the vitelline sac ; this elongation takes place with the greatest rapidity anteriorly, and is met by another cæcal pouch, which commences from the surface, and is directed inwards. In this manner the mouth and œsophagus are formed. At about the second or third day a dilatation is observed upon the anterior process, which represents the stomach, and at about the same period the posterior process divides into two cæcal pouches. The anus then commences from the external surface, and passes inwards to join one of these pouches ; so that at this period the embryo possesses a mouth and an anus, and a straight alimentary canal, with several dilatations upon its course. At about the third day a pair of cæcal pouches are developed from that portion of the anterior process which is behind the stomach, and corresponds with the future duodenum. These processes divide and subdivide, forming a number of pullulations, and constitute, as Malpighi has already observed, the rudimentary liver. At about the period of the formation of the mouth, the digestive canal recedes from the vertebral column, and carries with it a duplicature of the serous

layer, constituting the mesentery. It is at this time that the serous layer and the amnion resemble the mucous layer forming a central groove and two terminal pouches.”* We must now return to the human embryo, and after giving a few particulars of its development at the early, middle, and latter periods of gestation, we shall finish the first division of the subject by drawing up a general summary of what has been advanced on the anatomy and physiology of the foetus in utero. The human ovum at first consists of an ovarian vesicle, which contains the germinal vesicle and germ-cell. This latter contains the germinal spot, which, after fecundation, disappears, and is supposed to have become blended with the sperm-cell. After a certain time, it reappears under the form of the embryotic cell—its fluid contents being transparent and coagulable. According to Ollivier, the human embryo begins to be visible about the third week after impregnation. It is now oblong, a little distended in the middle, obtuse at one extremity, and pointed at the other. It is somewhat vermiform in appearance, of a white or grayish colour, demi-opaque, gelatinous, without consistence, two or three lines in length, and weighing two or three grains. There is no trace of the head except a little projection, partly separated from the rest by a slight notch ; neither can there be seen any rudimentary members or openings on

* Owen's Lectures.

the surface of the body. It adheres to the internal membrane by the part where the cord becomes apparent, and which is nearest to its small extremity. The whole volume of the ovum is about equal to that of a hazel-nut. At the tenth week the embryo is about two inches in length, and about an ounce and a-half in weight; the head is largely developed, the nose is large, and the nares appear under the form of two slits widely separated from each other; the lips and the eyelids have made their appearance—the eyelids present two papillæ on their borders, pierced with holes. These are the lachrymal puncta. The neck is very short and indistinct, so that the face appears continuous with the superior part of the chest. The walls of the chest are sufficiently formed to conceal the movements of the heart. Prior to this period, changes similar to those observed in the chick in ovo have taken place; the thoracic viscera and dependencies are more developed than the abdominal. At first, the arm and thigh are smaller than the forearm and leg, and the latter less than the hands and feet. From this period the reverse is established. The fingers are visible, and the toes have the appearance of little tubercles linked together by a soft substance. The plantar surfaces are directed inwards. The cord is about the length of the embryo, and somewhat spiral. It is less infundibuliform than at an earlier period, and

its insertion further removed from the pelvis. Its base still incloses a portion of intestine. The caudal prolongation of the spine has nearly disappeared. As yet it is difficult to distinguish the sex, the genital openings being continuous with the anal. Generally about this period the umbilical vesicle ceases to exist. The entire volume of the ovum is about equal to that of a hen's egg. Up to the fourth month the formative process proceeds with great rapidity. It is, however, less active towards its termination than at its commencement. At this period all the parts of the foetus have become more defined, and are now pretty distinct. The length of the body is from six to eight inches, and its weight about seven ounces. The head forms a third of its whole volume. The fontanelles are large, as are also the membranous commissures of the cranium. Comparatively, the face is little developed; the eyes and nose are closed; there is no longer any doubt about sex; the scrotum, with its raphe, are very evident; the penis is long, gland naked; the latter cannot now be confounded with the clitoris, although this is still of considerable length, and surmounts the largely-developed labiæ; the skin is reddish, and covered with a light down, and on the head is formed a little hair, short, white, and silvery. Already there is a considerable deposition of fat, but only under the skin, nor is it found in any other situation up to the time

of birth. The yellow substance in which the muscles originate has become developed into muscular fibres, and very sensible movements are effected, the transverse striæ, however, are not visible before the sixth month. At the ninth month, the foetus is from eighteen to twenty inches in length; the average weight being, according to Chaussier (who is stated to have examined 20,000 infants), about six pounds. Very distinct hair has taken the place of the down, which occupied the eyebrows and eyelids; the nails, which were first seen at the third or fourth month, are still imperfect; the insertion of the umbilical cord has gradually elevated itself from the hypogastric region; in consequence of the development of the pelvic and other organs, it now nearly corresponds to the middle of the whole length of the body. The membranes and their fluid contents, at the end of the third month, exceed the weight of the embryo; afterwards, the reverse takes place. According to Meckel, at the middle period of gestation the weight of the membranes to that of the ovum is as one to eight; and, according to Chaussier, a foetus weighing about five pounds would have the placenta, cord, and membranes weighing about twenty ounces, and the liquor amnii about two pounds.

We shall now take a short review of the development of the internal parts—the viscera, nerves, bloodvessels, glands, &c. The development of all

the principal organs happens successively up to about the middle of the fourth month, when the state of embryo ceases, and that of the foetus begins. All the parts increase with more or less rapidity during this time, and draw towards the form which they must present after birth. The oral opening is formed about the sixth week, the anal a week later—sometimes the latter is found closed at birth, presenting the condition named imperforate anus. The stomach is first distinguished by a projection of the intestinal tube towards the left side about the ninth week, but the separation of the large and small intestines is of much later occurrence. The folds of mucous membrane belonging to the intestinal canal, and which are found only in the higher animals, do not appear until a late period of gestation. Before the sixth month the lungs are very small, the heart large, but its four cavities confounded, or at least difficult to distinguish; the liver is large, and occupies a great part of the abdomen; the gall-bladder is full of a colourless fluid, not bitter; the small intestine in its lower part contains yellowish matter in small quantity; the testicles are placed upon the sides of the superior lumbar vertebræ; the ovaria occupy the same position in the female. At the end of the seventh month the lungs assume a reddish tint, the cavities of the heart become distinct, the liver preserves its large dimensions, but removes a little

from the umbilicus ; the bile shows itself in the gall-bladder ; the meconium is more abundant, has acquired greater consistence and a darker colour, and descends lower in the great intestine ; the ovaria tend to the pelvis ; the testicles are directed to the inguinal rings. At this period the foetus is capable of life, that is, it could live and breathe if expelled from the uterus. All the above parts become more perfect during the eighth and ninth months. Most of the secretions commence at an early period, and among others the urinary.* The functions of the mucous membranes and skin are soon in activity, but their activity and nature vary at different epochs ; thus in the early months the intestinal canal contains a liquid matter, the properties of which undergo successive changes up to the time of birth, and which appears to be exclusively excrementitious.† According to Vauquelin and Berriere the viscous kind of grease with which the foetus is coated about the sixth month has its

* The late Mr. T. W. King has related a case in Guy's Hospital Reports, where an imperforate urethra caused so much distension of the foetal bladder as to produce its rupture and subsequent fatal peritonitis, from the urine passing into the abdominal cavity. The dead foetus was avorted at the fourth month. It may be seen in Guy's museum. Billard has recorded similar cases.

† See Dr. Davy's paper in the *Lancet*, March 23rd, 1844, "On the Composition of the Meconium, and of the Vernix Caseosa, or Lubricating Matter of the New-born Infant."

source in the albuminous matter contained in the liquor amnii. Most physiologists consider it a secretion, or rather an excretion of the fœtus, particularly as its appearance is simultaneous with that of the sebaceous follicles. Speaking of the appendages of the skin as excretions, Carpenter says, "The hair of the fœtus of the seal and other mammals, as it is not necessary in the uterus, can only be considered as a preservative excretion; soon after birth it is shed and replaced by another of a different colour, the growth of which has begun in the uterus. The lanugo, or down of the human fœtus, is an homologous production, and must, I think, be similarly useful in its economy by removing from the blood excrementitious matter." The glandiform organs of the fœtus are early developed, and it was thought by Broussais that, besides their secreting functions, their capillaries have an independent movement, and give an impulse to the blood. If this view be correct, the spleen, the thymus, and thyroid glands, and the supra-renal capsules must contribute greatly towards propelling the blood along the fœtal vessels. The great difference between these organs and ordinary glands is, that they have no efferent ducts. It is, however, very probable that they are all parts of the same assimilative apparatus, their office being apparently to withdraw certain crude matters from the blood, to submit them to an

elaborating action, whereby they are rendered more fit for the nutrition of the tissues, and then to restore them to the circulating current. Each may be described as consisting of a number of vesicles closed and isolated, or opening into a closed reservoir, these vesicles being lined with epithelial cells; around these, as around the follicles or tubuli of the true glands, bloodvessels are copiously distributed, and the elimination of products from the blood appears to be effected by their agency precisely as if those products were destined to be sent out of the body. The mode in which they are taken back into the circulation is not very clear; both bloodvessels and absorbents have been supposed to participate in the operation, and this idea may not be regarded as improbable when the large size and number of their lymphatics are considered. The elaboration which the fluids undergo in the tubuli of these organs is no doubt owing to their cells.*

We have now to notice the *vascular system* of the foetus. Very little is known regarding the origin of the red colouring matter of its blood, but we have the analogy of birds in support of the doctrine that it is formed by the foetus itself. Foetal blood has a temperature several degrees below that of the mother. It contains less water and a greater proportion of red corpuscles than the maternal; it is also of a darker colour, and not so susceptible of

* Carpenter's Physiology.

a florid hue on exposure to the atmosphere ; the clot formed by it is soft and diffuent. Velpeau and Bichat have made out a difference between the venous and arterial, disputed by others on the ground that Velpeau's experiments were made on children born alive. Fourcroy could detect in it no fibrin, and Bichat no phosphoric salts ; both these constituents, however, have been found by other observers. Hæmatine is found in an embryo fourteen or fifteen days old, and consequently before the heart exists. The development of the vessels of the ovum is the same as that of accidental membranes, adhesions, and cicatrices ; like those, they first appear as isolated vesicles, and afterwards form canals which unite and form the general vascular system. This mode of formation is easily traced in the placenta, in the vessels of which neither coats nor fibres are very distinct. It is generally admitted that the veins are formed before the arteries, and that by their function of absorption the elements of nutrition are collected for the support of the embryo. The circulation of the foetus presents at different periods variations resulting from the successive changes to which the whole body is subject. The blood first appears in the veins of the "membrane vitellaire." These form the origin of the vena porta, at the extremity of which is perceived the rudiments of the heart and aorta ; thus having a simple circulation with

only one circle: subsequently the allantoid and umbilical veins appear, and their trunks become united to the vena porta. Arteries are now discovered, and they soon become united to prolongations of the aorta. The circulation at this period becomes more extended, and describes in its course two circles, one to the vitelline, the other to the allantoid vesicle, and which are united in the embryo in a single vascular trunk, the centre of which may soon be defined as an auricle and ventricle, giving off trunks venous and arterial. The circulation does not become more complicated until the period when ascending branches of the aorta appear, when both the auricle and ventricle become double, and when the liver is formed. The vascular ramifications, which gradually join the principal trunks, and develop themselves simultaneously with the organs they are intended to supply, have a calibre varying at different periods; those of the liver are from the first very voluminous, hence the large size of that organ; also the vessels which supply the thyroid and thymus glands, and the suprarenal capsules are comparatively very large. In all these organs, as in other parts of the body, the functions of the lymphatic system enjoy an excessive activity, which commences early and continues to an indefinite period after birth. The mode of development of the vascular system proves that it is eccentric, and not concentric, as stated by

M. Serres. Without following the gradual changes which take place in the bloodvessels of the foetus, perhaps it will answer all useful purposes to give Wilson's concise description of an advanced period of the foetal circulation:—"The pure blood is brought from the placenta by the umbilical vein, passes through the umbilicus, and enters the liver, where it divides into several branches, which may be arranged under three heads:—1st. Two or three which are distributed to the left lobe. 2nd. A single branch, which communicates with the portal vein in the transverse fissure, and supplies the right lobe. 3rd. A large branch, the 'ductus venosus,' which passes directly backwards, and joins the inferior cava. In the inferior cava the pure blood becomes mixed with that which is returning from the lower extremities, and is carried through the right auricle, guided by the Eustachian valve, and then through the foramen ovale into the left auricle. From the left auricle it passes into the left ventricle, and from the left ventricle into the aorta, whence it is distributed by means of the carotid and subclavian arteries, principally to the head and upper extremities. From the head and upper extremities the impure blood is returned by the superior vena cava to the right auricle, from the right auricle it is propelled into the right ventricle, and from the right ventricle into the pulmonary artery. In the adult, the blood would now

be circulated through the lungs and oxygenated ; but in the foetus the lungs are solid and almost impervious. Only a small quantity of the blood therefore passes into the lungs, the greater part rushes through the ductus arteriosus into the commencement of the descending aorta, where it becomes mingled with that portion of the pure blood which is not sent through the carotid and subclavian arteries. Passing along the aorta, a small quantity of this mixed blood is distributed by the external iliac arteries to the lower extremities ; the greater portion is conveyed by the internal iliac, hypogastric and umbilical arteries, to the placenta, the hypogastric arteries proceeding from the internal iliacs, and passing by the side of the fundus of the bladder and upwards along the anterior wall of the abdomen to the umbilicus, where they become the umbilical arteries. From a careful consideration of this circulation we shall perceive—1st. That the pure blood from the placenta is distributed in considerable quantity to the liver before entering the general circulation. Hence arises the abundant nutrition of that organ, and its enormous size in comparison with the other viscera. 2ndly. That the right auricle is the scene of meeting of a double current—the one coming from the inferior cava, the other from the superior, and that they must cross each other in their respective courses. How this crossing is effected, the theorist

will wonder—not so the practical anatomist, for a cursory examination of the foetal heart will show, 1st. That the direction of entrance of the two vessels is so opposite that they may discharge their currents through the same cavity without admixture. 2ndly. That the inferior cava opens almost directly into the left auricle. 3rdly. That by the aid of the Eustachian valve the current in the inferior cava will be almost entirely excluded from the right ventricle. 4thly. That the blood which circulates through the arch of the aorta comes directly from the placenta, and although mixed with the impure blood of the inferior cava, yet it is propelled in so great abundance to the head and upper extremities, as to provide for the increased nutrition of those important parts, and prepare them, by their greater size and development, for the functions which they are required to perform at the instant of birth. 5thly, That the blood circulating in the descending aorta is very impure, being obtained principally from the returning current in the superior cava, a small quantity only being derived from the left ventricle. Yet it is from this impure blood that the nutrition of the lower extremities is provided. Hence we are not surprised at their insignificant development at birth, while we admire the providence of nature, that directs the nutrient current in abundance to the organs of sense, of prehension, and of degluti-

tion, so necessary even at the instant of birth to the safety and welfare of the creature. After birth, the 'foramen ovale' becomes gradually closed by a membranous layer, which is developed from the margins of the opening, from below upwards, and completely separates the two auricles. The situation of the foramen is seen in the adult heart upon the septum auricularum, and is called the 'fossa ovalis,' the projecting margin of the opening is the 'annulus ovalis.' As soon as the lungs have become inflated by the first act of inspiration, the blood of the pulmonary artery rushes through its right and left branches into the lungs, to be returned to the left auricle by the pulmonary veins. Thus the pulmonary circulation is established; then the ductus arteriosus contracts and degenerates into an impervious fibrous cord, serving in after life merely as a bond of union between the left pulmonary artery and the concavity of the arch of the aorta. The current through the umbilical cord being arrested, the umbilical arteries likewise contract and become impervious, and degenerate into the umbilical ligaments of the bladder. The umbilical vein and ductus venosus, also deprived of their circulating current, become reduced to fibrous cords—the former being the round ligament of the liver, and the latter a fibrous band, which may be traced along the fissure of the ductus venosus to the inferior vena cava."

The nervous system next demands a short notice. The successive development of its different parts does not seem to depend on the arteries which are distributed to them, for the vascular and nervous systems and intestinal canal are formed very nearly at the same time. The law of concentric formation, which Serres has applied to an exposition of the laws of symmetry, is not more susceptible of a rigorous application to the nervous than to the vascular system. It is well known that the nerves are generally developed from the circumference to the centre, and that at first the cerebro-spinal and sympathetic systems are made up of parts separated from each other, that subsequently they unite and constitute the wonderful apparatus which contributes to the perfection of the whole organization. We have, notwithstanding, reason to think that it is not correct to give the nerves a concentric development in all cases, for although they are formed in those parts which they afterwards supply with nervous power, it is evident that where the limbs are developed, and where as yet they exist as little tubercles, the nerve ganglion is almost an imperceptible point. As, however, the limbs are formed and become elongated, the nerves follow the same course, and are thus elongated from the centre to the circumference. The nerves of the fœtus are comparatively very much larger than those of the

adult. Except, however, for the purposes of nutrition, their functions must be very limited, and almost dormant.

At birth the brain is soft, almost pulpy, and has a reddish tint throughout. Its weight relatively to the entire body is as one to six. The difference between the white and grey substance is not well-marked. The nerves are firm and well-developed.

Various opinions have already been alluded to regarding the nutrition of the human foetus. Ollivier thus sums them up:—"It seems very probable that the nutrition of the embryo is at first effected by the absorption of fluid contained in the umbilical vesicle—that during the first half of intra-uterine life, the liquor amnii and gelatinous matter of the cord contribute to it, but from the moment that blood first appears in the embryo, the umbilical vessels are the principal and constantly-renewing sources of the elements of food."

We have now noticed the most striking features in the development of the human foetus, and have included the most prevailing notions on the fecundation of the germ, the nutrition of the embryo, and the formation of its structures. Perhaps a great deal more might be said with advantage, for it is doubtful even now whether we have any very defined views on some parts of the subject, whether we have adopted any of the opinions entertained by others, or found sufficient data to go upon for

forming an opinion for ourselves. Without trying to answer Dr. Hooper's difficult questions, What was the germ before its appearance? Did it exist, or was it formed at that instant? Does the little, almost opaque mass that composes it contain the rudiments of all the organs of the foetus and the adult, or are these created the instant they begin to show themselves? What can be the nature of a nutrition so complicated, so important, performed without vessels, nerves, or apparent circulation? How does the heart move before the appearance of the nervous system? Whence comes the yellow blood that it contains at first? Without trying to answer these questions, or to attempt impossibilities, I shall propose another set of questions, perhaps more within the scope of human intelligence, and which may already in some measure have received an answer in the preceding pages:—

- 1st. How is the foetus in utero nourished? Is it by transmission of the parent blood, or some of its constituents? Is it by a secretion from the maternal fluid by means of lymphatics or cells, or is it by the simple aeration of the foetal blood by means of contact with the maternal?
- 2nd. Are acquired diseases transmissible from the mother to the child, and if so, how are the poisonous elements made to circulate in the foetal blood?
- 3rd. Is it possible to diagnose diseases of the foetus, or to affect it by medicines through the mother's system? I will

almost venture to say that the first question is nearly solved. This, however, cannot be arrived at by isolating the different means by which the foetal blood is said to be renewed; they must be taken together; the mere aeration of the blood would not suffice. Adults require something besides oxygen to live upon, and so does the foetus. No less an authority than Boerhaave has made the foetus an aquatic kind of animal, respiring the oxygen of the liquor amnii, and swallowing other portions of it for nourishment. One of the chief arguments in support of this view is, that the fluid has frequently been found in the foetal lungs and stomach. Some have objected to this, that such an imperfect kind of respiration would not admit of the act of deglutition. There is reason, however, to believe that this objection might be explained away. It seems more difficult to dispose of the anomaly of the foetus swallowing its own urine: that this forms a part of the liquor amnii is now scarcely disputed, but it must be recollected that only one or two observers have detected urea in the foetal urine, or azote in the meconium, and also the absorbing vessels of the stomach have an elective power, by which deleterious substances are kept out of the system. The large quantity of viscous matter found in the stomach, the changes it undergoes in the intestines, even to the production of an imperfect sort of chyle, and the activity of the liver—all point to some

form of digestion. Sir Astley Cooper, Dr. Robert Lee, and others have attributed to the foetal liver very important nutritive functions, which they have considered peculiar to foetal life. It seems, however, that similar functions belong to the adult liver. A short time ago I heard M. Bernard state in his lectures, that the liver, besides secreting sugar, which in adults becomes decomposed in the lungs and in the foetus probably to some extent in the lobes of the placenta,* also receives all the albuminoid and saccharine elements from the alimentary matter thrown into the intestinal canal, and that the only office of the lacteals is to receive the oleaginous portions of food in the form of an emulsion formed by admixture with the pancreatic juice. His experiments, which I had an opportunity of witnessing, fully supported the truth of this theory, and he also showed that the albumen and sugar undergo important changes in the liver previous to their being again received into the circulation. If either of these substances are thrown into the jugular vein of an animal they are soon detected in the urine. On the other hand, if they are injected into the portal vein, the changes which they undergo in the liver prevent any traces of them from being discovered in the urinary secre-

* M. Reynoso has shown that the foetal urine always contains sugar, which he attributes to the fact that the lungs being inactive, do not decompose it as in the adult.

tion. Thus, it is easy to conceive what an important part the liver plays in elaborating the fluids before they enter into the general circulation. In the adult it acts chiefly on blood brought from the abdominal viscera, and in the fœtus on that brought from the placenta. The prepared pabulum is taken up by the lymphatics in connexion with the liver, and thus reaches its destination. The fact that the umbilical vein conveys its contents to an organ endowed with so many and such important offices, is a proof that they consist of new elements, of materials which before they can enter the foetal circulation must be submitted to the modifying influences of the hepatic vital actions. It can hardly be supposed that the umbilical vein merely returns to the liver the blood which it receives from the umbilical arteries; there must be fresh supplies to account for increase of volume in the embryo. Besides, I have given a sufficient number of experiments and anatomical facts to prove that fluids pass from the parent to the offspring. We have considered the utero-placental vessels described by Albinus, Hunter, Dubois, and Simpson, the lymphatics of Cruikshank, Mascagni, and Lauth; the secreting cells of Goodsir; the experiments of Williams, Magendie, and Bernard; the anatomical descriptions of Owen, Ollivier, and Dr. John Reid; the ingenious theories of Liebig, Boerhaave, Allen Thompson, Lee, and Carpenter; the speculations

of Tiedemann, Müller, and Roget on that mysterious and potent agent the vital force, the nature of which neither the philosopher's calculations, the physiologist's microscope, nor the chemist's crucible have yet revealed to us. I think we may glean from the whole a tolerable and sufficiently correct idea of the mode of intra-uterine existence. An attentive observer cannot but perceive that most of the above agencies are more or less in operation in the course of foetal development; and that the question, How is the foetus in utero nourished? has received an answer. The answer may be thought too general, but we must recollect that we are not warranted in giving to one set of organs, or one set of vital actions, powers and attributes which nature has distributed amongst many.

I have purposely said very little about extra-uterine foetation, because, at least in situation, it must be considered as an abnormal development. In these cases the embryo generally dies about the third or fourth month from an insufficient supply of nourishment, a fact which may be advantageously appended to the other evidence in favour of utero-placental communication being the great source of foetal nutrition; nor has anything been said on the subject of double, triple, and quadruple conceptions. All, however, that requires to be noticed here is, that whilst their causes are not very

well understood their laws of development are similar to those of a single embryo. In passing on to the second division of our subject I think we are warranted in carrying with us the conviction that whether in the embryotic or foetal states the new being has inherent and independent powers of life; that as in the adult this life is continued so long as there are no serious interruptions to its functions, and a proper supply of nourishment is obtained, and that the notion is no longer vague and unsupported that the nourishment is derived from the parent through the utero-placental communication. With these premises then, and in the hope of throwing some light on the questions I have proposed as to the susceptibility of the foetus to the parent's diseases—its own diseases and their diagnoses and treatment, I shall now endeavour to give them as full a consideration as the subject will admit of.

PART II.

PATHOLOGY, DIAGNOSIS, AND TREATMENT

OF

FŒTAL DISEASES.

WHEN we regard the fœtus in its natural position, enclosed in the uterus, floating in the liquor amnii, with its head bent forwards, the chin resting on the chest, the arms folded or free, the thighs flexed on the abdomen, and the legs on the thighs, the knees slightly everted, the heels approaching each other and applied against the buttocks, presenting, on the whole, an ovoid form, which it usually preserves during pregnancy—when we consider that this form or attitude is undoubtedly the best for resisting easily those shocks and accidents from the exterior which perpetually threaten the womb—that at the inferior part it is received into a strong bony encasement, lined with soft parts, forming a comfortable cushion for its repose—that it is everywhere surrounded by the walls and viscera of the

abdomen, which form, with the uterus and amnion, a third cavity, surrounding and protecting its contents, at first sight, we should be inclined to think that ample provision had been made for its safety and welfare. Yet, with all these apparent safeguards, the foetus in utero is liable to accidents, disease, and death. We have only to glance at statistical accounts to be convinced of the constant and immense sacrifice of foetal life. A great deal may, no doubt, be referred to accidents attendant upon childbirth; but it is very probable that the greater number of deaths would receive no other explanation than that of the previous existence of disease. In a recent Glasgow medical journal is found the following report:—“Throughout the whole of France, in 1850, the still-born to the ordinary deaths were as 1 to 31·28. In Paris alone, 1 to 10·69. Throughout the whole of France the still-born to the living births were as 1 to 31·7. In Paris, 1 to 12·6. In Glasgow the average is 1 still-born to 10 deaths. Many circumstances make it very probable that in London we should meet with the same average; in which case we should have in the metropolis alone about 100 still-born cases per week, or 5200 per year. It must be remembered that this is very far from showing the extent to which foetal diseases prevail. The work of destruction is not always so direct or rapid. Many morbid affections accompany the new being

in its passage from intra-uterine to extra-uterine life, and are either met successfully by medical treatment, or else pass into more formidable diseases, which often terminate in premature death.

The embryo being at first a simple, shapeless, vegetating appendage to the parent stem, although disease may blight it, no particular affection can be referred to any particular structure. When death takes place during the early periods of gestation, it is impossible to find an anatomical lesion sufficient to account for it. The fatal malady seems to act upon the whole organism without producing any appreciable circumscribed lesion ; or, if lesions do exist, they become effaced by the changes which the dead embryo undergoes in the uterus. Progressive development, however, is accompanied with a liability to morbid changes which can be easily recognised. It is found that nearly all the diseases of adult life may reach the foetus in utero. At an early period the liver and intestines suffer most ; subsequently, hydrocephalus, hydrothorax, peritonitis, ascites, pulmonary lesions, syphilitic and scrofulous eruptions, deposits, and disorganizations show themselves ; and, ultimately, it is in danger of nearly the whole list of human diseases—constitutional, idiopathic, epidemic, and accidental. Velpeau has observed ulcers of the head in an embryo of two months, and alterations in the liver in one of three. He has also observed phleg-

masia of the tegumentary system about the same period ; and, somewhat later, he found the effects of peritonitis, a very common appearance, so much so that it has been considered one of the common causes of foetal death. Of all the causes, however, of foetal disease and death, syphilis is admitted to be the most common. Indeed, this opinion is carried so far in Paris, that a great number of medical men practising there refer to it in nearly all cases the lesions that are found in examinations of the still-born, as well as the diseases met with in children born alive. We shall, perhaps, be better able to judge of the value of this opinion when we know the grounds on which it is founded. For the sake of convenience I shall divide the diseases of the foetus into three classes :—1st. Those received from the parents. 2nd. Those peculiar to itself or to its appendages. 3rd. Those arising from accidents or other causes. There is ample proof, both from physiological facts, and daily experience, that the hereditary or acquired diseases or peculiarities of the father affect the offspring nearly as much as those of the mother.* A great deal has been said and conjectured on their *modus operandi* ; but, as we know too well the inutility of conjecturing on the hidden processes of nature, we must now chiefly confine ourselves to the results of observation.

* See the Article Generation. Cyclopædia Anat. and Physiology.

Hereditary diseases, then, may be divided into those transmitted by the mother, and those by the father.

We shall first consider the diseases, and predispositions to disease, derived from the mother. Carpenter says:—"If the mother supplies the nutritious materials, which contain large quantities of albuminous and fibrinous matter, any change affecting her system would also affect the offspring." During pregnancy the mother is not only subject to the ordinary liability to disease, but that condition itself often hurries her into a serious disturbance of the health, and there are very few who altogether escape the morbid feelings, depraved sensations, and sympathetic pains accompanying the parturient state. Hippocrates, after saying a great deal about conception, that fat women could not conceive, and "*Mulier ubi concepit, statim inhorrescit ac dentibus stridet, et articulum reliquum corpus convulsia prehendit,*" goes on to say that, from the moment a woman conceives, her whole system has undergone a complete change. There is something remarkable in the fact that, although in most cases of pregnancy the health is more or less altered for the worse, some sickly women have had their healths completely restored by going through the ordeal; whilst others, as in cases of consumption and scrofula, have only experienced a temporary improvement. Moreau observes, that

the changes in the mental manifestations are also strongly marked,—the intelligence of pregnant women becomes weakened, their judgment is less sound, their imaginations more restless, and their wills more capricious.*

The maternal diseases affecting the child in utero may be, first, the acute ; second, the chronic ; third, other morbid states, such as abnormal growths in the pelvis. In the first—the acute—we cannot say whether the disease of the foetus arises from the general disturbance of the mother's system, or whether it is affected by the disease itself ; there is reason, however, to believe that both causes may exist, and this is particularly seen in typhus, typhoid and eruptive fevers. The invasions of cholera have shown that when that frightful disease attacks the mother the foetus seldom escapes, but, as has been already remarked, it is not always certain how it is affected, whether by the epidemic itself or by the stagnation of the mother's blood. Cazeaux and Bouchut have thought the foetal disease and death in these cases to result from mechanical pressure on the uterus, caused by cramps and convulsions of the abdominal muscles, or again in consequence of low diet and the large number of evacuations, which carrying off the serum of the blood, the sources of nutrition become dried up.

* See also "Changes in the Uterus and System at large," in "Montgomery's Signs of Pregnancy."

It is stated on good authority, that during the prevalence of cholera infants in the womb have been destroyed by its influence, whilst the mothers have escaped the disease altogether—a proof of the independent liability of the fœtus to epidemics. Of course, every acute affection attacking the mother, by disturbing the uterine functions must more or less affect the child in utero, but it does not always destroy life, as the following heading of a case from Mauriceau will very well illustrate: “D’une femme qui accoucha assez heureusement au terme de huit mois, de deux enfans vivans, laquelle étant grosse de trois mois, avoit eu durant six semaines entières une fièvre continué.”

The *chronic* diseases of the mother affecting the child in utero is one of the principal parts of the whole inquiry, for at present in their study is centred nearly all we are able to accomplish in the form of diagnosis and treatment of fœtal diseases. To take the most striking and most important example—an anti-syphilitic treatment has enabled women, who before had had repeated abortions, to send into the world living and healthy children. It may be reasonably hoped that other constitutional poisons will ere long find a similarly efficacious antidote. The chronic and transmissible diseases of the mother may be hereditary or acquired; syphilis may belong to either, but most commonly it is acquired, that is, contracted by the parents

themselves. As I have collected several observations on syphilitic diseases, it will perhaps be advantageous first to consider them, and afterwards diseases of a less formidable character. I shall chiefly confine myself to comparatively new researches, the ordinary details of syphilis in infants being too well known, or too accessible to every reader, to require notice here. The subject has been made one of special investigation by a few able French physicians, and I have attempted to select from their evidence and conclusions that which seems to be the most practical and valuable. The mode in which the syphilitic poison finds its way into the constitution of the new being is as full of obscurity as it is surrounded with interest. Although the name hereditary or constitutional disease may be useful to the practitioner in aiding him to designate something not understood, it does not aid the inquirer; it does not reveal to him the nature of the poisonous elements which constitute the disease, neither does it inform him whether the germs of disease existed in the unimpregnated ovarian vesicle, or whether they are implanted in the embryo at a particular epoch of its development. We are equally in the dark as to the differences between intra-uterine and extra-uterine syphilis. Many authors believe that the former is always secondary, others that it may be either primary or secondary, but at birth always secondary. When in the new-

born there are no external manifestations, and yet the internal organs give evidences of syphilis, it is supposed that the secondary period has passed over during intra-uterine life, and that at birth the deep-seated alterations are tertiary. Ricord believes that the primary form may remain latent in the foetus, as in the adult, and that the secondary symptoms may be delayed to even six months after birth. According to Depaul, the ovarian vesicle receives the primary syphilitic taint in common with the whole maternal system, and the ovum in some cases preserves this taint unchanged through the whole period of gestation. Several writers, and Cazenave in particular, consider that the secondary symptoms appearing soon after the healing of a chancre, ought not to be considered a modification of the original poison, but the primary poison itself: this, in some respects, agrees with Depaul's views on syphilitic manifestations in the foetus. The disease, however, seems to produce effects in the foetal economy and to put on characters which are seldom, if ever, observed in the adult.

The evidence which Mauriceau's cases afford supports the opinion, that unless the parents have contracted syphilis before impregnation, any subsequent infection during pregnancy is not likely to affect the foetus in utero; whilst in some he seems to infer, that the contaminated embryo is capable of being treated successfully through the mother's

system. After giving a few of these cases, followed by more recent observations, it will be seen how far the views of the old and new schools agree. Except in one or two instances, it will be sufficient to give merely the headings of Mauriceau's cases, and I have preferred giving them in his own language, seeing that in them is condensed, as it were, the whole pith of the story:—

CAS 1.—J'ai vu une femme grosse de deux mois et demi qui avoit une gonnorrhie virulente, qui lui étoit survenue un mois après l'ouverture d'un boubon vénérien presque dans le même temps qu'elle étoit devenue grosse : nonobstant quoi, elle accoucha a terme d'un enfant très sain ; ce qui étoit une marque évidente que la mère n'avoit pas reçu d'infection qu'après la conception de cet enfant, qu'elle me dit avoir senti mouvoir a six semaines, comme elle avoit coutume de sentir ses autres enfans dans ses précédentes grossesses ; car si ce venin eut été communiqué a la mère avant que de devenir grosse, il est certain que l'enfant n'aurait pas pu être aussi sain qu'il étoit.

CAS 2.—Un de mes confreres me pria d'aller voir une jeune femme âgée de vingt-deux ans, grosse de sept mois, qu'il traitoit de la maladie vénérien, étant en peine de ce qu'elle n'avoit point senti remuer son enfant depuis trois jours, mais elle me dit en la visitant, qu'elle venoit de la sentir. Cette femme avoit pour lors une flux de bouche

assex copieux, qui lui avoit été excité par plusieurs frictions d'onguent de mercure, crachant jusques a cinq ou six bassins par jour, sans aucun autre accident extraordinaire, par lequel flux elle fut bien guérie de cette facheuse maladie et accoucha ensuite heureusement a terme d'un enfant fort sain, qui auroit été en grand risque d'être infecté de cette maladie contagieuse de la mere, si elle eut differé à s'en faire traiter après son accouchement.

CAS 3.—D'une femme qui fut traitée avec bon succès de la maladie vénérien dans le temps de sa grossesse. He remarks on this case, that it is easier and safer to both mother and child to treat the disease in the earlier months of pregnancy, as the foetus is yet small, and not requiring much *nourriture* from the mother; and the latter is better able to bear the depression and drain on the system caused by salivation. Also, if the treatment is not active, or too long deferred, the malignity of the disease would increase, and eventually, probably by indirect means, destroy the infant in the womb, or shortly after birth.

CAS 4.—D'une femme grosse de deux mois et demi, qui fut traitée de la maladie vénérien et accoucha ensuite heureusement a terme. In this case, after the woman became pregnant, the father contracted syphilis; gave it to his wife; both cured by free salivation; child born alive, and free from contamination.

The great living authorities in Paris on this important subject are Professors Dubois and Depaul. Both have elucidated it by numerous post-mortem examinations, published memoirs, and the reading of papers before the Academy of Medicine, principally, however, for the purpose of establishing the correctness of certain original views.* A good many of the leading doctrines which they have advanced have been ably replied to by M. Cazeaux, and some of the principal points advocated by them still remain matters of dispute. Dubois' views are, that certain lesions of the thymus, and also pemphigus in the "nouveau-nés," are indications of syphilis. With regard to the former, his conclusions are,—1st. La présence du pus disséminé ou réuni en foyers dans le thymus des enfants nouveau-nés qui avaient succombé à une syphilis évidente, doit être considérée non plus comme une simple coïncidence, mais comme un résultat et un témoignage de la maladie dont ils étaient atteints. 2nd. Cette altération autorisé, en l'absence de tout indice explicatif de la mort du fœtus, à prescrire un traitement antivénérien comme le seul moyen de prévenir le retour du même accident. He adds, "I am far from regarding these conclusions as settled. With less experience, I might assume this pretension. On the contrary, I believe that the subject

* These will be found in most of the French medical journals.

merits further attentive study. It may be that the suppuration of the thymus in the foetus is not always the result of syphilis. Notwithstanding, I have observed it in all cases where that disease has been fatal." The pemphigoid vesicles of syphilis are distinguished by their violet or blue tinge, and on the plantar surfaces they are often united by their bases, which is not the case with the pemphigus of ordinary cachexia. It generally precedes birth, and sometimes the vesicles appear in all stages of development. In all cases where these appearances were well marked at birth, the infants died in a few days, with nothing else to account for death. Dubois remarks:—"I do not regard as a syphilitic manifestation vesicles few in number, showing themselves after birth in weak, debilitated children, generally dispersed over the body, without any other alteration of the skin than a slightly reddened areola, and which usually disappears in a few days. Sufficient stress has not been laid on the difference between syphilitic and simple pemphigus; those cases reported to have been treated successfully by Valleix, Guillot, and Rayer, most probably belonged to the simple variety, and it should be remarked that Guillot has noticed its formidable character when it attacks the hands and feet. Having (continues the professor) in three years at the Maternité and Clinique d'Accouchements become acquainted with 13,000 lying-in

cases, I maintain that one form of pemphigus is a veritable indication of syphilis in the fœtus; yet it is one of its most rare morbid phenomena."

Professor Depaul has been long engaged in the same inquiry, and has made several original communications on the general pathology of foetal diseases. With regard to syphilis, perhaps his views will be better understood by giving one or two cases which he has brought forward to verify his opinions. His views agree with those of Dubois; but he has made some additions, the most important being that certain morbid alterations and abscesses in the lungs of the fœtus are to be considered as indications of syphilis. The first case I shall notice is headed, "*Pemphigus syphilitique. Abscès du thymus et du poumon gauche observés sur un enfant qui mourut quelques minutes après sa naissance.*"* A young woman born and living in Paris was admitted into the Clinique d'Accouchements de la Faculté, October 23, 1841. She was about eight months gone in the family-way, and had been in labour from an early hour that morning. At the moment of entry, her pains were strong, regular, and continued, and dilatation of the os uteri advanced. At a quarter past nine, the

* This is taken from Depaul's *Mémoire sur une Manifestation de la Syphilis Congénitale*, &c., published in Paris a few months since, a copy of which was kindly presented to me by the author.

membranes gave way, but as the head was somewhat fixed in its position, and as the uterine contractions seemed to be losing their force, it was thought advisable to give ergot. Under its influence, the pains again became strong, but only for about twenty minutes. The uterus again fell into its previous inertia. At two o'clock P.M., strong pains came on, and the foetus was expelled. It was a female child, very small and weak. It respired and cried immediately after birth, but only lived a few minutes. The woman did well, and left the hospital ten days after her confinement. *Post-mortem examination.*—On the day after birth (observes Depaul), I examined the body of the infant. The skin presented a general discoloration rather more marked than at the time of delivery; length of body, about sixteen inches; weight, five pounds and a half; limbs, well developed; volume of the abdomen, greater than usual. The skin of the hands and feet presented a violet colour, which was more evident than at birth; four or five "bulles" of a whitish yellow colour and of variable volume existed upon each of the palmar and plantar regions, the largest being about the size of a large lentil, and all contained a yellowish white liquid, which had the consistence and all the other appearances of pus. The thymus, a little more voluminous than usual, presented in each of its lobes a little cavity, filled with a yellowish and

thick grumous matter, similar to that contained in the large "bullæ." Lungs—the air did not appear to have penetrated farther than the principal bronchial divisions; the pulmonary tissue was compact, of a yellowish white colour, very different from healthy lung, and having a friability not unlike that of the liver. These appearances were pretty general. The summit of the left lung, however, differed from the rest; on its exterior could be perceived a little irregular growth, about the size of a small hazel-nut, and surrounding it a yellowish tinge, strongly marked. On making an incision into this morbid production, it was found to be indurated throughout; no other induration of the kind was found in the lungs. The liver was a little larger than usual, and a small quantity of serum was found in the peritoneal cavity. All the other organs appeared healthy. Although at this period free from all appearances of syphilis, both parents had been imperfectly treated for that disease two years previously, and the woman had had three abortions.

The second case is headed, "*Pemphigus syphilitique observé sur un nouveau-né; abcès multiples des poumons avec indurations ayant occasionné la mort vingt minutes après la naissance.*" In this case the alterations in the lungs were more numerous and more strikingly marked; the child died quite unexpectedly twenty minutes after birth;

“bullæ” were found on the hands and feet, and copper-coloured spots on the thighs and legs. It was easy to see, by an external survey of the lungs, the points where air had penetrated and where it had not; the former had a reddish colour, and was a little projecting; the latter, a violet tinge, and on pressing portions of it with the fingers it was found to have considerable hardness. Placed in water, both lungs sank rapidly to the bottom. The portions not penetrated by air appeared in the form of irregularly rounded masses of variable volume; the superior lobe of each lung contained some, having the dimensions of a large hazel nut; others, smaller, were disseminated throughout the other lobes. On making incisions into these diseased masses, they were found to consist of a greyish yellow compact tissue, having in their centres a yellowish sero-purulent liquid, varying in quantity according to the volume of induration; this liquid had all the appearances of pus, which was still further shown by the microscope; the walls of the indurations were about five or six millimètres in thickness, and owed their colour and density to a veritable purulent infiltration. These results, submitted to the observation of MM. Robin and Lebert, received a complete confirmation. M. Lebert also examined the vesicles of the plantar surfaces, and found their contents to consist of pus, and that they were formed by an elevation of the epiderm,

having for their base the derm, on the surface of which already existed a greyish coat—the epiderm in process of reparation. The thymus presented in the cavity of each of its lobes a small quantity of yellow pus; otherwise its tissue appeared healthy, and presented no trace of inflammation. On inquiring into the health of the parents, the mother's history afforded no grounds for suspecting the existence of syphilis; the father, however, two months before the connexion which resulted in his wife's pregnancy, contracted a chancre, and passed through all the stages of primary and secondary syphilis, and at the time alluded to the manifestations of general infection, eruptions, red patches on the skin, falling off of the hair, &c., were very evident. M. Depaul says, that during fifteen years he has met with twenty similar cases to the foregoing, and on these and other facts and observations he founds the following conclusions. 1. That syphilis in infants during intra-uterine life is much more common than is usually supposed. 2. It may be transmitted by either parent. 3. The laws of its propagation are not the same as in the syphilis of extra-uterine life, because in the latter there is a succession of phenomena almost always constant, and in which the "point de départ" is always the same, that is to say, a lesion purely local; while, on the contrary, in the other we see a general affection producing a lesion, or, in other

words primary or secondary symptoms in another subject. 4. To the numerous lesions which the infant presents at the moment of birth, or which develop themselves some time after birth, and which have been correctly considered as manifestations of syphilis, we ought to add that special alteration in the lungs stated in the memoir. 5. This alteration presents itself sufficiently often to cause it to be considered one of the most grave that has been noticed. 6. Whilst curative treatment offers some chance of success when the malady shows itself upon the skin or other organs, the integrity of which is not indispensable to the establishment of extra-uterine life, the danger to life which happens near the time of birth, from disorganization of the pulmonary tissue, leaves little to the physician but to make out the pathological lesion. 7. With these considerations, the necessity is forced upon us to combat the syphilis of the parents before fecundation takes place, or to endeavour to lessen its effects during gestation by submitting the mother at an early period to a suitable anti-syphilitic treatment. 8. If after the accouchement of a dead child the lesions I have pointed out have been discovered, even if by ordinary means it is impossible to prove the existence of syphilis in the parents, the physician ought to consider himself sufficiently authorized to place both under mercurial treatment.

Another of Depaul's dogmas is, "*La mère étant incontestablement saine, et la syphilis n'ayant pu être transmisé que par le père, et seulement au moment de la fécondation, l'embryon, seul malade pendant quelque temps, pourra à son tour infecter la mère pendant son séjour dans l'utérus.*"

M. Cazeaux has brought forward several objections to the foregoing doctrines, some of which will be found in the following remarks. Purulent alterations in the lungs of new born children have already been spoken of by many writers—by Baron, Billard, Husson, Lestier, and Cruveilhier; some have called them softened tubercles in a state of suppuration, others that they are abscesses, the result of partial inflammation or phlegmasia, but no one before M. Depaul has referred it to the consequences of hereditary syphilis, or considered them as a certain sign of previous infection. It is true that the secondary symptoms observed in infants are not the result of a primitive ulceration, and instead of having lost, as in the adult, the power of propagating itself, nurses have been observed to receive a general infection, said to be syphilitic; which may, however, go through a regular train of symptoms simulating syphilis, without its really being that disease. The statement that a fœtus tainted by the father is capable in its turn of communicating the disease to the mother is not sufficiently supported by evidence. Professors Dubois and Depaul

maintain that syphilitic pemphigus is either developed during intra-uterine life, or a few days after birth; nearly all other writers on the subject say that hereditary syphilis shows itself usually several weeks, sometimes months, after birth. Bertin says, "During ten years at the Hôpital des Vénériens I have rarely observed at the moment of birth any very evident signs of syphilis." Trousseau and Lassegue say it is very rare for constitutional syphilis to be evident at birth. Hugier during a long time at the Hôpital de Lourcine had only seen it once. At the same hospital Cullerier had never seen an infant affected with syphilis but what could be referred to its passage through the vagina, and none of the surgeons of this institution have ever found abscesses either in the thymus or in the lungs of new born children. Although M. Depaul states that he has seen several cases, it is rather unsatisfactory to find him giving the particulars of only two.

Syphilis may destroy the child in the womb, or soon after birth. It may be asked, How does it exercise its pernicious influence? Does it become mortal merely by the alteration of the elements essential to nutrition? Does it penetrate to the organs and effect changes in their structure? If this be true, what are the organs generally affected? What is the nature of those alterations? At what epoch of foetal life are they produced? In those

cases where it is not mortal, what influence does it exercise after birth upon the functions of the altered organs? What light does the knowledge of these alterations throw upon the causes of the death of the fœtus? To what valuable inductions does their study conduct us, as to the probable effects of syphilis in the adult? Lastly, What conclusions do these researches furnish us with in a therapeutic point of view? The real progress in the question would be to distinguish syphilitic lesions from those arising from other causes. Pemphigus is the expression of hereditary cachexia; it may be syphilitic, scorbutic, tubercle, rachitis, scrofula, or the result of debility produced by various kinds of misery and privations. The tendency of the mercurial treatment inculcated by the opinions of Messrs. Dubois and Depaul would be to place the organization in an unfavourable condition, and make it more susceptible of morbid actions, and there would also be a danger of its being administered very unguardedly, and when in reality no syphilis existed; nor should we overlook the imprudence of announcing the existence of syphilis in families without decided proof. M. Cazeaux's conclusions are to the following effect:—1st. In an immense majority of cases the symptoms of congenital syphilis do not show themselves until several weeks after birth. 2nd. This excessive rarity should cause great care and discrimination

in a nosological classification of the morbid lesions presented by the new born. 3rd. The coincidence of an ancient syphilis in the parents, with the always doubtful and badly characterized morbid appearances in the infant, are insufficient to establish between the two the relationship of cause and effect. 4th. If pemphigus, abscesses of the lungs and of the thymus, can be regarded as having a syphilitic origin, there is no reason why those morbid conditions may not be brought about by other diatheses. 5th. Pemphigus has been long known and described as sometimes arising from syphilitic cachexia, but more frequently from other causes. 6th. In the present state of science it is impossible to distinguish among these morbid manifestations whether they are syphilitic, or the results of other diseased states of the mother or foetus. 7th. This uncertainty in their diagnoses ought to make the physician very careful in pronouncing upon their nature. 8th. It does not appear advisable to treat the parents when the infant presents only such doubtful signs of syphilis, but only when its existence has been well established by the antecedents of the former. 9th. The whole question is still open to discussion, and requires for its solution very numerous and long-continued researches.

According to Ricord, syphilis produces two orders of lesions; one direct and characteristic, the other indirect and passing into a humoral cachexia in-

duced by general disturbance of the system. In both cases the antisymphilitic treatment is indicated, and a woman having had repeated abortions, and in whom the existence of syphilis was suspected, would in most cases find it a complete remedy. Pemphigus in the new born may be induced by the cachexia caused by the diseased fluids of a syphilitic mother. Whether in the fœtus or adult, pemphigus is often a manifestation of syphilis, and the syphilitic cachexia is capable of engendering various other diseases, tegumentary and visceral. At the same time all foetal diseases cannot be referred to it.

M. Cazenave observes, with regard to syphilitic pemphigus:—"When the epiderm is removed, the abraded surface which remains has a striking analogy to certain atonic ulcers, and has been compared to the gray pseudo-membranous covering which is seen in the secondary syphilitic ulceration of mucous membranes. Gilibert and Montfalcon say that the ulceration of these abraded surfaces is very rare in acute pemphigus, but is the usual sequel of the chronic form." Sometimes it is due to mechanical irritation, or a low and vitiated state of the health. It is commonly said that syphilis may appear in every form of skin disease, but there are two exceptions to this rule—impetigo and eczema.*

* This is a common opinion, but I find there are many opposed to it, and among others Depaul in Paris.

Many contend that if syphilis is capable of producing morbid alterations in the lungs of the foetus, it should also be true of the adult. The following attempt has been made to prove that it does happen. M. Lageau, in 1851, published a "Mémoire" entitled, "Des maladies pulmonaires causées ou influencées par la syphilis." He describes various kinds of syphilitic affections of the organs within the chest, the particular tissues affected, the symptoms accompanying each, and the means of diagnosing them from the results of common inflammation; the treatment recommended is first to subdue the inflammation by antiphlogistics, and after the active symptoms have subsided to employ antisypilitics. He gives fifty-three cases where syphilis existed more or less with phthisis; it is not, however, satisfactorily shown that the one acted as a cause of the other in the way that it is supposed to act during foetal life.

M. Moreau, professor of midwifery at the Ecole de Médecine, was one of the committee appointed to examine M. Depaul's Memoir on congenital syphilis in the foetus, but he afterwards stated before the Academy of Medicine, that although he had given his approbation to M. Cazeaux's views, he was less exclusive on the question of preventive treatment. He then related the case of an officer of the royal guard, who after having been apparently cured of an old syphilis married a young

lady in perfect health. In the three first confinements which followed the children were dead; the antisyphilitic treatment was then adopted, and the result was, that in the three subsequent confinements the children were born alive.

In the "Gazette Médicale" for 1852, M. Gubler has written a "*Mémoire sur une nouvelle affection du foie liée à la syphilis héréditaire.*" He begins by saying that the attempt in the present day to attribute many visceral diseases, both in children and adults, to syphilis, is only a revival of doctrines entertained by the old writers. A dissertation on syphilis was published by Keil, in 1614, containing the following passage:—"Morbus chronicus et occultus hepatis ex contagio ab impurâ venere primum natus, naturalem facultatem, a totius substantia dissidio insignita lædens." By many authors of this early period most of the important diseases of the liver were referred to syphilis, and subsequent writers attributed diseases of the stomach, spleen, and kidneys to the same cause. After alluding to some of the characteristic lesions of syphilis in the foetus, M. Gubler states that a very important one is the presence of fibro-plastic elements in the liver, and also an albuminous fluid which infiltrates itself into the parenchyma of the organ, and disconnects and deranges its proper secreting structure. When the disease has lasted for some time different parts or the whole of the liver becomes converted into

what is termed a yellow plastic induration. He refers these changes to tertiary syphilis, and relates cases in support of his views. In some, other internal organs were found similarly affected. Generally the affection belongs to the earlier months of infancy. Another writer in the same journal suggests that this morbid alteration is probably similar to the syphilitic induration of the adult liver described by Ricord, and which is often the only constitutional indication of syphilis.

Dr. Tyler Smith, in one of his lectures published in the "Lancet," in July 1853, remarks, "In this country it is not very uncommon to see cases in which men who have had syphilis a few years before marriage convey secondary syphilis to their wives through the medium of the ovum. He relates several cases chiefly to show that leucorrhœa is as common a manifestation of secondary syphilis as is the syphilitic sore-throat. One case, however, is particularly applicable to our subject. In this the husband, who had had syphilis, but was in such apparent good health as to quiet suspicion, impregnating his wife, who was in good average health, led to the destruction of four fœtuses, and the saturation of his wife's system with secondary syphilis. It appeared evident that the poison was conveyed to the mother through the ovum. She was healthy until her first pregnancy, but after each successive gestation her health was in a worse

condition than before. This patient rapidly improved in health under a mild mercurial course, and the husband was placed under similar treatment by his medical attendant. In another place Dr. Smith remarks, "In the cases I have narrated the mothers contracted secondary syphilis from the ovum without having been the subjects of primary syphilis. I have the notes of several cases of primary syphilis in the female, in which syphilitic leucorrhœa was a prominent symptom of the secondary affection, but more commonly women who have become mothers are infected with secondary disease through the medium of a syphilitic ovum.* These remarks lend a good deal of support to one of Depaul's doctrines.

In the "Edinburgh Medical and Surgical Journal," vol. xlv., will be found an excellent paper, by Dr. Simpson, on Peritonitis in the Fœtus; he relates several cases in which he was able to establish a connexion between that affection and syphilis; he also attributes to peritonitis a great many deformities and abnormal conditions of the pelvic viscera acquired during foetal life. Several instances of peritonitis and ascites in the fœtus may be found in the works of French authors, particularly Cruveilhier.† It has not, however, attracted much

* Dr. Ramsbotham in his "Obstetric Medicine and Surgery," advocates similar opinions.

† Anatomie Pathologique, tom. xv.

attention, either as a consequence of syphilis or as a cause of abnormal dispositions of the abdominal viscera.

Necrosis, and other diseases of the bones, although when they have their origin in syphilis, are usually met with in old cases, and are considered tertiary, are nevertheless occasionally met with in the foetus in utero. A short time ago I saw a case at the Clinique d'Accouchements, where necrosis of the bones of the left leg was the only syphilitic manifestation.*

The foetus may die of syphilis without carrying with it any traces of the disease. This most probably arises from the general influence of the poison acting on its delicate and imperfectly formed structures.

Having said so much on congenital syphilis in the foetus, I shall now give a few observations on its treatment. M. Devilliers, in 1851, read a paper before the Academy of Medicine, entitled "*Recherches sur le traitement antisiphilitique chez les*

* A graphic description of the other syphilitic manifestations at birth or shortly after birth, such as coryza, ulcerations about the mouth, nose, lips, and arms, scaly eruptions and red patches on the skin, with their treatment, will be found in Dr. West's work on the "*Diseases of Infancy and Childhood*," and also Dr. Whitehead's "*Hereditary Diseases*." See also excellent wax models in Guy's museum showing venereal blotches and large venereal petechiæ in the foetus.

femmes enceintes," in which he arrives at the following conclusions:—1st. The mother and child sustain well the mercurial treatment during the early weeks and first half of pregnancy. 2nd. The cause of the injurious effects of the treatment at this period appears to be, that it is not always tolerated by the digestive organs, and also the nervous irritability that it sometimes develops. It is thus often from mechanical causes that abortion takes place. 3rd. The fœtus becomes more susceptible of syphilitic affection, and of the action of specific remedies, as it approaches perfect organization. 4th. In the application of treatment, the following circumstances are observed in the march of syphilitic affections during pregnancy. The conception possesses the power of developing symptoms of syphilis, which has long been lying latent in the parents. Gestation, therefore, appears to hasten rather than retard the development of venereal lesions. These lesions come and go during the early part of pregnancy, and always re-appear during the sixth, seventh, and eighth month. They often disappear spontaneously, and after parturition, in a very short space of time. 5th. Against the primary affection in the early months, palliatives are useless; the radical treatment should be immediately employed. For the secondary and tertiary affections during the same period, the motives are still stronger for using im-

mediately the specific treatment. 6th. The active treatment commenced towards the latter months of pregnancy—that is, the epoch when abortion by syphilis is most frequently produced—ought to be administered with greater caution than at an earlier period. 7th. The treatment should be continued in small doses after the disappearance of symptoms, otherwise the disease is liable to reappear. 8th. At all epochs of gestation the mother and child bear the treatment better when it is employed to combat the more grave and complicated syphilitic lesions. 9th. Syphilitic symptoms, whether primary or secondary, which show themselves during the last weeks of pregnancy, ought to be subjected to treatment, not only local, as in cases where they have their seat in the genital organs, in order to avoid direct contagion, but also general; when this practice is followed the child seems better able to undergo the mercurial treatment, when it becomes necessary after birth. 10th. After parturition we must not wait too long before commencing the treatment. If the existence of syphilis is made evident, in both cases—that is, in mother and child, we ought not to go beyond the eighth or tenth day. 11th. In the earlier periods of pregnancy mercurial frictions are more suitable and better tolerated than the direct administration of mercury.”

In “Siebold’s Journal” there are cases related of

syphilitic affections in new born children treated successfully by muriate of gold. In some the disease was developed at birth—in others, appearing two or three weeks after birth. The most common continental practice in these cases is the use of mercurial frictions. Dubois always recommends it, and says its employment is perfectly safe. Some time ago, M. Coffin read a paper before the Academy of Medicine, in which he says that nearly all the women delivered in the Lourcine, in 1850, gave birth either to dead children, or who died during the mother's stay in the wards. The cause of death did not appear to be mercurial treatment. This should rather be considered a preservative. The fatality could only be referred to syphilis. He adds:—"The mercurial treatment may be employed during any period of gestation, for it does not appear to produce worse effects at one time than at any other."

A great deal of discussion has arisen on the transmissibility of secondary symptoms, and especially with regard to nurses and children. M. Cullerier has brought before the notice of the profession in Paris eleven cases, to prove that no form of syphilis is transmissible from the child to the nurse, and *vice versâ*. In six, the infants had syphilis, but failed to communicate it to their nurses. In the remaining five the nurses were diseased, but the children escaped the infection. Although a great

deal might be said on this subject, I shall here only oppose two cases to the foregoing doctrine of M. Cullerier. In September, 1851,* M. Raciborska published a case, where a woman, after connexion with a man who had secondary symptoms, became the subject of constitutional syphilis. After she was apparently cured, she became pregnant, and was delivered of a living child at the full period. At the end of a few weeks the child showed symptoms of syphilis, which were soon afterwards transmitted to the nurse. In a late number of the "Edinburgh Medical and Surgical Journal," Dr. Stark gives a case, where a young woman, in her fifth month of pregnancy, contracted syphilis, which was cured by the seventh month. The child, born at the full period, at first presented no morbid appearances. These, however, became apparent in a few weeks, and were also communicated to the nurse. Hence resulted a case of congenital syphilis, making its appearance after birth, and subsequently transmitting itself to the nurse by secondary, or, according to Depaul, by modified primary symptoms. A great deal more might be added on the manifestations of syphilis in the fœtus, but sufficient has been said to show the present state of recent inquiries on the subject in the minds of those most engaged and interested in their investigation. The bold

* Gazette Médicale. Dr. Whitehead's experience is also quite opposed to M. Cullerier's.

doctrines of Dubois and Depaul seem to be but slowly received even in their own country. It is very likely however, that the numerous cases which are constantly appearing in the French medical journals in support of their views will make several converts. Both gentlemen are still pursuing the inquiry with much earnestness.*

I have had an opportunity of watching several cases in Dubois' service in the Clinique d'Accouchements, where syphilis was suspected and pemphigus looked for. I did not, however, in the course of several months, see more than two instances of a well-marked affection of the skin. These belonged to the commonest form of syphilitic papular eruptions in the new born—namely "lichen." In one of the cases the mother, before confinement, had a sore on the labia, which, being of a doubtful character, Ricord was sent for, and he immediately diagnosed it to be syphilitic. I learnt from the intelligent *chef de clinique* of this service, that most of their cases of premature births and infantile diseases and deaths are referred to syphilis, and, in many instances, he had been able to corroborate Dubois' opinions by examinations of the still-born

* M. Depaul kindly permitted me to inspect his drawings of skin diseases and morbid alterations of the lungs, thymus, &c., in the fœtus. They are highly finished, and when published will, no doubt, from their importance and novelty, attract considerable attention.

children.* Of the latter I had opportunities of seeing several, both at the Hôpital de la Faculté, and also at the Société Anatomique. One case in particular, brought before the society by Dr. Barth, a seven months' foetus, from syphilitic parents, presented numerous abscesses in the lungs, liver, and right testicle: the body was small and attenuated, and the skin somewhat shrivelled, but free from eruption.

On the whole, I think most practitioners will partake more or less of M. Cazeaux's scruples. In matters of this kind, in particular, "temerity is less pardonable than timidity." In the present defective state of our knowledge—that deficiency which causes to be generalized under one name diseases which are very different in their nature and indications of treatment—it would certainly show a little recklessness to treat all alike. When the existence of syphilis has been proved by the patient's history and evident symptoms, there is no longer any doubt about the course to be adopted; but when it has to be proved without these, and only by appearances, which equally represent other diseases, should we be justified in acting on such doubtful evidence? This is merely a re-echo of M. Cazeaux's views, and perhaps the more rational

* It should be borne in mind that the class of persons who become hospital patients, are more likely to be tainted with syphilis than other parts of the community.

part of them; for, as lookers-on, we cannot be expected to agree wholly with the advocates of either side of the question. The objections to the doctrines of Dubois and Depaul are almost as sweeping and general as the doctrines themselves. To condemn with so little reserve the only treatment we have—the mercurial—without being able to substitute a better, seems to be carrying opposition too far; nor are we prepared to say that syphilis is not the primary cause of many diseases, which, in the course of their development, receive other names. We have abundant evidence that other hereditary causes of disease in the fœtus besides syphilis are in operation. Morbid deposits are found in the lungs or liver, and changes of structure in other organs and other parts of the body, where the parents' histories make it impossible to give them a syphilitic origin. In seeking other causes, we are obliged to have recourse to those vague and little-understood terms—a strumous, scrofulous, or tubercular diathesis. One French writer endeavours to reduce the march of these diseases to some kind of order, and brings them together under a forced arrangement. Thus, the syphilitic diathesis is made to induce the scrofulous, the scrofulous the tubercular, and the tubercular the phthisical. Syphilis is thus considered to be the exciting cause of a whole train of maladies. Although we can hardly be prepared to accept the

order in which the diseases are made to follow each other, the proposition seems to be not altogether unsupported by evidence. Taken alone, syphilis can hardly be considered analogous to the other hereditary diseases, inasmuch as it is, strictly speaking, an acquired disease ; and it is also said to be a foreign transportable matter, whilst the others reside in what we designate "a special organic disposition." Whether this disposition is in the fluids, whether it is in the nervous apparatus, or whether in the vital principle itself, independent of structure, is a subject upon which we are not likely to obtain much information. When we consider the probability that the germs of syphilis often reside in the ovarian vesicle, it is difficult to draw any distinction between its disposition and that of gout, scrofula, cancer, and other morbid taints. New temperaments are acquired, and become as inherent, ineffaceable, and transmissible as the old, and so may, probably, new morbid diatheses. But with regard to syphilis, although it may become inherent and transmissible, we have reason to think, notwithstanding Cazenave's startling doctrine, that real secondary syphilis is never eradicated from the system,* that it is effaceable. Here, then, is a point, among many others, in which it differs from the other hereditary diseases, and it is

* I have heard this doctrine advocated by M. Cazenave in his lectures delivered at the Hôpital St. Louis, Paris.

possible that from the commencement it has a different disposition in the embryotic organism.* In concluding the subject of syphilis, I may observe that I have preferred giving general observations from eminent authorities to any classification of diseases coming under the same head. Classification, from the indefinite character of foetal diseases in general, and the syphilitic in particular, would be a very difficult task. What we should especially bear in mind is, that the most common morbid phenomena in the foetus in utero are affections of the skin, and that almost any variety of them may be representatives of syphilis.

GENERAL REMARKS ON OTHER MORBID STATES OF THE MOTHER AFFECTING THE FŒTUS.

Among the other diseases of the mother affecting the child in utero may be mentioned intermittent fever, an advanced stage of phthisis, icterus, or rather the disease of which it is the symptom, and scrofula. M. Œehler has found the mesenteric glands of the foetus, or new-born, tumefied, hard, adipose, and having all the characteristic features of scrofula; and although these appearances were found in children whose parents were in apparent

* If such a difference be not admitted, manifestations of the other hereditary diseases ought to be as common as those of syphilis.

good health, they seemed to be the true manifestations of that disease.*

It is not common to find chronic and hereditary diseases of the parents, except syphilis and scrofula, manifesting themselves very evidently in the fœtus; but the chronic, without being hereditary, may deprive it of healthy sources of nutrition, and thus generate debility and disease. The hereditary, for the most part, exist as predispositions to diseases, which only develop themselves under favouring circumstances after birth. Dr. Allen Thompson says — “ hæmorrhoids, hypochondriasis, scirrhus, apoplexy, catarrh, amaurosis, hernia, and urinary calculi may be mentioned as examples of diseases more or less directly transmitted as predispositions from parent to offspring.”

There are many diseases of the mother which affect the child more by mechanical interference than by extension of disease. These are morbid conditions and malignant growths affecting the pelvic viscera, particularly the uterus and its appendages. Among others might be mentioned moles, polypi, adhesions of the broad ligaments, cysts, hydatids, diseased ovaria, metrites, acute or chronic; cancer, ulcers of the neck of the uterus, permanent congestion of the uterine walls, a condition met with in plethoric women; excessive irri-

* Scrofula has already been noticed in connexion, or rather in juxta-position with syphilis.

tability and sensibility, tenesmus caused by the pressure of pelvic tumours, extra-uterine foetation, and ruptures of the uterus—all of which may become hurtful to the child,—some, by mechanically interfering with its development, and others, by forming an obstruction to its passage at birth. According to Dubois, uterine congestion proves fatal by causing blood to ooze between the placenta and uterus, and thus destroying the vascular connexions between the mother and child. The loss of blood which takes place from the insertion of the placenta at the inferior segment of the uterus he terms, “*hæmorrhage de l’essence de la grossesse.*”

There is some disagreement among authors as to whether the foetus suffers from the poor living and bad nourishment of the parent. Orfila relates the following case in favour of that doctrine. A woman, aged twenty-eight years, in the fifth month of pregnancy, was attacked with laryngitis, which continued to get worse up to the full period, when she gave birth to a thin, half-developed child, apparently of not more than five or six months. She had been unable to take solid nourishment for many months, and latterly, very little of fluid. She died shortly after delivery in an extreme state of emaciation. The child, however, by careful nursing and good feeding, gained flesh and did well. Although extreme cases of this kind may exert a pernicious influence on the child’s health,

we know it is not at all uncommon among the lower classes to find thin, sickly, and half-starved looking women, who seem to live on small allowances of tea and bread-and-butter, giving birth to plump and healthy children.* Drs. Merryman and Denman found that women who emaciate during pregnancy bring forth healthier children and have easier labours than others, while with those who grow corpulent the children are generally small.

Among the many other causes in the mother likely to prove injurious to the child may be mentioned great fatigues, mental excitement, violent and long-continued exercise, toilsome employments, convulsions, immoderate and oft-repeated bleedings,† the administration of ergot,‡ rue, savin, drastic cathartics, mercury, and chloroform. Some of these will receive a separate notice.

M. Gaspard's experiments have clearly shown the fatal action of mercury upon the embryos of animals. And M. Colson has published two cases in the "*Archives Générale de Médecine*," 1828,

* Dr. Ramsbotham considers that no system of diet would have any effect in controlling the growth of the fœtus in utero. — *Obstetric Medicine and Surgery*, p. 296.

† See Depaul's observations in the *Archives Générale de Médecine*, vol. xxi., p. 224, On the influence of blood-letting and low diet on the development of the fœtus in utero.

‡ See Dr. Wright's Observations.

intended to support the same doctrine when applied to the human subject. In the first case a woman, six months in the family way, was subjected to mercurial frictions for a vaginal discharge. The whole quantity employed was about eighty grammes of the ointment. At the end of fifteen days she could not feel the movements of the child, although previously they had been active. Four days later, she was delivered of a seven months' foetus, still-born. In the other case, a woman at the same period of pregnancy was treated in the same way for vaginal discharge and inguinal buboes. Two months after the commencement of the treatment labour came on, and she was delivered of an eight months' child, still-born. Its general appearance indicated that it had ceased to live for a long time previous to birth. From these and other facts, M. Colson believes that mercury employed on the mother, is the surest means of compromising the life of the foetus. But I think it will be at once seen that the evidence of the two cases here related is not sufficiently strong to support such an opinion.

I have recently assisted in making experiments with chloroform on pregnant animals, with the view of ascertaining its effects on their young. These have not yet been carried far enough to enable me to give any detailed or satisfactory accounts. I may state, however, that after administering chloroform to a pregnant bitch sufficient to destroy

life, I found, on almost immediately opening the uterus, that of the five puppies it contained two were dead, and on opening their bodies it was easy to perceive the odour of chloroform.*

With regard to convulsions in the mother, when the fits are long and frequent the fœtus either soon dies, or else appears to be affected in the same way. Dr. Simpson has observed violent convulsive and trembling movements of the child in utero when the mother has been suffering from convulsions or fits of ague. He has also observed less violent commotions within the uterus when the mother has been free from illness, and which he has attributed to severe functional disorder affecting the child's system.

Although phthisis, particularly with such grave complications as hæmorrhage and fever, is often prejudicial to the child, Mauriceau gives a few exceptional cases. In one case the mother, enfeebled by phthisis, spitting of blood, and occasional hæmorrhage from the uterus, became the subject of continued fever at about the seventh month of pregnancy. The child was born about the middle of the eighth month, and did well: the mother died ten days after accouchement. Here again, he adds, is another proof that the fœtus has

* Is not this an important fact in connexion with the administration of chloroform in labour;—ought it not to be somewhat limited?

its own principle of life, and that it rectifies by the force of its particular temperament the impure nourriture which it receives from the mother. One or two cases of severe loss of blood seemed to have no injurious effect on the child :—" D'une femme très infirme qui accoucha d'un enfant qui étoit très fort ; quoiqu'elle eut eu une perte de sang qui lui avoit duré plus de six semaines lorsqu'elle n'étoit grosse que de deux mois." And again—" De l'accouchement d'une femme qui étoit dans une très grande perte de sang, et d'une autre femme, à qui un chirurgien avoit témérairement fait l'opération césarienne qui est toujours fatale à la mère." In the first of these cases both mother and child did well : in the second, both died. As in modern practice and modern writings, so we find in Mauriceau's, that in many cases of pregnancy, accompanied with frequent losses of blood, the children, although born at the full period, were remarkably small ; and on the contrary in other cases, where, notwithstanding the hæmorrhage lasted two or three months, the children were healthy and vigorous.

Dropsy in the mother may impede development of the foetus, and cause its death ; but not necessarily so. I have seen four bad cases of ascites which did not prevent the patients from becoming pregnant, going their full time, and giving birth to living and strong children. Moreau relates

a case of a woman who had ascites for seven years, during which time she passed through five pregnancies, and gave birth to vigorous children.*

Notwithstanding long-continued fevers, and nervous debility accompanied with fever, often induce abortions, or act prejudicially on the foetus, I have seen several cases in which no such bad consequences followed. Mauriceau also has a case in point. *D'une femme qui accoucha d'un gros enfant que se portoit très bien, quoiqu'elle eut eu les fièvres durant la plus grande partie du temps de sa grossesse, dont elle fut guérie par l'usage du quinquina en poudre.*

MENTAL IMPRESSIONS.

Powerful and long-continued mental impressions in women during gestation are said to have had in many instances injurious effects on the child. "It would be easier," says Dr. A. Thompson, "to understand these effects could the utero-placental nervous connexion, stated by some anatomists, be satisfactorily made out." When, however, we know the influence of the passions in changing the character of the fluids, and deteriorating the health of the parent—for instance, grief, anxiety, or continued fretfulness tend to render the milk thin and serous, and to impart to it qualities that excite intestinal irritations, griping, and fever in the child

* Dr. Copland mentions cases of ascites existing before or happening during pregnancy. Cases are also recorded by Desormeaux and Duges.

that ingests it,—that the foetus in utero is nourished by the same fluids, but through another channel,—and also, when we recollect the sympathy existing between the mind or the brain and the uterus, we have, in the deranged circulation of the latter, and the altered condition of the blood which it circulates, or the fluids which it supplies, quite sufficient to account for the absence of health and vigour in the offspring.

The influence of the mother's imagination in producing deformities is still a disputed question. Remarkable cases are constantly occurring; but I believe most scientific men regard them as remarkable coincidences. *Nævi*, or mother's marks, which have been said to resemble "strawberries," "currants," "soles," &c., are nothing more than a morbid alteration or hypertrophy of the vascular tissue of the dermis.* Mauriceau says:—"J'avoue que la forte imagination d'une femme peut bien dans le commencement de sa grossesse causer une telle commotion au petit corps de l'enfant: dont la matrice est pour lors encore toute molle, que la figure régulière de ses parties en étant corrompue, elle en devienne monstrueuse,* mais après le deuxième ou le troisième mois, comme les parties du corps de l'enfant sont assez fermes et solides, je ne crois pas que leur figure puisse en ce temps être changée par la seule imagination de la mère."

Several cases have been related in which

* Wilson.

pregnant women, after violent fits of passion, have been delivered of dead children, and it has been a matter of surprise that such fleeting passions should be attended with such evil results. It seems, however, to receive an explanation in the extreme agitation of the maternal system, and the temporary suspension of the uterine functions which such powerful and oft-repeated agitations give rise to.

Those who believe in the utero-placental nervous connexion, and the direct influence of the maternal passions on the infant, imagine that too great an amount of nervous power may be thrown into its feeble organism, and that it destroys life in the same manner as that brought about by an electric shock. Electricity itself is supposed by them to be a cause of death of the foetus, either by passing along the utero-placental nerves, or being conducted to it through the liquor amnii.

Numerous cases of foetal deaths and abortions are recorded by Mauriceau as having resulted from "*une grande peur ou chagrin.*" A very good illustration of the influence of fear is also given by Baron Percy, as having happened after the siege of Laudan in 1793:—"In addition to a violent cannonading, which kept the women for some time in a constant state of alarm, the arsenal blew up with such a terrific explosion as few could bear with unshaken nerves. Out of ninety-two children born in that district within a few months of the

occurrence, sixteen died at the instant of birth, thirty-three lingered for from eight to ten months, eight became idiotic, and died before the age of five years, and two came into the world with numerous fractures of the limbs." Dr. A. Combe, in his work on Insanity, has recorded some curious facts illustrating this subject, and he also alludes to the well-known circumstance, that Pinel and Rush, in their respective countries, observed the great number of insane, idiotic, and malformed children born during, or shortly after the intense excitement of the revolutionary periods. It would, perhaps, be too much to say that all the foregoing phenomena are capable of being explained on physiological and natural principles. The defective intellects, in particular, seem placed beyond our calculations. These may, however, be due rather to the frantic passions and bewildered minds of the parents at the time of conception, than to any subsequent influence of the mothers' imagination; and the deteriorating effects of such a continued state of mind on the health of the mother would be almost sufficient to account for the absence of mental and bodily vigour in the child.

We have now considered some of the principal diseases and conditions of the mother likely to affect the foetus in utero. With regard to small-pox, and the other exanthemata, though opinions are still divided, I think the evidence is in favour of the doctrine, that they reach the foetus by con-

tagion, and not from any direct communication with the mother's system: they will, therefore, be noticed in another place. Of course, it would be as impossible as it is unnecessary to notice all the diseased or other states of the mother which might interfere with the well-being of the fœtus. It may, therefore, be generally stated, that any morbid condition — whether considered hereditary and transmissible or not—impairing the vital powers to such an extent as to involve the whole maternal system, and of making its own nutrition faulty, and its existence precarious, must necessarily place the health and life of the fœtus in great jeopardy.

DISEASES TRANSMITTED TO THE OFFSPRING BY THE FATHER.

On this subject, observation has revealed to us what no reasoning could ever have effected. It was formerly thought that the father's diseases could not be communicated to the offspring; but we now know that the embryo is liable to inherit the diseases of both parents. Still, as if to make the doctrine doubly sure, new confirmatory cases are frequently met with in the medical journals. I have lately heard Dubois mention in his lectures a case, in which a healthy young woman married a man whose health had been broken down by dissipation. She aborted several times; became a widow; married again, and more fortunate this time, all her confinements resulted in healthy

children. This was not exactly a case of transmission of disease, but such as we should expect in a very young, very old, debauched, or otherwise degenerated father,—an inability to procreate living and vigorous children.

It is believed by many eminent men that fatigue, depression, and intoxication on the part of the father at the time of coition, acts as a cause of feeble development in the new being. Intoxication in particular has been supposed to have an injurious effect on the mental as well as the bodily development.

The actual diseases transmitted by the father to the foetus have already been noticed in connexion with the subject of syphilis: that disease and scrofula are perhaps the only two derived from this source manifesting themselves during intra-uterine life, others existing only as predispositions.

DISEASES ORIGINATING IN THE FŒTUS ITSELF.

It will no doubt be considered rather arbitrary, in the present state of our knowledge, to say that certain diseases of the foetus originate in primary disease of its own structures, and that others are derived from the parents; but although it is difficult in many cases to decide to which they belong, in many others the difficulty disappears. We have seen that we cannot regard the foetus and its membranes as strictly a part of the maternal system, and, as any other part of that system, liable to the

same diseases, but rather as an independent organism liable to its own derangements and diseases.

An eminent authority has stated that a blighted ovum or disease of the foetus is a greater source of danger to the mother than are the diseases of the mother to the foetus. The evidence which I have collected is opposed to this view. It is well known that a diseased or blighted ovum may remain in the uterus for many months without prejudice to the parent, and when the parent is badly affected by it, the results are to be referred rather to the decomposition of the foetal structures than to any disease which originated in its own living organism. At the same time, the opinion might be received in support of the doctrine of independent liability to disease in the foetus. The latter may affect the mother, but there can be no analogy between their mode of operating on the maternal system and that of diseased actions and morbid growths in direct connexion with that system. When an ovum has been procreated by parents perfectly free from disease, its own vital powers will enable it to thrive, even if the parent becomes the subject of very grave affections, and even in diseases terminating in the mother's death, if the child's organization is sufficiently matured for independent life, and if quickly removed from the dead womb, it is physically in almost as favourable a condition as if born under ordinary circumstances, and in this way

the lives of many vigorous and healthy children have been saved. Mauriceau remarks :—" Il faut remarquer que quoique l'enfant se nourrisse du sang de la mère et qu'il vive ainsi de sa substance durant qu'il est en son ventre, il a néanmoins en soi un principe de vie particulier qui purifie souvent la mauvaise nourriture qu'il en peut recevoir en la convertissant en sa propre substance, comme nous voyons que le greffe d'un arbre rectifie et adoucit l'austérité de la fève du plant sauvage sur lequel elle est entée."

We have stated that it is the generally received opinion that diseases which are epidemic or contagious attack the mother and child as independent beings. The child may be attacked and die, and the mother escape, or *vice versâ*. It has been observed that both mother and child having intermittent fever at the same time, the fits in the child have been found—by tumultuous movements in the womb—not to correspond with those of the mother; so that one may have a quotidian and the other a tertian, or both may have the same type of the disease with the fits showing themselves on different days. Therefore, in cases of fever and other contagious diseases in pregnant women, the disorder or death of the foetus which sometimes follows, is to be referred rather to an irregular, altered, and defective supply of nourishment arising from the disturbed state of the parent's system, than to the direct influence of the contagion, unless, indeed, this reach

it through the usual medium by which individuals become affected; and we cannot but admit, from all we know of the laws of contagion, that the contiguity of the fœtus to the mother renders it particularly liable to the contagious diseases with which she may be affected, and we also know that, as in adults, from some salutary peculiarity in the constitution, the fœtus very often escapes.

EXANTHEMATOUS DISEASES.

When small-pox in the fœtus follows that of the parent, it requires some time to show itself, as if the infection had taken the same time to operate as it does in passing between two persons.* In the Guy's Hospital Museum there is a fœtus of six months, covered with small-pox pustules. It was born when the mother happened to be recovering from the disease. In the "American Journal of the Medical Sciences" for 1853, there is a case related in which vaccination of the mother during pregnancy seemed to have extended its protecting influence to the child. After birth, vaccination was repeatedly tried without success. I have recently become acquainted with a case in which a child was born at the full period with the eruption in the second stage, and died twenty-four hours after birth, and another where the mother had confluent small-pox with severe pneumonia at the seventh month. She recovered, went to the full time, and

* Montgomery.

was delivered of a female child. The child was vaccinated. On the fourth day there was considerable irritation at the seat of puncture, but it gradually died away. Subsequent trials appeared to show that the child was protected.

Dr. Jenner has placed several cases on record where the foetus was attacked with small-pox, whilst the mother escaped; and a case is noticed by Mead, in which a woman far advanced in pregnancy—being in attendance upon her husband, who was ill with small-pox—did not take it herself, as she had had it previously, but during her husband's convalescence the child died in utero, and was born covered with small-pox pustules. In cases of twins, one child may be covered with the eruption, the other being perfectly free. Children born at the "full term," or prematurely, have frequently been found covered with small-pox pustules in various stages of development, and sometimes with well-characterized cicatrices, particularly in those cases in which the mother had been affected with the disease during pregnancy. Of these children, some have died in utero, others born alive have died shortly after birth, while some have rallied and continued to live. Ebel has recorded a case in which a woman fifteen days before her confinement experienced considerable uneasiness, and felt the child struggling violently in the womb. When it came into the world, it was covered with small-pox pustules in the third stage. It is not stated whether

the mother also had the disease. As we should expect, it is generally in those cases where the parents have been vaccinated or otherwise protected, that they send into the world infants covered with small-pox pustules, without themselves having felt any symptoms of the disease. Such was the case with Mauriceau's mother. She had been in attendance on her eldest son, ill with small-pox; he died, and on the following day she was delivered of Mauriceau, who at the moment of birth had several small-pox pustules upon different parts of his body. Dr. Watson makes allusion to several similar cases, but observes that Heberden, Coturnius, and others, considered the communication of the disease in this way very rare. Nearly the same phenomena have been observed with regard to measles and scarlatina; these eruptions, however, from being less defined in their character, are not so easy to make out. Œehler has described a species of exanthema in the fœtus and new-born, which runs its course in forty-eight hours. Its vesicles are similar to pemphigus, appearing on all parts of the body, but particularly between the fingers and between the toes; they usually attain the size of a pea, are encircled with a red areola, become filled with a serous fluid, which is soon changed into veritable pus, and then burst. Desormeaux regards this affection as approaching nearer to varicella than pemphigus.

Gæckel and Ledel have reported observations on infants where the skin was covered with pustules or vesicles filled with serosity, which on bursting left excoriations;—a disease probably allied to that form of pemphigus to which is attributed the complete separation of the epiderm. Similar cases have been noticed by Dr. Whitehead, but he refers the desquamation of the cuticle and the eruption which preceded it to syphilis.* In some cases related by Albinus, children at birth were found entirely denuded of their tegumentary covering, a condition which some physicians have referred to the use of acids by the mother during pregnancy. Besides epidemics and contagious diseases, the foetus is liable to morbid alterations and changes of structure in any part of its organism,—idiopathic inflammation may arise, as in the adult, and produce serious results. If it attacks organs and interrupts functions which are indispensable to life, it is very soon fatal; but very often the skin and its appendages, or other parts not connected with the vital organs, become the seat of disease. It may then either subside altogether, or pass into a chronic form, and show itself at birth in the shape of some eruption or deformity.

Many of the conditions which have been alluded to as the consequences of hereditary and infectious diseases may arise without any known cause.

* Hereditary Diseases, p. 247.

VISCERAL AND OTHER DISEASES.

Cruveilhier, after relating the post-mortem appearances in a few cases of disease of the liver and lungs in infants, says, "The multifarious offices of the liver during foetal life, and its irregular supply of blood from the placenta, render it particularly liable to congestions and derangement in its functions; and it is easy to understand, when this happens, how the lungs and other parts of the body would soon become secondarily affected."*

Jaundice, or at least a yellowness of the skin, is a common appearance at birth. I have frequently observed it, both in public and private practice. It is generally of a mild character, and passes off in a few days. There seems good reason for supposing that this yellowness is not always due to a disordered state of the liver or the presence of bile in the blood, but rather to a peculiar condition of the skin, which retains the yellow colouring matter of the blood, as in ecchymosis.

Cirronosis, a disease in which certain structures of the foetal body have acquired a yellow tinge, has been observed by Lobstein. It is found as early as the third or fourth month, and does not, like jaundice, affect the skin and cellular tissue.

As an additional proof that the urinary apparatus is in active operation during foetal life, a case of

* Anatomie Pathologique, tom. xv.

stone is related in the "*Répertoire d'Anatomie*," occurring in a child, from whose age, and the size of the calculus, it was supposed that the formation commenced long before birth. There is a preparation in Guy's Hospital Museum showing a remarkable distension of the foetal bladder. The evidences of Drs. Prout, Lee, and Montgomery are also in favour of the secretion of urine during intra-uterine life, and a few cases are related in which the distended foetal bladder interfered considerably with delivery.

The foetus is said to be liable to convulsions from the same cause that produces them in children after birth,—namely, the presence of irritating matter in the intestinal canal. Where convulsive movements have been well marked and frequently repeated, there has generally been an escape of meconium into the liquor amnii, giving it a greenish tinge.

The general subject of diseases of the osseous system belongs more to the study of deformities than diseases of the foetus. There is one affection, however, which may be admitted here. In the "*Archives Générale de Médecine*" for 1850, M. Depaul has described what he calls a new form of "*rachitisme*," and purely a foetal disease. The title of the memoir runs thus:—"Sur une maladie spéciale du système osseux, développée pendant la vie intra-uterine, et qui est généralement décrite

sous le nom de rachitisme.” The conclusions he arrives at are the following:—1st. The morbid alterations which the skeleton undergoes during intra-uterine life have various origins. 2nd. Those which have been generally described under the name “rachitisme congénitale,” do not appear to have the same origin as those which belong to the “rachitisme” developed after birth. 3rd. The form and direction of the curvatures, the internal structure of the bones, &c., all combine to establish between them a well-marked distinction. 4th. Whilst that which is developed during foetal life is explained by the absence or irregularity of the deposit of calcareous matter, the veritable “rachitisme” it seems probable is owing to the “ramolissement” of bones already nearly formed, and which have received some temporary interruption to their regular development. 5th. The moral emotions or imaginations of the mother are without influence on these vices of conformation, and nothing short of the superstition and credulity of former epochs could encourage the opposite opinion. 6th. Neither should we be justified in referring these conditions to lesions of the nervous centres, and the consequent muscular contractions. At the same time, it appears incontestible that a great number of congenital malformations have this origin. 7th. From the contributions already made to science, we know that the state of the mother’s health is quite

foreign to their development; in no case has there been established the existence of scrofula or syphilis. 8th. It is worthy of notice that in many instances the malady has manifested itself in "*des grossesses gemellaires*," and this condition has probably something to do with its production. 9th. Those cases which have been exhibited as examples of congenital fractures have been badly interpreted,—they may all be considered as the same kind of lesion, and traced to the same cause, which may be said to be the complete absence in a limited space of calcareous matter. In certain cases, exuberances are formed, and present swellings which have been mistaken for fractures undergoing the process of reparation. 10th. The morbid alterations in the skeleton, which have been considered in the "*mémoire*," are much more frequent than is generally believed. I have observed nearly forty cases, and by further observation it would no doubt be easy to add to the list. 11th. They are not only grave by the deformities which they cause in the limbs, but, by altering the form of the chest, render the mechanical act of respiration imperfect; and also the brain is deprived of its proper protection, and is exposed to injuries incompatible with life.

There are several preparations in the museum at Guy's showing defective points of ossification in the foetus, probably due to Depaul's "*rachitisme congénitale*."

Among affections of the skin in the fœtus, Geoffroy St. Hilaire has described cases in which the tegumentary covering has been too small for the body ; as the body becomes developed, the skin splits, and gives the fœtus a striped appearance, not unlike that of a clown : he has also described cases in which the skin has been too large, hanging in folds on the body. There are two or three specimens of both conditions in Dupuytren's Museum, Paris, and also in the museum at Guy's. The history of one of the cases at Guy's is, that the fœtus was born at or near the full time, hide-bound, in consequence of extreme hypertrophy of cuticle, as if from "Ichthyosis," variety of fissures in the epidermis, which shows that its structure is columnar ; there is no division of the cutis ; the integuments are very tense. Two of the specimens are very similar—in one the striped appearance was said to be owing to the mother having visited Astley's Theatre at about the middle period of pregnancy, and carrying in her mind a vivid impression of the clown's appearance.

M. Ollivier has made several observations on œdema in the new-born ; he finds it most common in still-born cases, and attributes it for the most part to congenital weakness. Other causes, however, must be admitted, because it has frequently been observed in robust and vigorous children.

Sclérème, or hardness of the cellular tissue, is

another foetal disease, and is generally caused by intense cold, and happens most frequently in the winter months. Children born before the full period are especially liable to it—they are always cold, even in a warm room, and with ample covering; a well sustained and moderately high temperature is necessary to keep them warm. The causes which have given rise to their premature delivery are generally of a nature to produce debility, œdema, anasarca, and induration of the cellular tissue before they leave the womb; sometimes they are only predisposed, and become subject to those conditions at, or shortly after, birth. Sclérème has various complications, and is often accompanied with a yellowness of the skin.

It is found that although there may be no actual disease of the lungs at birth, they are often in such a condition as, immediately on being called on to perform their functions, to take on a diseased action. Valleix, in his "*Maladies des Enfants Nouveau-nés*," says—"Pneumonia is very common, and usually appears from the second to the tenth day." Cruveilhier states that disease of the lungs is so frequent in the new-born that it carries off as many infants as adults. M. Vernois has opened the bodies of 130 new-born children, and found pneumonia in the greater number.

A few German authors have noticed inflammation of the trachea in the foetus, constituting intra-

uterine croup; and Dr. Watson relates the following case of whooping-cough, which he supposed existed before the child was born:—"My bed-maker's daughter, in Cambridge, had a child ill with whooping-cough in the house with her during the last week of another pregnancy, and the new comer whooped the first day he came into the world." *

Congestion and inflammation in any part of the foetal economy may arise from placentary congestion; but, as I have before observed, the liver is particularly liable to this accident, and this in its turn would give rise to pulmonary congestion: whether the latter in most cases is primary or secondary to tubercular deposit, is a question not easy to determine.

I have seen a few cases of ascites in the foetus. Numerous cases are recorded by French authors.† Depaul believes that the distended foetal bladder is often mistaken for that disease, and gives a case in which a large accumulation of foetal urine impeding delivery presented all the characters of dropsy.

Cruveilhier and Valleix have frequently met with various forms of apoplexy in the new-born, and much oftener than in older children. Valleix states that in a great many instances he found a subcranial ecchymosis. By accoucheurs this appear-

* Principles and Practice of Medicine.

† In Guy's museum there is a very good preparation of ascites at the fifth month.

ance is generally attributed to the pressure, congestion, and probable rupture of vessels which happen during labour. We know, however, that congestion and inflammation may take place in the brain and its membranes in utero, as in cases of tubercular deposits, clots, and hydrocephalus; I have seen the latter complicated with spina bifida, and forming a serious impediment to delivery; in some cases it has been necessary to tap the membranes of the brain before delivery could be effected.

Various kinds of worms, or "entozoa," have been found in the foetus, generally in the intestines. Hippocrates, Bremser, and Brendil speak of *tœnia* in the new-born. Some authors have attributed to them the convulsions which the foetus seems sometimes to experience in the womb. Although it is not common to meet with them at this early period fully formed, we do not know to what extent their ova may exist. The existence of entozoa, isolated, dwelling in closed cavities in different parts of the foetal body, has been brought forward to support the doctrine of spontaneous life, but it has been opposed to this that their ova are small enough to pass along the utero-placental vessels.

I shall not attempt any further enumeration of diseases peculiar to the foetal organism. I believe the most important have been noticed, and we shall now pass on to the diseases of the cord, membrane,

and placenta, which secondarily affect the health and often cause the death of the new being.

MORBID CONDITIONS OF THE UMBILICAL CORD.

These may consist of a partial obliteration of its vessels, undue torsion upon itself, a clot of blood beneath its coats obstructing the flow of blood, shortness or too great length, all of which are attended with more or less danger to the child. Ollivier mentions a case in which a clot of blood was found in the cord near its umbilical insertion, and seemed to have caused the child's death. Shortness or too great length may, in various ways, place the life of the child in danger, and particularly so during the act of parturition. Some cases have been related where tumours in the substance of the cord, forming almost a total obstruction to the flow of blood, or even the absence of the cord altogether, have not interfered with the nutrition and vitality of the child; these, however, have been but imperfectly related, and want confirmation.

In a "Thesis," by M. Voisin, the following affection of the cord is described:—"A foetus of six months having died and passed into a state of decomposition, the cord, from its principal divisions in the placenta to within a few lines of its abdominal insertion, was found to be three times its natural volume; the engorged matter was a thick,

viscous humour, apparently of a strumous nature, and had infiltrated itself into the tissue which unites the umbilical vessels." Desormeaux remarks upon this case:—"It is doubtful whether we ought to attribute the death of the foetus to the affection of the cord, for the latter may be three or four times its natural size without any injury to the child." The exsanguine condition of the umbilical vessels, another feature of the case, might have been the consequence of the death of the foetus and not the effect of the compression produced by the infiltration.

Most of the cases of hydatids, and other abnormal conditions of the cord which have been related by various authors, may be considered as secondary affections, appearing with or after the same affection in the placenta, the membrane, or the foetus itself.

The great differences observed in the umbilical cord as to length, smallness, shortness, thickness, irregularity, and torsion are not easily accounted for. As a general rule, thinness and length of cord are accompanied with debility in the child, and a plump cord, of the natural length—that is, about the length of the child—with a corresponding plumpness and vigour in the body to which it is attached.

DISEASES OF THE MEMBRANES.

The organic alterations of the membranes are comparatively rare; the chorion sometimes becomes thick, opaque, and red on its internal surface, and the granulations of the external swell, and give birth to hydatids or tumours in bunches resembling hydatids, which have received the name of vesicular disease of the chorion.* Velpeau has thrown considerable light on these alterations; they have received various names, such as *môle hydatique* ou *vesiculaire*, *môle en grappe*, &c. "The villousities, which in the first months of gestation cover the external surface of the chorion, and in the middle of which the vessels helping to form the placenta ramify, present swellings which have been taken by some for lymphatics, while others have considered them glandular dilatations; these dilatations are simple cellular spongioles, which form, by an exaggerated development, a veritable morbid growth, the mole hydatique or vesiculaire. Albinus thus describes the disease—"Vasa placentulæ soluta, libera, per intervalla contractiona, mediis locis capaciora, et tanquam si inceperint in hydatides degenerare." Moles often become of large size, the embryo dies early, but many of the symp-

* There are several specimens of this disease in the Pathological Museum of Guy's Hospital.

toms of pregnancy continue until the passage of hydatids or sanguinolent matter announce the real condition of the patient. They may remain in the uterus for many months, or even years, after the proper period of pregnancy has passed over. Writers on the subject have pointed out the difference between the "mole vesiculaire," which contains a false conception, and the true hydatic mole fixed by a pedicle to the walls of the uterus.

The chorion is liable to become irregular and lobulated; and the amnion participating in the same changes, the healthy appearance of the involucra is entirely lost.* The membranes may also become the seat of lesions, excited or propagated by wounds or rupture of the uterus from external violence, or by powerful shocks affecting the body of the mother. Among other morbid changes that have been noticed may be mentioned those which are supposed to be the sequel of inflammation, such as alteration or increased thickness, with softening; this renders the membranes weaker, and gives them a less power of resistance. Sometimes the thickening is accompanied with a cartilaginous induration with ossific deposits; this, on the contrary, would render the membranes stronger, and give them a greater power of resistance.

Taken singly, the morbid affections of the amnion are more serious than those of the chorion. Being

* Dr. Lee.

a serous, or analogous to a serous, sac, it may become disorganized, adhere to neighbouring parts, or become the seat of dropsy and other affections which impede development and determine atrophy in the fœtus.* Membranous bands or cords, the result of inflammation, are often found in its interior. Dr. Montgomery believes that to these bands should be attributed the amputations of the limbs which have usually been referred to spontaneous amputation.

The inflammatory adhesions which take place between the internal surface of the amnion and various parts of the body in the embryotic state have been brought forward to account for many forms of monstrosity.

Although but little endued with vitality, the membranes may become the seat of such active inflammation as to cause a serious disturbance of the maternal system. M. Ollivier has reported a case, in which a young woman, aged eighteen, in the fourth month of her first pregnancy, without any known cause, except an accidental bending of the body, experienced a general uneasiness, accompanied with constipation, a slightly reddish vaginal discharge, lumbar pains, diminished sensibility about the hypogastric region, and on the fourth or

* In the museum at Guy's Hospital there is a very good specimen of inflammation of the amnion at the seventh week.

fifth day a considerable increase in the volume of the abdomen. These symptoms continued about a fortnight, and were met by emollients and repose; by which simple treatment they subsided, and the pregnancy continued its regular course. The child was born at the full period, and did well. The membranes, for about a third of their extent, were found thickened, whitish, opaque, villous on the internal surface, and passing into a condition of softening. All the thickened portion was traversed by delicate vessels, particularly in the neighbourhood of the placenta. Other portions of the surface of the membranes presented red points, similar to those seen in mucous membranes when scraped with a scalpel.

The various alterations which the liquor amnii undergoes do not seem to be of much pathological importance. It is sometimes found thick, brown, sanguinolent, greenish, and having a foetid odour, without the child's health becoming at all affected.

By some pathologists dropsy of the amnion has been referred rather to a morbid state of the foetus and placenta than to any inflammatory action in the amnion itself. I think, however, it must be admitted that it may be induced by both conditions, and most commonly by the latter.

M. Naegele has related cases in which the liquor amnii seemed to have acquired a corrosive quality,

or, at least, to have determined some degree of maceration in the epiderm, which could be removed by the slightest touch. In one case the child, although weak, was born alive, and, at the end of fifteen days, and after the separation of the whole epiderm, had become quite healthy.

Velpeau found in several abortions that a collection of serum and blood had taken place between the chorion and amnion.

Many cases are on record where the liquor amnii, escaping at an early period, did not prevent the mother to going the full term, and giving birth to living children ; so that, if it has anything to do with nutrition, it can only be one of its minor sources.

DISEASES OF THE PLACENTA.

These require very little said to show their importance. Recollecting the structure and offices of the placenta, it is very easy to understand how its morbid alterations may influence the condition of the fœtus. This does not take place by an extension of disease—their diseases are, for the most part, quite distinct—but by a loss of function, whereby the sources of nutrition are either interrupted, vitiated, or totally arrested. Dr. Simpson says, that disease and death of the fœtus is almost always referable to disease in the placenta. This, however, is an opinion which, although coming

from a high authority, does not seem to be sufficiently supported by collateral evidence. It is very possible that many cases of death of the foetus, referred to unknown causes, might have been traced to disease in the placenta; but when we recollect the many diseases to which the foetus is liable—that it may be mutilated by morbid changes, the placenta remaining perfectly healthy, and that all those observers who have said so much about the syphilitic, and other post mortem morbid appearances of the foetus, have not noticed to any extent morbid alterations in the placenta—should we be justified in attributing to its diseases such an amount of danger to foetal life?

Many continental writers, and particularly Cruveilhier and Breschet, have described the various morbid changes usually met with in the placenta, and in so doing have given them a great variety of names. Dr. Simpson, in his valuable paper on “Diseases of the Placenta,” published in the “Edinburgh Medical and Surgical Journal,” No. 137, simplifies the subject by making the tumours, indurations, schirrhous, tubercle, morbid deposits, and malignant growths in the placenta described by French and German authors, to consist, for the most part, of nothing more than effused blood undergoing various degrees of change. Dr. Barnes has made some important communications on diseases of the placenta, and has described in them a form of

fatty degeneration.* Dr. Druitt, also engaged in the same inquiry, considers this fatty degeneration a natural process of decay appearing in an organ whose term of office has nearly expired, and associates with it, as the results of his own observations, a deposition of calcareous matter. Both are supposed by him to be evidences of decaying and obliterated structures from cessation of function, and not, as Dr. Barnes supposes, a veritable disease. The inquiry is quite new, and, in its present state, it would perhaps be premature to adopt any of the opinions offered upon it. Ollivier's account of the placenta, its white fibres, obliterated vessels, calcareous and fatty deposits—all showing themselves towards the end of pregnancy; and, also, the results of my own observations, lend a good deal of support to Dr. Druitt's views. I have heard Cruveilhier, in his lectures, speak of "les noyaux indurés blanchâtres et les collections sanguines multipliés qui présente souvent le parenchyma du placente." M. Jacquemier, like Dr. Simpson, believes that many of the morbid appearances in the placenta arise from the progressive transformation of clots of blood. He, however, maintains that the placenta itself is not susceptible of inflammation, nor of real organic disease; and he confines its morbid conditions to hypertrophy,

* See the early numbers of the *Lancet* for 1853, and also Med. Chir. Trans. 1851, vol. 36, p. 351.

atrophy, and moles, vesicular and fleshy.* Dr. Simpson believes that congestion of the placenta may arise from a division of either the umbilical vessels or the utero placental. M. Jacquemier admits only the latter. In the paper already alluded to, Dr. Simpson gives a detailed account of three stages of inflammation in the placenta. 1st. The stage of inflammatory congestion which, though not differing from the non-inflammatory in its anatomical appearances, differs materially in its results. The former gives rise to extravasation of blood, the result of mechanical over-distension of the vessels; but the latter, to the various morbid products which are observed to result from inflammatory action in other organs of the body, and which are not mechanical extravasations, but vital though morbid secretions. 2nd. Effusion of coagulable lymph; the morbid appearances and effects of which depend on the parts in which it is found, in the interstitial substance, or upon the uterine or foetal surfaces.† This deposition gives

* *Traité d'Accouchements.*

† A physician accoucheur has given me the particulars of the following case of supposed syphilitic inflammation of the placenta:—natural labour, in a woman with constitutional syphilis—child dead—severe hæmorrhage for a fortnight, with retention of a portion of placenta—death. The maternal decidua extremely thick—white—and the curling arteries still full of blood passing through it. The adhesion was so firm that, in trying to separate it, a portion of the

rise to a reddish and grayish-yellow induration, which may also arise from chronic inflammation. In this and similar cases is the coagulable lymph effused at first into the substance of the placental decidua, causing its morbid thickening? or is it usually thrown out upon the uterine or foetal side of that membrane? and are the cavities of the decidual utero-placental vessels liable to become obstructed thereby? Is the inflammatory effusion of lymph, producing the morbid adhesion of the placenta to the uterus, furnished by the decidual or decidual and proper placental vessels? or is it chiefly thrown out by the vessels of the adjoining portion of the internal surface of the uterus? or are not all of these vessels generally the seat of inflammation, and the sources of effusion at the same time, owing to the inflammatory action, in most instances speedily spreading by contiguity of texture from one to the other? The effused lymph may become the seat of various diseases and morbid deposits. 3rd. Purulent effusion. This is found in various forms and situations in the placenta, sometimes occupying nearly the whole, sometimes in little abscesses scattered throughout its substance, surrounded by hepatized tissue. Cruveilhier relates several cases of placentary con-

uterine tissue was torn up. White patches on the foetal surface of the placenta have been considered pathognomonic of syphilitic inflammation.

gestion. He calls it "*apoplexie placentaire*," and believes it to be not unfrequently a cause of death in the foetus. He also notices cases in which concrete purulent matter was found infiltrated through the tissues of the placenta. All the stages of inflammation may be observed at the same time in the same placenta; and every shade and transition may be observed in an inflamed portion of the viscus, from congestion to the effusion of lymph or of purulent matter. It is also possible to trace the gradations between the increased solidity of acute hepatization and that of the most advanced and best marked variety of chronic induration.

According to some authors, about the third month, when the chorion becomes applied immediately against the decidua reflexa, effused blood, instead of passing between the two membranes, passes into the substance of the placenta, constituting the "*apoplexie du placente*" of Cruveilhier, and the "*apoplexie utero placentaire*" of Jacquemier.

Dr. Simpson analyzes the histories of twenty cases of "*placentitis*," with the view of becoming acquainted with their symptoms and diagnosis. In one case, although the uterine surface of the placenta was extensively inflamed, the foetus did not appear to have suffered—making it probable that the attack supervened towards the close of gestation. Breschet relates four cases of *placentitis*,

in which two of the children were still-born, and the other two thin and emaciated. Dr. Simpson, in alluding to these cases, remarks—"That the state of the infants was really dependent, not upon any pathological condition in their own economy, but upon the morbid condition of the placenta; and the mal-performance of its functions was proved, on the one hand, by no abnormal or morbid lesion being discovered upon a careful post mortem inspection in the fatal cases, and, on the other hand, by the two born alive rapidly gaining plumpness and strength."

Professor Wilde, in enumerating the symptoms of "placentitis," mentions, as one, that the movements of the child gradually become weaker, and at last cease altogether; a circumstance observed in two of Breschet's cases, and also in a few cases recorded by Mauriceau.

The exciting causes of inflammation of the placenta are blows upon the belly, falls, violent succussions, sudden and great movements, frights, emotions, all kinds of lively and profound sensations and diseases of the mother, particularly metritis and other inflammatory complaints, a previous attack always being a predisposing cause. When, after the action of any of these causes, a local lumbar or uterine pain supervenes, we may, as M. Breschet has stated, in general presume with some confidence the presence of placentitis. Auscultation may here

be employed with advantage. If the seat of pain is found to correspond to the seat of the placental "souffle," inflammation of the placenta will appear more probable, particularly if Monod, Kennedy, and Dubois are correct in referring the sound in question solely, or in its greater degree of intensity, to the seat of placental attachment, or to the uteroplacental vessels themselves. Dr. Simpson says—"Whether the presence of diseases in the foetal economy is capable of exciting placental congestion through the long tortuous tract of the umbilical vessels, and what morbid effects they may produce upon the placental circulation in general, are points open to investigation ; but the placenta being apparently directly subservient both to the respiration and nutrition of the foetus, performing for it during the greater part of intra-uterine life at once the functions of the lungs and stomach, it is not surprising that chronic inflammatory disease affecting it should, by more or less impeding the performance of its functions, sometimes destroy the life of the child, and in other instances produce in it a state of phthisical marasmus. When placentary congestion occurs after the period of quickening, and is very acute in its character or rapid in its appearance, the movements of the foetus would appear to be rendered suddenly irregular, and at times almost convulsive. If the congestion is more chronic in its nature, the movements occasionally become languid,

or not at all appreciable, but by a timely abstraction of blood they may, as Madame Lachapelle has remarked, be again reproduced, and this has sometimes happened even when they have been absent for several days."

A little loss of blood from rupture of one of the placental vessels, though harmless to the mother may be fatal to the infant, whether it is extravasated at an early period upon the villous surface of the chorion, or at a later period into or around the placenta; it may be sufficient to arrest the processes of foetal nutrition and respiration to such an extent as effectually to impede the development and destroy the life of the embryo. Dr. Simpson remarks—"In some cases I have found the ovum of the average size of an orange, the embryo having been arrested in its growth at about the fifth or sixth week, or at that stage of development at which the extremities of the body first begin to appear in the form of rounded buddings. In many others, expulsive uterine contractions had not supervened for several weeks after the internal sanguineous effusion had actually taken place, and in some the general growth of the membranes and placenta appeared to have gone on during the interval; while in one or two cases the embryo itself had enlarged to nearly the size of the thumb, although individually the development of the limbs and other organs had been arrested." Dr. Lee says—"The

placenta in some cases of abortion after the third month has been hard, like cartilage, small, and imperfectly formed, with calcareous particles deposited in its substance; in others, the placenta is unusually large, and its vascular structure changed into a soft, yellow, fatty substance; hydatids have also been developed in its tissue; the umbilical cord in these instances has been remarkably slender, and the foetus has appeared to perish for want of a proper supply of nourishment, and not from any defect in the organization of its internal parts. By far the most frequent cause of abortion is in the product of conception itself—namely, in a diseased condition of the foetus, or its involucra, by which it is deprived of life, and afterwards expelled from the uterus like a foreign body.” Mauriceau says—“The blighted ovum is thrown off from the parent as fruit which has become withered is separated from the branch of the tree on which it has been produced.” “I have examined,” says Dr. Lee, “numerous ova which have been prematurely expelled, and in many of these where no disease was obvious at first, some morbid state of the membranes, placenta, or embryo itself has been detected sufficient to account for the accident, independent of any constitutional or local affection of the mother.”* With regard to the effect of emmenagogues, given sometimes to procure abortion, they seem to act more by a deter-

* Article “Abortion,” *Cyclopædia Practical Medicine*.

mination of blood to the uterus—this flowing between that organ and the placenta—than from any direct deleterious effect on the child's health. M. Moreau does not deny that the integrity of the placenta is essential to the development of the foetus, and that its morbid alterations often cause its death. He thinks, however, that this is not a common cause; considerable placental disease may exist without injury to the child; they seem in many respects independent, and this is particularly seen in cases where the placenta grows and becomes hypertrophied after the death of the child. Dubois, in his lectures, speaks of a circle formed on the foetal surface of the placenta, consisting of congested and distended vessels; as pregnancy advances the parts pass into inflammation and effusion, and towards the end of "terme" the circle becomes whitish and indurated. This is the seat of that kind of placental hæmorrhage which takes place under the coverings of the placenta, occasionally giving it an immense bulk, and which is generally fatal to the child, by compressing and arresting the whole placental circulation. I have seen two well marked cases in Dubois' service at the Clinique d'Accouchements. One belonged to a foetus of six months, the other a little older, and in both was found an effusion of blood, with large clots under the placental coverings in the part pointed out by Dubois as its usual seat. Both of the parents felt violent

strugglings in the womb a short time previous to delivery, probably owing to convulsive fits induced by the asphyxia which caused the children's deaths. Mauriceau thus notices a case of scirrhous placenta:—"D'une femme qui étoit avortée d'un enfant de six mois et demi, mort en son ventre par la disposition squirreuse de son arrière-faix, ayant déjà eu auparavant cinq autres avortemens consécutifs par la même cause."* He agrees with modern physiologists in referring death of the fœtus in these cases to obstruction in the placental circulation. In another case:—"De l'accouchement d'une femme grosse de sept mois et demi, dont l'enfant étoit mort en son ventre et l'arrière-faix tout schyrreux et corrompu." He remarks—the woman was delivered of a seven months' child, still-born; judging from the separation of the epiderm, it appeared to have

* There are numerous specimens of scirrhous and other diseases of the placenta in the museum of the Faculté de Médecine, Paris, and also a few in the museum at Guy's Hospital. Melanosis of the placenta is occasionally met with; there is a specimen in Longstaff's museum, and another in the museum of the Edinburgh University. One of the specimens at Guy's was a case of tuberculosis of the placenta; the mother died of phthisis, after delivery; the child—thin and emaciated—died in a few weeks; tubercles formed in the lungs; mesenteric glands cheesy. In another case somewhat similar the mother died of phthisis soon after delivery; child small, badly nourished; it died in three months with tabes mesenterica; the liquor amnii in both was very profuse.

been dead several days. At the third month of pregnancy the patient was attacked with continued fever, and for thirteen days she was so ill that her life was despaired of; having subsequently rallied and become convalescent, she suffered at the sixth month "*un mortel chagrin*," from the loss, by small-pox, of an only child, to whom she was passionately attached. This circumstance caused her to pass the remaining time of her pregnancy in continual affliction, which made it improbable that the child would be carried to the full period. The placenta was found schirroid and corrupted; the former probably owing to the malady experienced at the third month—the latter, the usual consequence of the death of the child. A good deal might also be attributed to the intense and continued grief of the mother, and to the contagious air continually respired by her during her watchings night and day over her sick child. Notwithstanding all these untoward circumstances the woman ultimately did well.

After the death of the fœtus the placenta usually becomes decolorized, because it receives less blood,—it shrinks and becomes thinner; but it now and then enlarges even to hypertrophy, and sometimes it is infiltrated with serosity. The latter condition generally happens when it is situated at the inferior part of the uterine cavity. In the treatment of inflammation and some other diseases of the placenta,

Dr. Simpson, after recommending repose, bleedings, and counter-irritations on the loins and hypogastric region, with a few ordinary medicines, says, "Under all circumstances, in employing the various therapeutic agents alluded to, and such other remedial measures, medicinal, dietetic, and regiminal as the peculiarities of individual cases are in the practice of our profession constantly found to require, we ought ever to be guided by the consideration that on the activity and success of our exertions are dependent perhaps the health and safety of mother and child."

ABORTION.

The subject of abortion has been so often touched upon, that it seems almost out of place to give it a separate notice. Having, however, a few cases to insert, and hardly knowing under what head to bring them, without attempting to give it a lengthy exposition, I shall avail myself of the above term. According to Dr. Lee's definition, abortion signifies the expulsion of the foetus from the uterus before its different organs have been sufficiently developed to enable it to support an independent life. When the product of conception is expelled between this period and the full term of utero-gestation, the process is usually termed premature labour. Abortion is a frequent occurrence in the early months of pregnancy, particularly among women of the lower

classes, who are exposed to much bodily fatigue and mental anxiety. Nearly all the diseases that have been enumerated calculated to affect the health and life of the child, may more or less be considered causes of abortion. Dr. Lee adds, as less evident causes, leucorrhœa, irritability, or too great contractility and rigidity of the uterine fibres and bloodvessels. "Those," he says, "who have insisted on rigidity of the uterine fibres as a cause of abortion, have been in error in supposing that the uterus enlarges during pregnancy by the mere force of mechanical distension by the ovum, and not by the gradual development of all the textures of the organ in exact correspondence with the growth of the organs of the fœtus." When the life of the fœtus is extinct, it becomes an extraneous body, expulsive efforts are set up, and abortion ensues. When the ovum is healthy, it adheres to the uterus with great tenacity, in proof of which, several instances are related where very severe blows and falls experienced by pregnant women have had no effect on the utero-placental connexions.

On the subject of abortion and other accidents of gestation, Mauriceau has left the following interesting cases on record:—1st. "D'une femme qui avorta d'un petit fœtus tout corrompu qu'elle avoit porté mort en son ventre plus de trois mois, après quoi, l'ayant vuïdé, l'arrière-faix lui resta dans la matrice, dont il ne fut expulsé qu'en suppuration."

In this case the woman ceased to feel the child after the seventh month. Three months afterwards it was expelled, having been preserved from decomposition by the liquor amnii. 2nd. "*De l'accouchement d'une femme dont l'enfant étoit mort en son ventre depuis huit jours sans aucune cause manifeste que celle d'une grande fâcherie.*" He remarks on this case, that the fit of passion experienced by the mother, who was a plethoric woman, probably determined to the child such an increased flow of blood as to cause congestion and asphyxia. 3rd. "*D'une femme grosse de sept mois, qui ayant eue une perte de sang presque continuelle durant quatre mois, avorta d'un petit enfant, que n'étoit pas plus grand qu'un enfant de trois mois.*" The continual loss of blood experienced by the patient during four months had rendered the aborted infant similar to abortive fruit, which, growing no longer after being deprived of the sap from whence it derives its nourriture, becomes withered, and separates from the parent stem before its time. 4th. "*D'une femme qui accoucha de trois enfans au terme de huit mois, dont le mari étoit paralitique de la moitié du corps depuis cinq ans.*" This case seems to confirm the opinion of some authors, that a man is capable of procreating children so long as he is equal to the act of coition. Two of the triplets died in a few days, the other lived to the 15th; the mother did well. 5th. "*D'une*

femme grosse de cinq ou six semaines qui souffroit une disposition inflammatoire de la matrice, causée par plusieurs pernicieuses remèdes dont elle avoit usé se faire avorter." 6th. "D'une femme qui ayant une fièvre continue depuis trois semaines, avorta d'un enfant de cinq mois et mourut deux jours ensuite." 7th. "D'une femme qu'après avoir été cruellement travaillée d'une colique néphrétique, accoucha d'un enfant de sept mois mort en son ventre." In this case, Mauriceau remarks that the "délicatesse" of the child was unable to withstand the great agitations to which it had been subjected by the parent's colic. The mother did well. 8th. "D'une femme grosse de cinq mois qui après une perte de sang durant plus d'un mois, avorta d'un enfant mort et vuida encore le jour ensuite une espèce de faux germe tout corrompu." This patient had severe fever after the abortion, with tumid and tender abdomen, but the unfavourable symptoms soon subsided, and she did well.

In the "American Medical Transactions," fourth volume, Dr. Osborne relates a case in which an entire ovum of three months' development being expelled, the embryo was found to be five inches in length, shrivelled in appearance, and attached by a cord ten inches long to a completely cartilaginous placenta of two and a half inches diameter.

Mauriceau gives numerous cases of abortion, where the foetus had been dead three, four, and

five weeks, and sometimes much longer. The deaths are usually referred to external injury received by the mother, "son propre maladie," medicinal substances, and in many instances no causes are assigned.

TWINS.

This occurrence, although not to be considered abnormal, is often attended with danger to one or both children. One may be more vigorous than the other, and in many instances seems to appropriate to its own use what was intended for the two. Sometimes the liquor amnii of the one escapes, and the embryo is then, having lost its protecting fluid, so much compressed by the distended membranes of the other, that it becomes atrophied, and speedily dies. In this way might be explained many supposed cases of superfœtation, where we find one fœtus large and the other small. Other causes might also contribute to the same phenomenon, such as disease in one fœtus, its membranes, or placenta; the other, with its placenta and membranes, remaining healthy. I have selected the following case of twins from a great many that may be found in Mauriceau's work:—
"De l'accouchement d'une femme grosse de deux enfans que se présent en mauvaise posture, l'un étant mort et corrompu et l'autre étant vivant."
Agreeing with modern accoucheurs, he says that in

diagnosing the death of the foetus, the cadaverous and purulent discharge alone ought not to be taken as an indication, as the same might be caused by the corruption of clots of blood.

Dr. Gibbon, of New Orleans, relates a case in the "American Medical Transactions," in which one foetus was blighted about the fourth month, and was retained with its living companion till the full period. Dr. Davies, of Ohio, in the same journal, gives a case of twins of unequal development. A woman, seven months advanced in pregnancy, miscarried with twins—one of them of seven months' growth—the other, of not more than as many weeks. Dr. Davies considered it a case of superfœtation. The editor says:—"It appears to us a case in which development was arrested, the membranes remaining entire: such cases are not rare in large practices. The ovum is not thrown off when its vitality ceases, but remains in the uterus until the usual time of pregnancy has transpired, or some exciting cause produces abortion."

What has been said of twins as unfavourable to development is applicable in a greater degree to cases of triplets and quadruplets. These conditions are caused by the impregnation at the same time of three or four embryotic germs, each subsequently obtaining its own separate membranes and placenta. The placentæ are usually united in one

mass, without, however, any communication existing between their vessels.

What is called the cohesion, or intus-susception of germs, is caused by more than one ovulum being contained and impregnated within the same vesicle. As development progresses, unnatural unions take place, which generally cause the death of both embryos; or if they happen to live to the full period of gestation, it is only to appear in the form of twin monstrosities.*

EXTRA-UTERINE FŒTATION,

Whether interstitial, tubal, or abdominal, ought to be noticed among the many causes of disease and death of the fœtus. When such a condition happens, death is usually brought about by inanition or deprivation of nourishment by an abnormal position of the ovum. Dr. Ashwell remarks:—"In these cases the fœtus seems to perish from want of nourishment, its vascular connexions with the Fallopian tube being of an imperfect character."† The usual termination of cases of extra-uterine fœtation is as follows:—The cyst which fills the office of the uterus acquires such a distension that it

* Instances are on record in which one germ has become gradually developed in the matured living structures of another.

† Diseases of Women.

generally ruptures about the fourth or fifth month, and, as in rupture of the uterus, the ovum passes into the peritoneal cavity, and either sets up fatal peritonitis, or leads to fatal hæmorrhage; or else the cyst remaining intact, the foetus dies, and its decomposed tissues, setting up inflammation in the neighbouring parts, subsequently effect a passage through the rectum or vagina. Some cases have occurred in which women have carried a foetus in the abdomen for many years. In the "American Medical Transactions," I find the following case reported by Dr. Johnson, of Richmond, Virginia. A child, fully developed, weighing nine pounds, with a placenta weighing but a few ounces, was removed from the abdomen of a woman by means of an incision made in the linea alba, from two inches above the umbilicus to within an inch of the pubis. It was contained in an extra-uterine sac, which it had occupied about a year and a half. Although the patient at first appeared to be doing well, she died seventeen days after the operation. From the history of the case, it was found that, eleven days from probable impregnation, the patient suffered symptoms of peritonitis. These, Dr. Johnson thinks, were caused by the attachment of the vivified ovum to the surface of the peritoneum. The inflammation of the latter seemed to have formed for the foetus a complete sac, having no communication either with

the abdominal or pelvic cavities. That the child must have lived to nearly the full period was proved by its size.

Dr. Watkins, Wisconsin, United States, makes the following observations on a case of Fallopian pregnancy, ending fatally :*—"The patient was not supposed to be pregnant ; and, therefore, when the alarming symptoms were exhibited which immediately preceded death, her true condition was not diagnosed. The post mortem examination disclosed a minute rupture of the right Fallopian tube, in which was found a foetus enveloped in its membranes, the placenta presenting at the rupture—being, in fact, a case of placental presentation."†

The following case occurred to Dr. Brown, Hannibal, United States.‡ A woman, aged forty, who had married at the age of twenty-one, had had several miscarriages, and one living child, and also had been freed of an extra-uterine foetus at the sixth month by ulceration through the abdominal parietes, having applied for advice, Dr. Brown found a tumour of the size of a child's head situated between the umbilicus and the pubis, feeling like

* Amer. Med. Trans.

† See also Dr. Oldham's cases in Guy's Hosp. Reports, vol. iii., Dr. Campbell's Memoir on Extra-uterine Pregnancy, and Dr. Ramsbotham's Obstetric Medicine and Surgery, fol. 646.

‡ Amer. Med. Trans.

an unyielding solid mass. On its lower edge was a small fistulous opening. A probe introduced into this opening detected fragments of bone. On laying open the tumour, a well-formed fœtus, of about the fourth month, was discovered, partially decomposed. It was firmly attached to the surrounding cyst, so as to be removed with great difficulty. For two days after the operation the patient was extremely feeble, but afterwards rallied, and, on the eighth day, all the remaining bones, together with the lining membrane of the tumour, which had softened and separated from the surrounding parts, were removed. In twenty-six days she was performing her usual duties. Dr. Brown considered it a case of tubal pregnancy.*

Another cause of death of the fœtus may arise from its being detained too long in the uterus, and thus acquiring too large a size to pass easily through the natural passage. This, however, is not common, nor is it always fatal. Mauriceau gives the following case :—“ De l'accouchement d'une femme qui avoit porté, à ce qu'elle croyoit, près de dix mois son enfant en son ventre.” Its weight and size being much greater than those of former children, was considered a proof of its being a ten months' child.

In practice it is believed by good authorities that every day that the child is retained in the

* There are several preparations of extra-uterine fœtation in the museums of the College of Surgeons and Guy's.

womb after the full period adds to the difficulties and dangers of parturition.

THE DEATH OF THE MOTHER

is also a cause of the death of the foetus. The child, however, may be saved by timely interference. Several such cases are recorded both in old and modern writings.

SIGNS OF FŒTAL DEATH.

These have reference both to mother and child. In the former, among the general symptoms observed when the foetus dies may be noticed the progressive disappearance of the sympathetic phenomena attending the state of pregnancy, and, in particular, the modifications of the breasts. These have been noticed, first, suddenly to enlarge, and then almost as suddenly to diminish in size, at the same time giving out a certain quantity of milky serous discharge. According to Dubois and Simpson, these phenomena are far from being constant. It is not rare to see the breasts simply diminish in size, with scarcely any discharge of milky serosity; and in some cases, except the discoloration of the areola, and the diminution of the papillary projections, no other changes are perceived.

It often happens, a short time after the death of the foetus, that the mother becomes sad, the

appetite is lost ; she has shivering fits, and general uneasiness ; the sunken eyes take on a pale, leaden hue ; the breath becomes foetid ; and with these symptoms there is generally a persistent febrile action. These phenomena do not last long, and, for the most part, when the moment of delivery has arrived, the patient has returned to a normal state of health.

When the membranes break after the death of the foetus, the latter passes rapidly into a state of putrefaction, and leads to a putrid discharge from the uterus. If retained, it becomes a source of infection to the whole maternal system. Under such circumstances, the patient may have all the symptoms of putrid fever, and thus be placed in a dangerous situation.

If we now examine the local phenomena, we find that, as soon as the foetus dies, the uterus ceases to be developed. There is a sense of weight in the hypogastric region. The abdomen seems to sink and diminish. The sinking may be owing to a cessation both of uterine distension and of the secretion of the liquor amnii. The latter may become absorbed, so as to permit the membranes to be applied immediately upon the foetus.

There are some exceptions to the rule that the uterus diminishes in size after the death of the foetus ; when death takes place in the early months, the placenta, in many instances, continues to be

developed, and thus distends the uterine cavity ; when this condition exists, although the uterus may have less blood in its walls, its circulation is scarcely less active than before, and the “*bruit de soufflet*” is easily recognised, a fact which some have brought forward in support of the doctrine that the sound is increased near or dependent upon the placental attachment.

If anything happens to cause the death of the foetus, its movements, having been weak for some time, or separated by long intervals, at length, after violent and tumultuous struggles, cease altogether.

When we wish to make use of the absence of foetal movements as a sign of death, we must direct the patient to lie on her back with the thighs flexed, and then with the cold hand make repeated and long-continued manœuvres on the belly ; if, after all, the movements cannot be perceived, we must not decide too hastily, because many circumstances may prevent their being felt ; among others may be mentioned an excessive quantity of liquor amnii, weakness of the foetus, or its compression by uterine contractions after the escape of the waters. Smellie reports a case in which, during the whole period of gestation, the movements of the foetus were not perceived, and yet it was born alive. The sensations which are experienced by pregnant women towards the end of pregnancy, and which are usually attributed to the movements of the child, are often due

to the slight contractions of the uterus which happen about this period, and which are no doubt designed to bring about those modifications in the passages necessary to the expulsion of the fœtus ; by their means the neck and inferior segment of the uterus become relaxed, and the placenta becomes partially disengaged from its already weakened attachments ; they also cause the sanguineous discharge so common to this epoch, particularly seen in those who carry a dead child.

It sometimes happens, as we have already noticed, that before the death of the fœtus, owing to some kind of disorder or suffering in its abdominal viscera, the meconium passes into the liquor amnii, giving it a greenish tinge ; after death this is its common appearance.

The absence of the sounds of the heart in several explorations, at short intervals, may be considered a sign of fœtal death, but the “*bruit de soufflet*” may be heard long after the fœtal heart has ceased to beat. Auscultation is here of great importance to the practitioner, as he has now no reason to wait for evidences of decomposition or other signs of fœtal death before employing instruments.

We have before observed that the dead fœtus may remain in the womb two, three, or four weeks ; it may, however, prolong its stay there for as many months. It undergoes various changes in colour and structure, but does not actually decompose un-

less air be admitted. Sometimes its structures are converted into a hard, dry substance, like the indurated fat of dead bodies, which is probably due to its long sojourn in the uterine or other cavity.

A great many opposite opinions have been entertained as to the absorbing powers of the uterus. Several apparently well authenticated cases are related, where in some animals the soft parts of the foetus have been absorbed, leaving nothing in the uterus but foetal bones. The same absorption has been supposed to take up portions of the liquor amnii, and also to remove portions of adherent placenta. As, however, it is well known that the placenta and soft parts of the foetus may decompose and be discharged through the vagina in the form of putrid matter, we can scarcely at present determine what amount of absorbing power belongs to the uterine walls. To conclude, it may be as well to recall the fact previously stated, that the foetid discharge from decomposed clots of blood simulates that which arises from decomposition of the dead foetus, and would be very likely to mislead us in our diagnosis.

AUSCULTATION OF THE FŒTUS IN UTERO.

On applying the stethoscope to the belly of a pregnant woman a great variety of sounds are conducted to the ear; a great many arise from flatus in the intestines, and some from abdominal muscu-

lar contractions, but an attentive examination will soon enable us to distinguish those which especially belong to the state of pregnancy. These have been divided by French authors into four classes—1st. The “*battements du cœur de l’enfant* ;” 2nd. The “*souffle utérine* ;” 3rd. The “*souffle fœtal*” or the “*bruit*,” caused by the passage of blood along the vessels of the cord or of the fœtus itself ; 4th. The sound which has been termed a “*choc*,” or “*frottement*,” and which results from the various active movements of the child.

Unless prevented by certain positions, the pulsations of the fœtal heart may be heard about the fourth month. They become slower, or take on an increased rapidity, without any apparent cause, and are not directly influenced by variations in the mother’s pulse. Their usual range is from 120 to 140 beats per minute. Depaul, in his “*Traité d’Auscultation*,” comes to the following conclusions with regard to the pulsations of the fœtal heart :—“ That an appropriate name for them would be ‘*doubles battements du cœur de l’enfant*.’ That they may be compared to the tic-tac of a watch, and are composed of two beats perfectly distinct, and in general without blending with a ‘*souffle*.’ It is not impossible, however, that a ‘*bruit de soufflet*’ or other sounds may be heard with them, but they are rare exceptions, and may be due to some abnormal conditions. It is not only at four

and a half months, as is generally stated, that the 'doubles battements' may be first perceived; it is very common to hear them at the fourth month, and even earlier: cases are recorded where they were perceived at the eleventh week. The absence of the foetal pulsations during the last three months of pregnancy would be an exceptional case; that is, if the foetus had not ceased to live. Out of 906 women examined during this period, they were absent only in eight. The point of the uterus at which they are heard varies according to the epoch of gestation and situation of the foetus. The region which corresponds to the foetal heart is that which communicates its sounds with most distinctness, but they may be heard with various degrees of intensity over all parts of the uterus accessible to the stethoscope. In a normal condition their frequency is always much greater than that of the maternal circulation. This frequency is nearly the same during the whole of pregnancy, and it is a mistake to suppose that it diminishes towards the ninth month. They are affected by uterine contractions, but only transiently. Allowances being made for individual differences and various modifying causes, their intensity is greater towards the end of gestation. The moral emotions felt by the mother are without direct influence upon the condition of the foetus. The disturbances of the maternal circulation act only secondarily upon the foetal. It seems impos-

sible to confound the 'doubles battements' with any other sound that may be heard in the abdominal cavity. The discovery of these sounds leads to the certainty not only of pregnancy but also of the life of the foetus. They are often the only obtainable signs of pregnancy. An experienced observer having repeatedly found them absent will rarely be deceived, and in all cases their absence would be superior to all the other signs of foetal death. Two 'doubles battements,' very distinct and not isochronous, leads with certainty to the diagnosis of twins. Should there be three foetuses, each having its particular cardiac sounds, we can easily see the possibility of diagnosing a triple pregnancy. The discovery of the foetal pulsations, when we know at the same time that the uterus does not contain the product of conception, would lead to the diagnosis of extra-uterine foetation; this theory, however, has not been verified by actual practice."

It is by some admitted, provided gestation is sufficiently advanced, to be possible, in the majority of cases, to diagnose the position of the foetus by its cardiac sounds. We may thus discover what parts are entering the pelvic cavity and what are in apposition with the uterine walls. For this purpose it is not sufficient to be assured of the existence of the "doubles battements" at a certain point of the uterus, the exploration must be general, a comparative examination is necessary to conduct us to the

“*summum d'intensité.*” That the diagnostic value of the stethoscope may be correctly appreciated, we ought to renew our examinations at the moment we are called upon to give an opinion; for it is not impossible that the fœtus, already well developed, may by its own movements modify its position or its presentation. Also, as it is necessary, for the purpose of learning the progress of labour, from time to time, to practise “*le toucher vaginal,*” so is it indispensable for the interests of the child to become acquainted with the state of its circulation. The modifications which are produced in the “*doubles battements*” ought to be followed with attention, for they cannot pass beyond certain limits without compromising the life of the child. These modifications may be only transient, still they are often sufficient to produce mischief, and delivery is often necessary as the only means of saving life. As, however, this is attended with passing dangers, it is doubtful in many cases how far the intervention of art may be useful. At all events, nothing can be better adapted to teach us the varying conditions of the fœtus than the state of its circulation. The changes in the fœtal pulsations which indicate danger consist of feebleness, irregularity, and diminution in number. The excessive acceleration observed in some rare cases have not the same signification; they may be raised to 200 or more in a minute, the child still being born alive. It is easy

to understand the importance of this means of diagnosis, when the choice of an operation, founded upon the respective interests of mother and child, has become necessary. Lastly, as far as we have seen, the uterine "souffle" is little capable of practical application, whilst the study of the "bruit du cœur" brings with it incontestable advantages, and which, in the present state of science, cannot be replaced by any other mode of investigation.

M. Moreau doubts the possibility of diagnosing by the above means the position of the fœtus, nor does he agree with M. Bodson as to the possibility of distinguishing with certainty the different degrees of suffering which the child experiences in the womb, or during parturition. Speaking of the uterine "bruit de soufflet," he compares it to that produced in certain affections of the heart, in the carotid arteries of chlorotic girls, in varicose aneurisms, and in certain erectile tumours. It is not distinctly perceived before the middle of pregnancy, and becomes stronger as the latter advances. There are many varieties as to its seat, extent, force, and persistence. With regard to its seat, it is generally heard on the lateral walls of the uterus. Moreau does not agree with Kergaradoc and others that it results from the passage of blood from the uterus to the placenta, but rather to a peculiar mode of circulation established between the large blood-vessels of the uterine walls. Depaul's observations

on this sound are to the following effect:—The denomination, “souffle uterine,” is preferable to others that have been adopted by various authors. It does not resemble the “bruit” heard in the course of the larger arteries; and if it is, like them, isochronous with the contractions of the left ventricle, it has its own peculiar character. It is very variable as to its thrill or tone, its persistence, and the point of the uterus where it exists. Numerous observations prove that it may be heard at the end of the tenth or the middle of the eleventh week; in general, however, it is later. Its intensity increases up to the seventh month; afterwards it makes less progress, and varies a good deal in different persons. As it is produced in the uterine arteries, it may be heard at all points of the uterus accessible to the ear or stethoscope. It is in the particular disposition of the uterine vascular system, and in the modifications to which it is subjected by the active movements of the child, that we find the most satisfactory explanation of its production, irregularities, intermittances, changes of situation, &c. Those accoucheurs are mistaken who regard the “souffle uterine” as a certain sign of pregnancy; taken alone it has not much more value than the other ordinary signs; joined to others it acquires and confers upon them additional importance. We are now convinced that a “bruit,” altogether resembling the foregoing, may be heard when the de-

velopment of the uterus is due to other causes than that of the product of conception. The death of the foetus does not impress upon the "souffle" any appreciable modification, and it is therefore of little use as a sign of the varied conditions of the foetal system. If it is true that in general a direct relation exists between the volume of the placenta and the development of the child, it is not correct to admit, with some authors, that we can appreciate their force and development by the intensity or other characters of the "bruit de soufflet." Since it is well established that no necessary connexion exists between the "souffle uterine" and the placenta, it is easy to understand that the diseases of the latter cannot be diagnosed by modifications in that sound; for the same reasons it will afford us no correct information as to what part of the uterine cavity the placenta is attached, nor enable us to discover its form and size, nor to diagnose double or treble placentæ, nor to determine the position of the child in the womb. Lastly, the value of the phenomenon altogether in a practical point of view must be admitted to be of a very limited character. Dubois, in endeavouring to account for the uterine souffle, says—"The uterine walls seem to be transformed into an erectile tissue, like that of varicose aneurisms; the column of blood contained in the uterine arteries, and the column, less rapid and less forced, contained in the sinuses, pass simultaneously

into the veins and so cause the sound; somewhat similar conditions are undoubtedly the cause of the 'bruit' in varicose aneurisms and in accidental erectile tissues." Depaul and also Dubois have published several cases in which the "souffle uterine" was heard after the death of the child. Depaul states—"Out of a hundred cases where women carried dead children, in only two instances was the 'souffle uterine' absent."

The anatomical conditions of the uterus are for a time but little modified by the death of the foetus. It usually ceases to enlarge, sometimes remains stationary, but more frequently diminishes. It is the utero-foetal circulation alone which has ceased, that which belongs to the uterine walls preserves nearly all its energy. Several authors, although admitting that the "uterine souffle" is heard after the death of the child, believe that it is only for a very short time, and that it presents well marked modifications previous to death. This was the opinion of Kennedy, and adopted by Carrière. Depaul relates the following case to show that the "souffle uterine" is not affected by disease and death of the foetus:—"A woman who had been submitted almost every day during five months to a minute stethoscopic examination of the abdomen was delivered, at the commencement of the ninth month, of a dead child, which appeared to have been dead only a few days. During the latter half of pregnancy, the

'bruit de soufflet' was constantly heard; it was generally strong, and sometimes, as is not uncommon, put on a sibilant character. Some days before the accouchment I was," he says, "surprised to find the foetal pulsations, which up to that time had been strong and regular, slow and weak, and offering some irregularities in their rhythm. The changes in the circulation of the foetus made so much progress that, eight days from their commencement, the beats of the heart could no longer be heard. I was thus enabled to watch and follow the deviation from health to the death of the child, six days from which it was expelled from the uterus. The 'bruit de soufflet' continued unchanged up to the time of birth."

Some observers have endeavoured to make out by the stethoscope the particular lesions taking place in the placenta: thus Hohl supposed that a sharp, resounding "bruit" indicated an alteration of the placenta characterized by deposits of phosphate of lime. A burning pain existing at a certain point of the uterus coincident with a "souffle" somewhat abnormal, announced hypertrophy or similar alteration of the same organ. These views, however, have not been confirmed by the observations of others, several cases of placental disease have been recorded in which no modifications were discovered in the "bruit de soufflet."

Dr. Montgomery thus describes what he calls the

placental "bruit:"—"The characters of this phenomenon are a low murmuring or somewhat cooing sound, resembling that made by blowing over the lip of a wide-mouthed phial, and accompanied by a slight rushing noise, but without any sensation of impulse. The sound is, in its return, exactly synchronous with the pulse of the mother at the time of examination, and varies in the frequency of its repetitions with any accidental variation which may occur in the maternal circulation. Its situation does not vary during the course of the same pregnancy, but on whatever region of the uterus it is first heard, it will in future be found, if recognisable at all, for it is liable to intermissions; at least, we shall be occasionally unable to hear it where we have already heard it a short time before, and where we shall shortly again recognise it. According to my experience, it will be most frequently heard about the situation of the Fallopian tube of the right side, but it may be detected in any of the lateral or anterior parts of the uterus."* Carpenter remarks—"That the cause of this sound exists in the uterus itself is distinctly proved by the fact that it has been heard when that organ was so completely anteverted that the fundus hung down between the patient's thighs. A sound so much resembling this as to be scarcely distinguishable from it, may be occasioned, however, by a cause of a

* Signs of Pregnancy.

very different nature ; namely, an abdominal tumour pressing upon the aorta, iliac arteries, or enlarged vessels of its own, and in doubtful cases it is necessary to give full weight to the possibility of such an explanation. The sound may be imitated at any time by pressing the stethoscope on the iliac arteries. The ‘bruit’ is not generally heard before the fundus uteri rises above the anterior wall of the pelvis.”

The remaining sounds which have been mentioned,—namely, the “foetal souffle” and the “choc” or “frottement,” seem to be too unimportant to deserve much consideration. It will be found in practice that even those which have received such a lengthened notice are far from being a satisfactory means of diagnosis, and at best can only be regarded as auxiliaries. In the ample opportunities I have had, I have found the greatest variety in their seat and character, without being followed by any ill-consequences either to mother or child. During the latter period of pregnancy, I have found the best place for catching the sounds of the foetal heart to be a little below the umbilicus. As to the uterine “souffle,” if we are not careful, we shall often fancy ourselves listening to that sound when we are in reality listening to the “bruits” of the large arteries within the pelvis, and which have nothing to do with the uterine walls.

CONCLUDING REMARKS.

On taking a general survey of what has been advanced on diseases of the foetus in utero and foetal development, it will at once be seen that much is involved in doubt and obscurity. There is such a contrariety of opinion pervading the inquiry, that unless I endeavour to reconcile opposite views, or prove that some are correct and others in error, the contents of the foregoing pages, I fear, will to many seem to possess but little value. It will, however, be something gained to obtain for the subject more attention. There is but little doubt, if the whole medical profession could be made to feel in it a sufficient degree of interest, their united observations would in a short time do a great deal towards advancing the study of the diseases of the foetus in utero, and a great deal more than can possibly be expected from many years devoted to it by a few physicians and pathologists. The latter cannot, however, be dispensed with; general practitioners have neither time nor inclination to go much beyond the collecting of facts; their generalization, the theories they originate, establish, or overthrow, must be left to the hard-working physiological and philosophical student.

Although all who read this essay will be able to draw deductions for themselves, it will perhaps be of some use if I attempt briefly to show some of

the points which require further investigation. First, with regard to foetal nutrition, the observations of Cruikshank and Lauth set forth much the same theory of nutrition as those of Goodsir. According to the latter, it is performed by means of secreting cells, whilst the former say it is carried on by lymphatics: after all, no very essential difference, seeing that the functions of the lymphatics are due to secreting cells. Both suppose the formation of a milk-like secretion, and both attribute to the placenta the office which is afterwards carried on in the alimentary canal. With regard to Lauth's researches, there seems a great probability that in such a delicate examination, the minute and imperfectly-formed bloodvessels traversing the decidua, containing blood-cells, but in too small quantity to give a colouring to the blood, may have been taken for lymphatics. On the other hand, the lymphatic vessels are so fragile, so minute, and so difficult to discover, even in parts that we know are abundantly supplied with them, that perhaps we ought to hesitate before saying they do not exist in the placenta, because they are not always visible. Here, then, is one point for future observers to decide.

Mr. Goodsir's authority is generally received as sufficient to establish the doctrine of the milky secretion in the placenta by means of cells. It would be satisfactory, however, to have it confirmed

by the observations of other competent microscopists.* The secretion itself is stated to have been seen in the decidua of certain animals, but I believe never in the human subject. The theory is a very convenient one, and it seems a pity to disturb it, particularly since one or two doctrines respecting the altered or vitiated functions of the decidual cells acting injuriously on the child are founded upon it. Of course we are not prepared to say that these cells do not exist, or that they may be merely the cells found in the capillary circulation of every structure of the body; but I think it may be shown that their existence is not necessary to foetal nutrition. Many, with reason, consider it a forced analogy to compare the functions of the placenta with those of the intestinal canal; their structure, their situation—the one being open to influences external to the body, the other deeply seated—the difference in the anatomical disposition and appearance of their surfaces, all fail to indicate a similarity of function. Besides, the lacteals are active during foetal life, and their greater activity after birth may be owing rather to their having more to do, than from having acquired new functions; and again, where would be the necessity of so many

* I have repeatedly looked in vain for the appearances so minutely described by Mr. Goodsir, and I could name one or two experienced microscopists who have been equally unsuccessful.

assimilative organs, such as the liver, thymus gland, spleen, super renal capsules, lacteals, &c., if such an important assimilation of new matter in the form of a milky secretion takes place in the placenta? The experiments of M. Bernard have proved that any oleaginous matter sent to the liver through the hepatic vessels would become deposited in its structure, and produce the disease called fatty liver. Hence a wise Providence has ordained that although the albuminoid and saccharine elements of food are taken to the liver, the oleaginous take another direction. Now, if Mr. Goodsir's observations are correct, the milky secretion being an oleaginous fluid, and taken directly from the placenta to the liver, would not the consequence be a diseased condition of that organ? I have seen experiments on animals, in which the pancreas, liver, and other organs had acquired fatty disease from deposit, not fatty degeneration, from having had oleaginous fluids injected into their vessels; rather a remarkable fact with regard to the pancreas, the pancreatic juice being the natural agent in reducing the oily or fatty portions of food. We may infer from the whole, that in a natural and healthy state, no oil or fat globules traverse those organs in which there is a danger of their being retained or deposited, and that at least there is a possibility that we may be wrong in supposing

that the secretion found in the placental cells is similar to the chyle found in the lacteals.

If the existence of lymphatics and secreting cells in the placenta is made doubtful, the only way in which fluids can pass from the maternal to the foetal portions of the placenta is by transudation or endosmose; and we need not be alarmed at finding portions of the maternal blood in the umbilical vein, because it is probable that most of the changes necessary to its conversion into foetal blood, are brought about in the liver. The structure of the placenta, its arborescent lobes, its interlobular sacculi, containing the maternal blood brought in by the curling arteries, and carried away by the venous canals, the thinness of the coats of its terminal vessels or capillaries, and also of the intervening membrane or placental decidua—so thin, indeed, and so easily torn, as to be often scarcely recognised as a membrane—all would seem favourable to the passage of fluids by a process of endosmose. The numerous experiments, also, which have been alluded to, make it very probable that such a passage takes place. These remarks are thrown out only as suggestions. I think the subject presents a fair and legitimate field for further inquiry. Microscopists should endeavour to confirm or disprove Mr. Goodsir's observations. He has made his views by means of drawings and explana-

tions, very plausible, but they certainly require a little corroborative evidence to ensure for them universal adoption.

If there is merely a passage of a part of the maternal fluids (for the separation of fluids by exosmose and endosmose takes place according to certain fixed laws), we are not at a loss to understand how coloured oil thrown into the abdominal aorta of the parent should find its way into the structures of the foetus.* For this purpose, direct communication by means of vessels is not necessary, nor, indeed, does any exist. The utero-placental vessels, of which so much has been said, and from which hæmorrhage takes place on the separation of the placenta, are the curling arteries and venous canals which pierce the parietal decidua to reach the interlobular spaces, and also the vessels of the decidual membrane itself, all of which belong to the maternal portion of the placenta. The question, then, I think, has yet to be decided, how far the secreting cells or endosmose are engaged in the separating of materials from the maternal blood for the use of the foetus. The points here adverted to are among the most important in the consideration of foetal nutrition, but whichever of the two processes Nature employs, the same law is applicable, that the morbid condition of the maternal fluids acts injuriously on the foetus. If the

* See experiments of Majendie and Williams.

process is by endosmose, we lose the danger of the local error in the secreting cells of the placenta, and look for errors in the liver or other assimilative organs, which, however, in a healthy state seem to have the power of correcting the vitiated condition of the fluids conveyed to them. There seems to be little to oppose to the doctrine that the placenta acts the part of lungs to the foetus, that the umbilical arteries send their contents into the placental capillary circulation for the purpose of getting it re-oxygenated. The structure of the lobes of the placenta, as well as the numerous observations alluded to in the foregoing pages, leave no room to doubt the correctness of such a view.

Among the minor points on the subject of foetal nutrition and development, there are many which require to be cleared up. It would be satisfactory to know the exact composition of the liquor amnii at different periods of pregnancy. A friend of mine, a teacher of chemistry, informs me that in some obtained at the seventh month, he has found urea; and Drs. Rees and Davy believe it may generally be found. In the absence, however, of much corroborative evidence, we must consider the question as yet undecided.

Dr. Davy's opinions with regard to the meconium are far from being universally adopted. At present we cannot with certainty say how much the liver,

the liquor amnii, or the mucous secretions of the stomach and alimentary canal, have to do with its production. It may be noticed, however, that as the bile becomes more perfectly formed, so the meconium acquires a darker colour. The mucous or viscous secretions found in the stomach, and also substances, flocculi, &c., supposed to be ingested with the liquor amnii, are considered to undergo a digestive process; but there is here a large field for the experimental chemist and physiologist. It must be left to them to prove what we can now only conjecture.

So long as obscurities surround the subject of foetal nutrition and development, we can hardly hope properly to understand foetal diseases: correct pathology must be preceded by correct physiology. It is true we are able to arrive at pretty correct general views on each; but if we wish to follow the complex operations of the foetal economy very narrowly, there is yet a great deal to be done. We know that the foetus is supplied with nourishment from the maternal fluids, and that, through the same channel, it may become diseased, or receive a check to its healthy development. If, however, we desire to interrogate nature as to all the agencies by which these are effected, we must be prepared to enter an unexplored region full of interest and difficulties.

One of the great difficulties met with in studying

the most important disease of foetal life—syphilis—is its protean character, and the unsatisfactory state of the question as to infection by secondary and tertiary syphilis. Ricord believes primary syphilis alone capable of producing constitutional syphilis; and this position he has long defended in opposition to Velpeau, and nearly all the members of the Academy of Medicine.* Depaul, while he gives his assent to Ricord's views, qualifies it by saying, that syphilitic manifestations, other conditions being the same, do not wear the same characters in the foetus as in the adult. From what, then, has been said of syphilis, the following questions will naturally arise:—If the ovum has the power of developing syphilis, which has been long lying latent in the parent's constitution, ought not the symptoms which spring from it to be considered secondary or tertiary syphilis? Does not secondary syphilis, in this instance, produce constitutional syphilis in another subject? or is it more correct to give it the name of degenerated syphilis appearing in the form of some other disease? It does not seem very likely that, as Depaul supposes, the

* We have seen in another place Ricord's admission that syphilitic cachexia may be transmitted to the offspring in a modified form of constitutional syphilis, but neither in his old Work nor in his Letters, is he very explicit on the hereditary properties of syphilis; although in his twenty-eighth letter he says, "*Pas de vérole constitutionnelle sans chancre, ou sans père ou mère vérolé.*"

ovarian vesicle has retained the primary syphilitic taint, when other parts of the maternal system have passed into the secondary form. On the whole, it appears more rational, instead of confining syphilitic manifestations in the foetus to one form, either primary,* secondary, or tertiary, to admit all three. Types of the whole may be found in the various ulcers, condylomata, deep-seated alterations and skin diseases presented by the syphilitic foetus.

With regard to the views of Dubois and Depaul respecting pemphigus and abscesses in the lungs and thymus gland, we should do well to suspend our judgment, and at the same time, take every opportunity of making examinations for ourselves. It would be of great importance to establish the genuineness of those morbid conditions as indications of syphilis, and this end will be obtained the sooner the more there are engaged in the inquiry. There seems to be ample evidence to prove that the mother's constitution may become tainted with syphilis through a syphilitic ovum. If this be admitted, we have no difficulty in subscribing to the commonly received opinion, that a woman contracting syphilis *during pregnancy* is capable of transmitting the disease to the child ; because, *à priori*, we should expect that the power of

* This is included on the supposition that Cazenave and Depaul are correct in believing that syphilis may, in some constitutions, retain its primary form for a considerable time after its admission into the system.

transmitting disease would preponderate on the mother's side. This rather militates against the views of Mauriceau, who believed that, to find syphilis in the foetus it was necessary the disease should have existed in the parents before fecundation took place. The cases, however, which he has related, apparently supporting this opinion, may be made to receive a very different explanation. We find that women contracting syphilis after conception took place, submitted to an anti-syphilitic course of treatment, were cured, and gave birth to healthy children. We do not know what the results would have been had no such treatment been employed. When we know that a child at the breast may be mercurialized, or experience the beneficial effects of iodine and other medicines, through the mother's milk, we can readily suppose that the foetus in utero may be affected through a somewhat similar medium—that is, through the maternal fluids. Therefore, it will not be altogether hypothetical to say, that healthy children, born of parents who have had syphilis, and who have been placed under the influence of mercury during pregnancy, have probably undergone an antisyphilitic course of treatment in utero. With these considerations, whether we suspect primary, secondary, or tertiary syphilis, our treatment will be much the same. Mercury and iodine are our chief means, and, as has been well enforced by most authors, we should lose no

time, for by administering remedies to the mother we may often preserve the health or even save the life of the child. With women who have had repeated abortions, and who are at a loss to account for such accidents, we should look for the indications of syphilis in the foetus. If we get tolerably satisfactory evidence of its existence, there seems to be no doubt as to the propriety of placing the parents under mercurial treatment. With a little tact this may be done without creating any suspicion in the minds of the patients or their friends as to its real object.

It would be a great step in the pathology of foetal diseases to be able always to distinguish between the morbid alterations of syphilis and those having their origin in scrofula. The latter may give rise to glandular swellings, morbid deposits, and general disease of the foetal system, simulating in many respects the effects of syphilis, and which are traced to their real origin more by the parents' histories, and other circumstances, than by any characters peculiar to themselves. In the two diseases the indications of treatment are very different. The development of scrofula often arises from bad air and bad living, therefore depressants, mercury, &c., required for the treatment of syphilis, would only make matters worse in scrofula; showing that the necessity is strongly forced upon us to consider well the circumstances connected with individual cases. It is very easy to see that a

foetus, procreated by scrofulous parents, would be in less danger of morbid deposits in the lungs, and general debility and disease of the whole frame, the more the mother during pregnancy sustains her vital powers by fresh air and good living, and avoids all situations and everything else favourable to the development of scrofula.

The apparent anomalies of healthy women giving birth to dead or sickly children, and healthy children born of unhealthy parents, would seem at first sight to present a wider field for abstract speculations than for any sound deductions; we can, however, in the absence of well-defined data on the subject, submit it to a process of reasoning. In the cases related by Mauriceau, where, notwithstanding severe and long-continued illnesses experienced by women during pregnancy, healthy children were born at the full period, we must either suppose that the children became ill and recovered, with their mothers, or that their organization was sufficiently matured, and their vital powers sufficiently strong and active, to enable them to resist the morbid influences conveyed to them through the maternal fluids.* Whether those fluids in any case are capable of conveying into the foetal circulation the par-

* In the Med. and Surg. Journal, Vol. XLIII., Dr. Simpson has shown that morbid agencies act equally on the male and female in utero. He attributes the greater mortality in males, to their larger size making parturition more difficult and dangerous.

ticular poisons of certain diseases, or whether they are arrested at the placenta or neutralized by the hepatic actions, or some other preservative power in the foetal economy, is, perhaps, debatable ground, but the latter theory is the most commonly received; and, according to it, when we have found an apparently direct communication of disease, the occurrence is explained by supposing that the powers of the foetus were too low to resist the attack, and thus the results of observations are capable of being reduced, though with some lack of precision, to certain explanations.

The theories of the ancients, and even moderns—particularly Sir Everard Home—respecting the connexion of the brain of the mother with that of the foetus by means of placental nerves, and the absurd but sometimes ingenious arguments deduced therefrom regarding the identity of the foetal system with the maternal, and that even the mental manifestations of the foetus were the same as those of the mother, being quite exploded, we must seek in the foetal economy itself for an explanation of many difficulties. With reference to the foregoing opinions it seems difficult to understand why observers have not made the theories of the utero-foetal, vascular, and nervous communications go together; if one be true, so must the other, for as the blood-vessels require nervous supplies to enable them to perform their functions, so the nerves are

nowhere found without vascular supplies for their nutrition, and for the preservation of their force and energy.

As yet we have nothing very satisfactory in the diagnosis of foetal diseases, the existence of disease in the parents, violent strugglings in the womb, certain sympathetic phenomena experienced by the mother, and the use of the stethoscope may lead us to the inference that the health of the foetus is in danger, and in the present state of our knowledge we cannot get much beyond this general conclusion. In some cases we should expect the foetus to be affected, either by transmission or contagion, with the same disease that the parents happen to be suffering from, as, for example, in syphilis and small-pox; but in others, our diagnosis must be to a great extent conjectural.

As our diagnosis is principally derived through the mother, so the treatment must pass through the same channel, and we are now possessed of sufficient evidence to prove that specific and general treatment are capable of reaching the foetus through the mother's system. For the preservation of foetal life and health, however, a great deal more will be done by preventive than curative measures, by attending to the health of the parents, and by removing from the mother, during the period of gestation, all those causes from without and from within which disturb the uterine functions.

In concluding this essay, I hope, in some measure, to disarm criticism, by repeating that my principal aim in publishing it is, to assist in bringing before the notice of the profession a subject hitherto neglected. The principal credit I can take to myself is in having collected a large number of facts, and I must leave it to others to draw from them more valuable deductions, and more correct conclusions, than I have been able to arrive at. Many circumstances have interfered with my making more observations, and prevented me from carrying out my original plans. Should, however, the little I have attempted meet with a favourable reception, I shall be encouraged to continue my inquiries, and lend my humble aid towards making the Diseases of the Fœtus in Utero an attractive and profitable study.

THE END.

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