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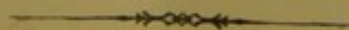
# TERATOGENESIS :

AN INQUIRY INTO THE CAUSES OF MONSTROSITIES.

History of the Theories of the Past.

BY

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## PREFATORY NOTE.

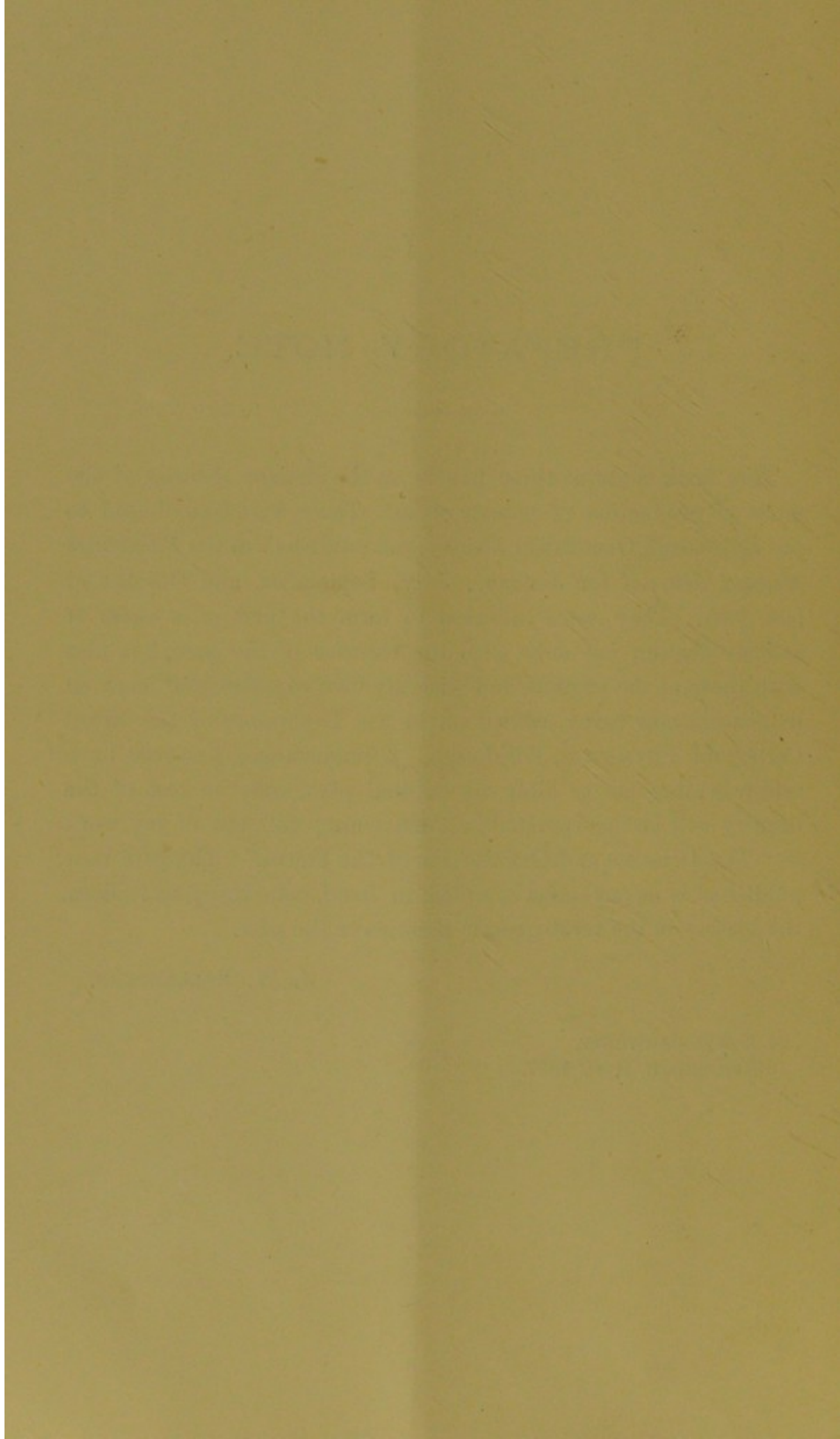
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THIS book contains three papers on the ancient theories of the mode of production of monstrosities. These were contributed to the Edinburgh Obstetrical Society, and published in the *Edinburgh Medical Journal* for January, July, September, and October of last year. They were intended to form the first of a series of articles dealing not only with the theories of the past, but also with those of the present, and with my own experimental work on incubation now being carried on in the Laboratory of the Royal College of Physicians, Edinburgh. Circumstances, however, have arisen leading me to alter my original plan, and the rest of the inquiry will be incorporated in forthcoming volumes of my work on "The Diseases and Deformities of the Fœtus." The part now published is nevertheless complete in itself, containing, as it does, the history of the teratogenetic theories of the past.

J. W. BALLANTYNE.

24 MELVILLE STREET,  
EDINBURGH, *April* 1897.





# TERATOGENESIS:

## AN INQUIRY INTO THE CAUSES OF MONSTROSITIES.

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### CHAPTER I.

INTRODUCTION; CAUSES OF MONSTROSITIES; THEORIES OF THE PAST; THE SUPERNATURAL.

FROM the earliest times attempts have been made to explain the occurrence of teratological phenomena. Many have been the theories advanced, and great has been the difference of opinion they have evoked; but it may be truly said that till within the last half-century little real progress had been made in this field of study. During the last few years, however, an immense amount of light has been thrown upon this obscure subject, and science now possesses a vastly wider and more accurate knowledge of the causes which lead to the production of monstrosities and of the manner in which they act. Since much of the work that has been instrumental in bringing about this improved condition of matters has been little, if at all, referred to in current medical literature; since, also, the practical bearings of several of the discoveries that have been made are very evident and of great importance, it has seemed to me desirable and opportune to pass in review the teratogenic theories that have been from time to time advanced, and to indicate the lines along which recent research has been working and the results which have been thus obtained.

Some of the views held by the ancients regarding the cause of monstrous births have long since been abandoned, and are now to be met with only amongst savage races; others are still accepted by the popular mind, but rejected by the scientific; and yet others have found a certain degree of justification in the results of the clinical and pathological investigations of the present age. But in addition to the ideas handed down to us as a heritage from past times there are those which have been brought into being or confirmed in existence by that powerful agent of modern scientific research, experiment. The artificial production of monstrosities or experimental teratogeny has done more than any other method



of investigation to explain in a rational way the causes of teratological formations and the manner in which they act, whilst it has also clearly demonstrated that teratology is not an isolated subject of little interest save to the curious, but an integral and important part of pathology, with practical bearings upon many of the problems of medicine and surgery.

In the following pages the attempt will be made to trace the history of the various teratogenic theories which have been handed down to us from early ages, or have sprung up within more recent times. The light which experimental teratogeny has thrown upon these theories will be also referred to, and thereafter the way in which teratogenic causes act will be discussed. I hope thus to be able to show how order has in a large degree been evolved from chaos, and an apparently unprofitable subject converted into a certainly fertile field of research.

It may be well here to indicate the scope of the inquiry and the order in which the various points will be considered. This is done in the following table:—

#### I.—CAUSES OF MONSTROSITIES.

##### A. Theories of the Past.

1. Supernatural Causes.
2. Physical Causes.
3. Mental Influence.

##### B. Theories of the Present.

1. Mechanical Causes.
2. Diseases of—(a.) Foetus; (b.) Foetal Annexa.
3. Embryological and Germinal States.
  - (a.) Heredity and Atavism.
  - (b.) Environment.
  - (c.) Germ Infection.

#### II.—MODE OF ACTION OF THE CAUSES.

1. The light which experimental teratogeny throws upon the mode of action of the causes of monstrosities.
2. Teratogenic processes.

#### I.—CAUSES OF MONSTROSITIES.

##### A. THEORIES OF THE PAST.

##### 1. *The Supernatural.*

In the early ages of the world's history it was customary to ascribe all unusual phenomena of Nature—earthquakes, comets, eclipses, and the like—to supernatural causes. Abundant evidence of this is to be found in the literature and legends of the past, and in the customs and beliefs of savage or primitive peoples existing at the present time. Amongst the unusual phenomena of Nature



malformations and monstrosities of the human foetus or of the young of the lower animals could scarcely fail to find a place, and so it happens that in the earliest records of teratology are to be found hints, and even proofs, that such occurrences were regarded as due to supernatural agencies. In different parts of the world, and in the same part but at different times, opinions differed as to the nature of the supernatural teratogenic cause and the meaning of the teratological phenomenon. Some peoples ascribed monstrous births to the gods they worshipped; other races, who had divided their pantheon into good and evil deities, put the blame sometimes upon the former and sometimes upon the latter; whilst yet others connected teratological states with the position and mode of combination of the stars and other heavenly bodies. Polytheism was succeeded, in certain countries, by monotheism, yet the same ideas lived on, naturally altered in some degree to suit the newer conceptions of the supernatural. To the God of the Jew and the Christian, to the Satan of the Old Testament and the evil spirits of the New, and to the stars in the midnight sky, men still looked as the causes, directly or indirectly, of the deformities with which an infant might come into the world.

The meaning, also, of the teratological phenomenon was variously conceived. The gods were amusing themselves, said some; they were exhibiting the extent of their creative powers, said others; they were angry with men, they were warning mankind, or they were chastising individuals or countries, were the views of yet others. From such beliefs the idea soon gained ground that monstrosities were portents of events in the future, that they foretold good sometimes, but more commonly evil fortune. The Chaldeans read in the starry heavens the secrets of the future, and rapidly learned to transfer to the monstrous infant born under this or that astral combination the meaning of the stellar message; and so in ancient Babylonia the birth of a babe of doubtful sex meant an approaching calamity to the land, whilst the appearance of one with an imperforate anus proclaimed a famine. Similar astrological beliefs were in vogue in Europe in the Middle Ages; but they did not reign alone, for a transference of teratogenic powers had taken place from the deity to the devil, and to the malign influence of the tempter and his emissaries—the mediæval succubi and incubi—were ascribed monstrous and malformed births. Happy was the mother of a deformed infant when she was able to show a preponderating amount of evidence in favour of the stellar origin of her abnormal progeny; otherwise a death at the stake awaited her and her “devil’s brat.”

Such were the various aspects in which the supernatural was invoked to explain the origin of malformed foetuses, and it is necessary now to give some illustrations of the different phases of this ancient belief. These illustrative instances may be considered in three groups,—*first*, those which exemplify a belief in the deity



as a teratogenic cause; *second*, those which ascribe this power to the evil one; and *third*, those in which astrology is regarded as the potent factor.

(1.) Abundant instances are forthcoming to show a widespread belief in the Divine power as the cause of monstrosities, and the following examples are cited to illustrate the various explanations given of the meaning of the exercise of this power.

It is possible that in the earliest ages of the world's history monstrous infants were regarded as divine, and worshipped. They might be the gods themselves or their progeny, or they might simply be simulacra of the deity. On this hypothesis it is easy to account for the teratological appearance of nearly all the heathen gods and goddesses. Of course, many of them are unlike the cases of monstrosity met with at the present time, but then it must be remembered that facts handed down by oral tradition from distant times, and through the agency of men unacquainted with anatomical details, must inevitably become distorted. Doubtless the artificer of the idol was seldom, if ever, an eye-witness of the appearances of the deformed infant, and was consequently compelled to draw upon his imagination in order to eke out the scanty data handed down to him to work with. At the same time, in the two-headed, many-breasted gods of the East, in the achondroplasiac god Pthah of the Egyptians, in the cyclops of the Greeks and in the fauns and satyrs of the Romans, are to be recognised monstrosities and malformations which are well known at the present day. Indeed, the one-eyed foetus has been named cyclopic from its resemblance to the cyclopes of ancient times; and it is far from improbable that Polyphemus in his turn took his origin in the one-eyed foetus of still earlier times. It is, therefore, a startling but not an unlikely conclusion to come to, that teratological specimens served to supply the races of mankind with many of the deities which they ignorantly worshipped.

To take up another line of thought, the gods were the creators of monstrous infants, and their purpose was amusement. Ζεὺς παίζει, Jupiter is playing, said Heraclitus; and Pliny (*Nat. Hist.*, lib. vii. c. 2) only slightly altered the idea when he wrote that Nature creates monsters for the purpose of astonishing us and amusing herself (*Ludibria sibi, miracula nobis ingeniosa fecit natura*).<sup>1</sup> Traces of this old belief are to be found at the present day in our use of the word "*Sport*" in Botany, and in the German "*Spielart*" and "*Naturspiel*," the French "*jeu de la nature*," and the Latin "*lusus naturæ*," as synonyms of monstrosity. A somewhat similar idea is conveyed by the expression "*freak of nature*."

<sup>1</sup> Holland (P.) in his *Translation* of Pliny (vol. i. p. 157, London, 1601) thus renders the passage, "See how Nature is disposed for the nones to devise full wittily in this and such like pastimes to play with mankind, thereby not onely to make her selfe merrie, but to set us a wondering at such strange miracles."



Soon, however, the notion of the sportive, pleasure-seeking deities turning out monstrosities very much like children making mud-pies gave place to another and a graver conception. The gods were still the cause, but now their purpose was to warn, admonish, or threaten mankind. The belief in the monitory or minatory meaning of teratological occurrences took a firm hold on the minds of men, and the introduction of Christianity only meant the transference to the one God of the power and purpose that had been previously ascribed to the many deities of the Greek and Roman pantheon. It may be that the word monster itself is derived from *moneo*, I warn; but another origin has been suggested for it, to which reference will again be made. The birth of a deformed foetus, then, was a Divine warning; it meant, further, that a deity must be propitiated, else some calamity would happen. From this belief to the sacrifice of the malformed infant is but a step, and thus doubtless arose one at least of the reasons why such monstrosities were, in Europe at any rate, almost invariably killed in the Early and Middle Ages. The Greeks of Sparta may have thrown their deformed infants into the abyss near Mount Taygetus in order to preserve the physical perfection of the race; but in other countries the killing was sacrificial and propitiatory, and fortunate was the mother if she escaped her infant's fate. Julius Obsequens,<sup>1</sup> for instance, states that, in the year 120 B.C., "in foro Vessano androgynus natus in mare delatus est;" and again, in 92 B.C., "Androgynus Urbino natus, in mare deportatus." Lucan,<sup>2</sup> also, in his *Pharsalia* relates how Arnus, the chief of the Etruscan diviners, ordered the slaughter and burning of all monstrous infants at the time of the overthrow of the Roman Republic.

Gradually it would appear that the idea of the deity as the cause of the monstrosity became lost in the consideration of the calamity which the malformed foetus was supposed to predict, portend, or presage. The supposed cause of the phenomenon was lost sight of in the supposed effect. In this way it is believed that the word *monstrum* originated, viz., from *monstro*, I declare or show; and as Cicero<sup>3</sup> puts it, "Monstra, Ostenta, Portenta, Prodigia appellantur, quoniam monstrant, ostendunt, portendunt, prædicant."

Innumerable instances might be given of the pretended connexion between monstrous births and national or personal calamities and misfortunes; the works of Lycosthenes and Obsequens are full of them, and long lists of them were found in cuneiform characters on the brick tablets of the Royal Library at Nineveh.<sup>4</sup> Sometimes, but rarely, the event predicted was of a fortunate nature, as when Cæsar's horse with feet showing digits was regarded

<sup>1</sup> *Julii Obsequentis Prodigiorum Liber*, pp. 86 and 103, Basileæ, 1552.

<sup>2</sup> Lucan, *Pharsalia*, lib. i. verse 589.

<sup>3</sup> Cicero, *De Divinatione*, lib. i. par. 42.

<sup>4</sup> Ballantyne, J. W., "Teratological Records of Chaldea," *Teratologia*, i. p. 127.



as an indication that the world would one day belong to the emperor (*Suetonius*). Notwithstanding active opposition on the part of such writers as Licetus and Polydore Vergil, the idea that monstrous births predict disaster held its ground in Europe till the close of the seventeenth century.

There is a small amount of evidence to show that a malformed infant was sometimes regarded as a punishment of sins committed. In early French history we read that Robert II. (the Pious), who succeeded Hugues Capet, married near the close of the tenth century his cousin (in the fourth degree) Bertha, daughter of Conrad, King of Arles, and widow of Eudes I., Count of Blois. For this reason the royal pair were excommunicated by the Pope of Rome. The Queen gave birth to an infant having the head and neck of a goose ("une tête et un col d'oie"). Sismondi suggests that the monstrous infant was caused by the fright received by the Queen during her pregnancy from the Papal excommunication; but Ségur,<sup>1</sup> in his *Histoire de France*, states that the birth of the monstrosity was a punishment from God ("un punition de Dieu"). Ségur, however, describes the deformity of the child as a condition resembling the feet and not the head of a goose; possibly, therefore, it was a case of webbing of the digits. This display of the vicarious teratogenetic powers of the Pope seems to have brought Robert the Pious to his knees; at any rate, Bertha was repudiated in 1006, and the King married the haughty Constance, daughter of the Count of Toulouse. Possibly the disciples of our Lord had some thought of the punitive nature of congenital malformations when they put the question concerning the man born blind,—“Master, who did sin, this man, or his parents, that he was born blind?” Christ’s reply, whilst in no way supporting the punitive theory of origin of the congenital blindness, probably gave rise to the notion that monstrous births were for the purpose of revealing the glory of God. Paré,<sup>2</sup> in his treatise on monsters, enumerates thirteen causes of such productions, of which the first is to proclaim the glory of God.

Curiously enough, the belief in the Divine origin of terata appeared again near the close of the seventeenth century as one of the consequences of the doctrine of the pre-existence of germs advanced by Swammerdam and Malpighi.<sup>3</sup> If normal germs pre-exist, why not also monstrous germs? This, however, Swammerdam and Malebranche would not admit, for they recognised that to do so would be to confess that monstrous infants were the immediate work of the Creator. Régis, in his *Système de philo-*

<sup>1</sup> Quoted by E. Martin, *Histoire des Monstres*, p. 78, 1880.

<sup>2</sup> Paré (A.), *Works*, translated by T. Johnson, lib. xxv., c. 1, p. 585, London, 1678,—“There are reckoned up many causes of Monsters, the first whereof is the glory of God, that His immense power may be manifest to those which are ignorant of it, by the sending of those things which happen contrary to Nature.”

<sup>3</sup> Vide Dareste (C.), *Production des Monstruosités*, 2nd edit., p. 13, 1891.



*sophie* (III., lib. viii., pt. 1, c. ix.), accepted this consequence, and explained that, whilst normal beings showed forth the infinite wisdom of the Creator, monstrosities demonstrated His infinite power. The question thus raised of the original character of malformations gave rise to heated discussions in the French Académie des Sciences, carried on by Lémery, Duverney, and Winslow, between the years 1706 and 1743; and Haller,<sup>1</sup> in his treatise, *De Monstris*, published as late as 1768, seems largely to have regarded monstrosities as the result of germs originally monstrous. The study of embryology, however, soon put an end to such imaginings.

(2.) It was inevitable that a belief in the teratogenic power of the deity should be followed sooner or later by the idea that this power was specially the possession of an *evil* or *malignant* spirit. According to certain of the older commentators, the events described in the first four verses of Genesis vi. refer to the cohabitation of apostate angels with the daughters of men, the consequence of which was the birth of giants ("monsters, prodigies," *Tuch, Knobel*); but this interpretation of the passage is not the one now generally accepted.

In northern Europe in early times the treatment of monstrous infants suggested a certain degree of belief in their diabolical origin. Du Chaillu, in his interesting work on the Vikings (*The Viking Age*, ii. p. 40), gives the following extract from an ancient legal enactment of the Norsemen:—"Every child which is born into this world shall be reared, baptized, and carried to the church; except that only which is born so deformed that the mother cannot give strength to it. . . . It shall be carried to a beach and buried where neither men nor cattle go; that is, the beach of the evil one."

From the early part of the Christian era up to the end of the seventeenth century the nations of Western Europe had opinions upon teratological subjects which reflected the beliefs and teaching of the early Fathers. To these men possession by devils was a real thing, and carnal connexion with demons was but an amplification of this belief. Deformed foetuses were looked upon as the progeny of Satan, and to destroy them was to diminish his family. St Jerome and Thomas Aquinas were firm supporters of these doctrines. St Augustine and St Gregory seem to have had more enlightened views, but did not state them very strongly. At a time when "incubi" and "succubi" were given full credence to, it would have been strange indeed if the diabolic origin of monsters had not also been accepted. In the sorcery and witchcraft trials of the Middle Ages in France, Germany, and Britain are many signs of such beliefs. "Coitus cum diabolo" was a matter always inquired into, and in many cases torture wrung from the unfortunate accused confessions of the most revolting and terrible

<sup>1</sup> Haller (A.), *Opera minora*, III. p. 133, 1768.



nature, as any one who chooses may read in Pitcairn's *Criminal Trials*. The Papal Bull of Innocent VIII. (A.D. 1484), which gave the full sanction of the Church to the persecution of sorcerers and witches, embodied the belief in Satanic dealings. It would be of no profit to go more fully into the history of this darkest fancy of these truly Dark Ages; but it may be mentioned that even Luther, writing in the next century after Pope Innocent's Bull, stated his belief in the possibility of little devils resulting from "coitus cum diabolo." A short reference may also be made, in passing, to the case reported by Hauppius (*Biblioth. port. pract.*, p. 454), and cited by E. Martin in his *Histoire des Monstres* (p. 50, Paris, 1880). It was that of a woman living in a town ruled over by Ladislaus of Berstem, who gave birth to a headless (anencephalic) foetus with deformed limbs. The infant was buried without baptism; but when the mother came to hear of it she asked that it should be burned, giving as her reason the fact that she had received a visit from a hopgoblin incubus ("un lutin incube"). Ladislaus, hearing of the circumstances, ordered the exhumation of the foetus; it was carried outside the town to be burned; but the flames would not attack it, says the old record, and it was only after it had been chopped up into small pieces by the hangman that it could be destroyed. A somewhat similar incident is related by Hector Boethius as happening in the county of Aberdeen in Scotland.

Paré, in his treatise *Des Monstres* (1573), admitted the active intervention of demons as a teratological factor, and as recently as 1893 a notice appeared in an Australian newspaper concerning the birth of a hirsute and otherwise deformed infant, supposed to be the result of incautious remarks about the evil one made by the mother in her pregnancy.<sup>1</sup> Mediæval beliefs have had a very firm hold on the popular mind, and the curious one in question has formed no exception to the rule. To enter into the subject of the supposed *modus operandi* of the Satanic or diabolic influence would be unprofitable.

(3.) The position, movements, and combinations of the heavenly bodies have entered largely into the formation of the opinions and beliefs of ancient races concerning the origin of terrestrial phenomena. The Chaldeans were, as is well known, past masters in the art of divination from all kinds of phenomena, stellar or terrestrial. That they connected together teratological and astrological occurrences is also beyond doubt. Lenormant,<sup>2</sup> in his work on Chaldean divination, explains in a very reasonable way how this belief grew. The passage may be rendered as follows:—"The development that their astrology had given to 'généthliaque,' or the art of horoscopes of births, had led them early to

<sup>1</sup> *Vide Teratologia*, i. p. 59, 1894.

<sup>2</sup> Lenormant (F.), *La Divination et la science des présages chez les Chaldéens*, p. 103, Paris, 1875.



attribute great importance to all the teratological facts which were there produced. They claimed that an experience of 470,000 years of observations, all concordant, fully justified their system, and that in nothing was the influence of the stars marked in a more indubitable manner than in the fatal law which determined the destiny of each individual, according to the state of the sky at the moment when he came into the world. Cicero, by the very terms which he uses to refute the Chaldeans, shows that the result of these ideas was to consider all infirmities and monstrosities that new-born infants exhibited as the inevitable and irremediable consequence of the action of these astral positions. This being granted, the observation of similar monstrosities gave, as it were, a reflection of the state of the sky, on which depended all terrestrial things; consequently one might read in them the future with as much certainty as in the stars themselves."

Astrology and the casting of horoscopes survived by many centuries the fall of the Babylonian empire; indeed, the notion of stellar influence upon the foetus lives still in the expression "born under a lucky star," and Zadkiel's Almanac is a solid fact. Ptolemæus Claudius,<sup>1</sup> an Alexandrian astrologer of the second century, not only stated the astral conditions under which terata were born, but also mentioned the nature of the malformation to be expected. The position of Venus or of the moon at the moment of conception had, according to the astrological doctrine, a potent effect in determining whether the infant was to be normal or deformed. It was also alleged that monstrous creations were more common in tropical lands on account of the position of Venus in respect to the zodiac.

It may be well here to refer to a tale which illustrates the opinions in vogue in the early part of the thirteenth century with regard to animal teratology and astral conditions. About the year 1200 a cow gave birth to a calf said to be half human (possibly an example of foetal hydrocephalis in the calf). The shepherd was in consequence accused of an unnatural crime, and was condemned to be burned alive. Albertus Magnus,<sup>2</sup> however, saved the man's life by giving it as his opinion that the teratological phenomenon was due to a certain constellation.<sup>3</sup> In this writer's work, *De animalibus*, it is stated that a monstrosity may be due either to a fault in the material or to celestial influence; when certain heavenly bodies are found in certain places in the sky a

<sup>1</sup> *Tetrabiblon*, lib. iii., c. viii. (*De monstris*). Vide Taruffi, *Storia della Teratologia*, iv. p. 18, 1886.

<sup>2</sup> Albert the Great was a most voluminous writer upon a vast number of different subjects, including theology, medicine, astronomy, metaphysics, etc. He was born in 1193 or 1205.

<sup>3</sup> Albertus Magnus, *De somno et vigilia*. Opera omnia, v. p. 64, Lugduni, 1651. Albertus Magnus, *De animalibus*, lib. xviii., cap. vi., tract 1, Venetiis, 1495.



man cannot be generated, and so a child is born with the head of a bull or a lamb. It is evident, therefore, that Albert applied the same ideas to human as to comparative teratology. Thomas Aquinas, a disciple of Albertus, accepted these theories, and even expounded them to some extent. Cardanus,<sup>1</sup> a prolific writer of the sixteenth century (b. 1501, d. 1576) notable for the extraordinary mixture of sagacity and foolishness in his works, moulded his beliefs upon those of Ptolemæus Claudius already referred to; he even supplied his readers with the representation of the constellation under which a double monster was born. Septalius<sup>2</sup> looked to the stars for the explanation of moles and nævi seen on the fœtus; and even T. Bartholin<sup>3</sup> believed in the potency of stellar influences on the unborn infant.

In a work entitled *Grande Encyclopédie universelle*, by Henricus Asteldius, and published about the beginning of the seventeenth century, it is stated that a Danish astronomer, who was also a medical man, had discovered the origin of monstrosities. He ascribed them to comets, and regarded them as tumours scattered throughout the firmament, which when they were precipitated upon the earth, took on there all kinds of unusual and extraordinary forms (E. Martin).

In the work by Aldrovandus (*De monstrorum historia*, p. 391, Bononiæ, 1642), edited by Ambrosinus, credence is given to the foregoing beliefs; at any rate, the views are stated and their adherents named. Ambrose Paré,<sup>4</sup> however, is openly sceptical, and says: "Yet astrologers (lest there should seem to be any thing which they are ignorant of) refer the causes of these (*i.e.* monsters) to certain constellations and aspects of the planets and stars." Licetus<sup>5</sup> altogether omitted the stars from his list of teratological causes, and so the theory died out, at any rate among scientists. A trace of the old belief in what may be called the teratogenic power of the heavenly bodies is preserved in the word "moon-calf," which Webster (*Dictionary of the English Language*) defines as (1) a monster, false conception; (2) a mole, or mass of fleshy matter generated in the uterus; (3) a dolt, a stupid fellow. Ogilvie (*Imperial Dictionary*, iii., N. Ed., 1882) gives to the word the same three meanings, and adds that it is comparable to the German "mond-kalb," a person or conception influenced by the moon. In a discussion in *Notes and Queries* (Eighth Series, iv. pp. 288, 432, and 475, 1893) upon the meaning of moon-blasting in connexion with the "churching of women" in the Episcopal

<sup>1</sup> Cardanus (J.), *Commentarium in Ptolemæum de astrorum indiciis*, lib. iii., cap. viii., *Opera omnia*, v., Lyon, 1663.

<sup>2</sup> Septalius (L.), *Libr. de nævis*. Mediolani, 1606.

<sup>3</sup> Bartholin (T.), *De cometâ consilium medicum, monstrorum nuper in Danianatorum historia*. Copenhagen, 1665.

<sup>4</sup> Paré (A.), the Works of that famous Chirurgeon, Ambrose Parey. Trans. by Th. Johnson, p. 601, London, 1678.

<sup>5</sup> Licetus (F.), *De Monstris*, lib. i., cap. 6, Patavii, 1668.



service, it is stated by E. S. A. that "moon-blasting," as applied to women with child, had to do with the belief that the beams of the moon might cause an abortion known as a moon-calf. Most writers trace this belief back to Pliny; but this author uses only the word "mole." It is to one of his translators (Holland) that we owe the introduction of the term "moon-calfe" into the *Natural History*. Caliban, in Shakespeare's *Tempest*, is frequently referred to as a "moon-calf" or "monster." The names water-calves and moon-calves<sup>1</sup> (Wasser-kälber and Mondskälber) have been given to cases of foetal dropsy in the lower animals, as L. Franck<sup>2</sup> tells us in his paper on a calf with general anasarca. It is probable, however, that "calf" in "moon-calf" does not mean the young of the cow, but a thick fleshy substance like the calf of the leg. Whatever may be the origin of the word, it certainly suggests a belief in lunar influence upon the foetus.

Such were the theories of the supernatural which our ancestors used to explain the occurrence of teratological phenomena, and whilst their very enumeration brings a smile to the face of the modern scientist, their existence was a very real thing to the people of the Middle Ages,—so real that death itself, and that of the cruellest kind, might be the fate of the unfortunate mother of a deformed infant. It must not be forgotten, also, that even at the present day traces of these early superstitions are to be found not only amongst savage races, but also in our own land and in the popular mind.

<sup>1</sup> Ballantyne (J. W.), *Diseases of the Fœtus*, i. p. 220, 1892.

<sup>2</sup> Franck (L.), "Zur Kenntniss der sogenannten Wasserkälber," *Deutsche Zeitschrift für Thiermedizin*, v. p. 82, 1879.



## CHAPTER II.

CAUSES OF MONSTROSITIES; THEORIES OF THE PAST (*continued*): PHYSICAL CAUSES.

It must not be supposed that the only teratogenic theories in vogue in past times were those which recognised supernatural agencies. As a matter of fact the early Greek philosophers looked for purely *physical* causes of monstrosities, and these they found in disturbances of the natural phenomena of reproduction. At the same time it must be borne in mind that the notions regarding generation which prevailed in the early Greek age, although vastly more correct than many of the fancies of the Middle Ages, were yet in certain points defective and even erroneous. Consequently the teratogenic theories founded upon them were not free from mistakes. Such as they were, however, they held their ground for something like two thousand years, and even now their influence is to be felt in many of the doctrines of the day.

In order to understand these theories it is necessary to remember the views concerning reproduction which were held by the early Greek writers; these may be indicated in a few words. Since the invention of the microscope was still in the distant future, nothing was known of the existence of human ova and spermatozoa. The evident facts of the generative process were the seminal discharge in the male and the menses in the female. Some writers regarded the semen as the sole, or at least the principal, factor in reproduction; according to them the woman was nothing save a temporary abode for the foetus. Others were of opinion that the menses supplied the material for generation, and that the male semen was of comparatively little importance. Others, again, saw that both semen and menses were essential factors; and in words which have been ascribed to Aristotle, "The blood of the menses is the marble, the semen is the sculptor, and the foetus is the statue." Somewhat similar views prevailed amongst the Romans. Pliny, for instance, in speaking of the menses says—I use the words of Holland's translation:—"In very deed it" (*i.e.*, the menses) "is the material substance of generation: and the man's seed serveth instead of a runnet to gather it round into a curd; which afterwards in processe of time quickeneth and groweth to the forme of a bodie."

The menstrual blood seems sometimes to have been called the female semen, and the sex of the foetus was supposed to be due to



the greater strength of one of the two seeds. Another notion was that boys were generated in the right testicle and girls in the left; and yet another was that when the semen was deposited in the left side of the uterus a female embryo resulted, when in the right side a male.

Mention, also, must here be made of another belief concerning generation which had its origin far back in the history of the world, and in illustration of which many examples may be found in Greek and Roman mythology. I refer to the supposed fertility of animals of different kinds with one another, and even with man. Aristotle, even, believed in this view to a certain but small extent, and later authors accepted the theory in its widest sense, and with its most ludicrous developments.

The theories of the Greeks passed in process of time to the Romans. During the Dark Ages in Europe they were cherished by the physicians of Arabia, and so in process of time they came to be the views of the nations of Western Europe, when the revival of learning put an end to the epoch of intellectual barrenness. In many ways, however, the original lucidity of the classic theories was obscured during the long period which elapsed between the times of Hippocrates and Aristotle, and those of Paré and Licetus; and metaphysical notions abounded in the writings of the Middle Ages, greatly to the detriment of the purely physical notions of the Greeks.

The teratogenic theories of the past which looked for physical causes of monstrosities were based upon the study of the phenomena of generation as these were then understood; they were, in fact, deductions from them. Further, the various phases of the ideas concerning reproduction were all reproduced in the theories of the causes of teratological productions. Those writers, for instance, who regarded the male semen as the sole, or at any rate as the chief factor in generation, ascribed teratogenic properties to alterations in its quantity or quality. Others, considering the menstrual discharge as of prime importance in reproduction, looked to it as the cause of monstrous births. These two primary theories did not, however, long exist separate, for it soon came to be recognised that both parents might supply teratogenic factors; thus a sort of coalition hypothesis in which now the seminal and again the menstrual element would predominate came into being and long persisted,—persists in a certain sense still.

Alongside of these theories was constantly to be found that other which regarded teratological productions as the result of intercourse between animals of different kinds and between man and the brutes. This, also, as will be at once seen, was the direct outcome of the old notion of fertility between different genera.

It will be convenient to consider these matters under four headings:—(1), Alterations in the male semen; (2), menstrual



influences; (3), alterations in both the male and female elements; and (4), hybridity.

(1.) The theory that monstrous infants are the result of *unusual conditions of the paternal element in generation—the male semen*—is a very old one; it seems first to have been expressed by Empedocles of Agrigentum, in Sicily, a physicist living between the years 495 and 435 B.C. He has been called the “father of the evolution idea,”<sup>1</sup> and seems to have had some knowledge of embryology and teratology. Empedocles, like Lucretius some four centuries later, recognised what may be called a teratological stage in the world’s history when animals appeared, spontaneously generated, as incomplete individuals—“heads without necks, arms without shoulders, eyes without their sockets”—and when through the fortuitous union of these parts with one another all sorts of monstrous forms came into being, soon, however, to become extinct through the absence of reproductive powers. But it is rather with the views that this philosopher advanced to explain the origin of monstrosities after Nature had succeeded in producing normal permanent animal types that we have here to do. As Plutarch<sup>2</sup> relates, Empedocles thought that monsters happened either from abundance or from defect of the semen, from slowness of movement, from division of it into several parts, or from aberration of the movement. Although five states are here enumerated, only three ideas really exist, these being the notions of excess, of defect, and of alteration of the semen. Curiously enough, these are precisely the ideas which underlie recent views, not, indeed, of the causation of teratological products, but of their classification. For the primary division of monstrosities into *monstra per excessum*, *monstra per defectum*, and *monstra per fabricam alienam*, which Förster employed, or into *monstra deficientia*, *monstra abundantia*, and *monstra sensu strictiore deformia*, as Otto recommended, cannot yet be said to have been improved upon. So in a certain sense it may be said that the views advanced so long ago by the Sicilian physicist live still; and there can be no doubt that they were widely accepted by Greek, Roman, and mediæval authors.

The teratogenic theories of Democritus of Abdera, another physicist of the same age as Empedocles, did not take a very firm hold upon the philosophic mind. As we are told by Albertus Magnus,<sup>3</sup> Democritus thought that double monsters were generated when the semen belonging to one or to two species was introduced into the uterus repeatedly at intervals; to begin with, the first semen reached the womb and sufficed to form the new being; soon thereafter the second semen arrived, mixed with the first, and began to

<sup>1</sup> Osborn (H. F.), *From the Greeks to Darwin*, p. 37, New York and London, 1894.

<sup>2</sup> Plutarch, *De placit. philos.*, lib. v., c. 8.

<sup>3</sup> Albertus Magnus, *De animalibus*, lib. xviii., c. 6.



operate in its turn; and so the members came to be duplicated. The abuse of coitus was thus made out to be a teratogenic factor.

Neither Empedocles nor Democritus ascribed to the female any formative power in the matter of generation; Aristotle, on the other hand, did so, and in consequence of this his theory of teratogenesis included faults in the female element in reproduction as well as in the semen. The Aristotelian hypothesis, therefore, was one which recognised a dual cause, and as such it will fall to be discussed immediately; in the meantime it may be said that through its weighty authority the case of the theories which looked for solely a seminal or solely a menstrual teratogenic factor was greatly weakened. Nevertheless Galen, living in the second century of the Christian era, seems to have believed in a purely seminal theory, for he thought that hermaphrodites were due to the entrance into the uterus of spermatic fluid from both the testicles.

The Arabian physicians during the Dark Ages in Europe served to perpetuate the doctrines of the past, and prominently those of Aristotle; but Avicenna, like Galen, sought for an explanation of the origin of hermaphrodites along the lines of the older theories, for he believed that whilst semen deposited in the left side of the uterus resulted in the birth of a girl, and in the right side in that of a boy, the male element when placed in the middle of the cavity gave rise to the procreation of a hermaphrodite.

In Europe in the thirteenth and fourteenth centuries certain contributions were made to the study of the causes of monstrosities; but the question was greatly complicated by the introduction of the terms "*materia*" or "*material*" instead of semen, and by the supposition that this *materia* had a formative virtue or faculty. In this way confusion was the result, for "*materia*" came to be applied to the menses as well as the semen, and the "*formative faculty*" was an idea which encouraged all sorts of profitless theorisings. To some of these hypotheses allusion will be made immediately when the causation of monstrosities through faults in both male and female elements in generation is under consideration. Here it may simply be said that the theory of Empedocles never again came to be accepted fully, although the discovery by Leeuwenhœk (in 1677) of spermatic animalcules in the semen gave a temporary support to the notion that after all the male element might be the chief, if not the sole teratogenic factor. With the discussion of the influence of the spermatozoa in producing monstrosities we have not at present to do; that is a matter to be considered along with the theories of the present, not with those of the past.

(2.) The idea that *the menses* play an important part in the generation of monsters seems largely to have been the result of the Hebrew legislation regarding coitus during or immediately after the flow. In a non-canonical book (Esdras, Book iv., c. 5, verse



8), the following statement occurs:—"Menstruous women shall bring forth monsters" (*mulieres menstruatæ parient monstra*); and in the Talmud the infant conceived during the period of impurity was regarded as certain to be an epileptic, a cretin, a drunkard, or insane. At the same time indications of a similar belief are to be found in the records of classic mythology, for it is said of Vulcan, who was so deformed at his birth that his mother in disgust threw him into the sea, that he was begotten by Jupiter when Juno was menstruating.<sup>1</sup> Witkowski (*Histoire des Accouchements*, p. 335, Paris, 1887), refers also to this belief, which he regards as a very common one, and quotes the following lines in which it is embodied in verse:—

"Femmes qui désirez de la progéniture,  
Durant le cours des mois respectez la nature ;  
Le fils de Jupiter, Vulcain, ainsi conçu,  
Vint au monde impotent, cul-de-jatte et bossu."

Aristotle and his followers did not admit the pre-eminence of the menses in teratogenesis; the menstrual blood or materia was only one factor in normal generation, and therefore also in abnormal generation. Nevertheless there were some who regarded the menstrual blood as of greater importance than the semen in the causation of monstrosities; thus Henricus of Saxony,<sup>2</sup> a pupil of Albertus Magnus, regarded teratological phenomena as due to deficiency or excess of the materia or menses. Paré,<sup>3</sup> also, amongst the numerous causes of monsters places intercourse between parents at such times as they ought to forbear by the command of God and the Church. Licetus, writing in 1616, mentions the menstrual flow at the time of conception as the seventh cause of the origin of shapeless monstrosities, and founds his belief on the passage in Esdras already referred to, and on a quotation from Solinus.

When it is borne in mind that Pliny and many of the writers of the Middle Ages attributed to menstrual blood the most maleficent powers as regards vegetables, metals, glass, trees, and even animals, it is not to be wondered at that numbers of authors found in it at least one of the causes of deformed births. Towards the close of the seventeenth century, however, discoveries were made which revealed the hollowness of such beliefs; and it was from the investigations of Harvey and de Graaf, and from the light which they threw upon the true nature of the female factor in reproduction, that the menstrual theory of teratogenesis received its death-blow. We know now that anomalies in the female factor are frequently causes of monstrosities, but that factor is no longer the menstrual blood but the ovum.

<sup>1</sup> Another explanation of Vulcan's deformity was, of course, the notion that Jupiter was drunk at the time of his conception.

<sup>2</sup> Henricus of Saxony, *De Secretis mulierum*, c. 6, 1478.

<sup>3</sup> Paré (A.), *Works*, translated by Th. Johnson, p. 585, London, 1678.



(3.) The theory which regarded *alterations in both the male and female elements in generation* as the cause of monstrous forms may rightly be called the Aristotelian. Aristotle<sup>1</sup> (384 to 322 B.C.), by means of his great intellect and strictly scientific methods of research by experiment and induction, placed all the workers who followed him in the position of debtors. Even in the subject of teratology his views were far in advance of his time. The definition which he gives of monstrosities reveals an extraordinary degree of critical insight. It may be thus rendered:—"The monstrosity," he said, "is something contrary to Nature; or rather, not absolutely contrary to Nature, but contrary to that which occurs most commonly in Nature; nothing is produced contrary to Nature, inasmuch as it is eternal and necessary; this occurs only in the things which are most usually produced in a certain manner but which may be produced otherwise." Aristotle, also, refuted the opinion of Democritus concerning the origin of monstrosities; neither did he adhere to the theory of Empedocles, for he believed in the conjoint action of perverted states of both sperm and germ. He recognised the teratogenic power of faults in the *materia* which exists in the menstrual blood, and pointed out the more frequent occurrence of terata in the animals that produce many young ones. He was truly the founder of both human and comparative teratology, and as regards the latter subject his knowledge of the embryonic origin of double monsters in the hen's egg was really wonderful. Had he known that man also originates in an ovum, it is more than probable that he would have applied the facts of teratogenesis in the chick to human teratology, and so have discovered in the fourth century B.C. what has been reserved for the savants of the nineteenth century A.D.

The doctrines of Aristotle were handed down by succeeding writers, Roman and Arabian, to the times of the Middle Ages in Europe, when Albertus Magnus, a Dominican monk (1193 to 1280 A.D.), accepted, but with modifications, the views of the Greeks concerning the production of monstrosities. The modifications were most unfortunate, and were destined greatly to obscure the original theories. Thus, Albertus admitted the teratogenic powers of the semen, but he used the word *materia* as a synonym; those who followed him lost sight of the real meaning of the term, and so great confusion was introduced. Again, Albertus ascribed to the stars the same powers in the production of monstrosities as he gave to the *materia*, and so gave his sanction to the supernatural notions of his time. He also believed with Aristotle that terata were less frequent in uniparous than in pluriparous animals. His disciple, Henricus of Saxony, held views to which reference has been already made. He seems to have regarded the *materia* as

<sup>1</sup> Aristotle, *De generatione animalium*, lib. iv., c. 3 and 4.



the menses, and he thought that all the causes of monstrosities might be reduced to two: disobedience of the materia, and its insufficiency. He introduced, also, such secondary causes as faults in the uterus preventing the retention of the semen, and the position of the body during coitus.

Thomas Aquinas, another Dominican of about the same period (1225 to 1274 A.D.), introduced the idea of a formative power or faculty which acted upon the semen; and, like Albertus Magnus, he ascribed teratogenic properties to the heavenly bodies. With him indisposition of the materia was the immediate, and the effect of the stars the remote factor in teratology. Pietro di Argelata added the notion of a formative power or faculty to the doctrine of the Greeks, for in writing concerning supernumerary and large and small digits, he admitted that they were caused by excess or defect of the materia, but only if these were combined with a strong or a weak formative power. The last-named factor was the more important; indeed, with only a small amount of materia, a large part might be produced if the formative faculty were sufficiently great. Possibly in such a case the formative power made the materia more obedient to movement and more capable of extension.

In the early years of the sixteenth century ample evidence was forthcoming in the writings of the time to show how confused the original Greek theories had become. Bonacioli,<sup>1</sup> an author of this age, seems to have returned to the views of Empedocles with regard to the formation of foetuses with supernumerary parts, hermaphrodites, and monstrosities showing defects; he also complicated matters by referring to a materia supplied by the woman as well as by the man. About the middle of this century Savonarola<sup>2</sup> wrote at some length on the generation of moles from the semen and menses, reproducing largely the opinions of Avicenna; he stated that some women, from impurity of the blood, gave birth not only to a true foetus, but also to a piece of flesh resembling an animal, *e.g.*, a toad, falcon, lizard, etc.; this was due to an error in the second semen, and this error was the result of stellar influence. Varchi,<sup>3</sup> whilst he believed that the two principal causes of monstrosities were faults (qualitative and quantitative) in the male semen and in the menses of the woman, also recognised others, such as the state of the uterus and the secundines, the imagination, and the effect of the heavenly bodies. The last-named cause was introduced so as not to contradict the theologians.

Towards the close of the sixteenth and beginning of the seventeenth century the tendency, already seen in Varchi's writings,

<sup>1</sup> Bonacioli (L.), *Enneas muliebris*, c. ix., Ferrara, about beginning of 16th century.

<sup>2</sup> Savonarola (M.), *Practica major*, tr. vi., c. xxi., f. 269, Vinetiis, 1559.

<sup>3</sup> Varchi (B.), *Lezioni sopra la generazione dei mostri*, p. 101, Firenze, 1560.



towards a multiplication of the causes of monstrosities became very evident. Paré, for instance, enumerated eleven different teratogenic factors, and Licetus gave even a larger number for selection; but both these writers gave a very prominent place to faults in the material; thus the third and fourth causes of Paré were, "abundance of seed and overflowing matter, and the same in too little quantity and deficient;" whilst Licetus referred to such conditions as "defect of proper material," "inaptitude of the material," "feebleness of the formative or separative faculty," and the like.

It is unnecessary to quote further from the writers of this century (the seventeenth), for in all of them the same ideas are reproduced,—often, however, with a great deal of obscurity, and not uncommonly in language which has to us now little or no meaning at all. The embryological discoveries of the later part of the century so altered the notions of generation which had prevailed that the old teratogenic theories founded upon them fell to the ground. As we shall see later, their place was taken by new hypotheses, which in not a few instances embodied the notions of the ancients; and it came to pass that instead of talking of excess or defect or alteration of the semen, the menses, and the materia, teratologists began to theorise regarding faults in the spermatozoa, in the ovum, or in the product of their union, the embryo.

(4.) The theory which has now to be considered might quite well have been discussed with the preceding, for it has to do with conditions affecting the male and female elements in generation; but it has at the same time very characteristic features of its own, which serve specially to differentiate it. It may be termed the *hybridity theory* of teratogenesis, and it is founded upon the notion that animals of different kinds may be fertile with one another; the products of such unions are, however, monstrous. It was only an expansion of this doctrine to believe that deformed infants resulted from the cohabitation of the human subject (male or female) with one of the lower animals.

"That which followeth is a horrid thing to be spoken; but the chaste mind of the Reader will give me pardon, and conceive that, which not onely the Stoicks, but all Philosophers, who are busied about the search of the causes of things must hold, That there is nothing obscene or filthy to be spoken." Thus wrote Paré<sup>1</sup> some three hundred years ago in his chapter entitled, "Of monsters by the confusion of Seed of divers kinds;" and, notwithstanding the boldness of a modern novelist, who has described, in *The Island of Dr Moreau*, a community of creatures half human and half animal, the theory under consideration is one over which it is not profitable long to linger.

<sup>1</sup> The Works of Ambrose Parey. Transl. by Th. Johnson, p. 599, London, 1678.



The finding of an anencephalic human foetus<sup>1</sup> preserved as a mummy in a sarcophagus reserved for sacred animals at Hermopolis, on the Nile, proves that in ancient Egypt the bestial origin of monstrosities was a common belief. The anencephalic foetus had evidently been regarded as a monkey, an animal sacred in the eyes of the Egyptians, and having been the offspring of a woman, its conception had, doubtless, been ascribed to an act of unnatural intercourse. There is even evidence to show that in these times such acts were, under certain circumstances, looked upon as praiseworthy. Possibly the same views held also in ancient Chaldea; at any rate, the cuneiform tablets of Nineveh speak of a ewe giving birth to a lion, etc.<sup>2</sup> It is easy to understand how such beliefs arose when it is remembered that at the time all kinds of animals, including man, were supposed to be fertile with one another, and that the male was regarded as the sole factor in generation.

In the mythology of nearly all the races of mankind traces are to be found of similar notions. In the legends of the Greeks and Romans, for instance, mention is often made of the Minotaur, "semibovemque virum, semivirumque bovem;" of Echidna and Chimæra, offspring of Medusa; of Chiron the Centaur, half a man and half a horse; of Castor and Pollux; and of many others. But the conception of half human monstrosities was not an attribute of the gods of Olympus only; it was a faculty shared in by the humblest of mortals, as is witnessed by the tale which Plutarch<sup>3</sup> tells of Periander's shepherd and the centaur-like offspring of a mare. This same writer attributed to Aristotle the story of the beautiful daughter of Aristonymus of Ephesus, whose name was Onoscellis, which name suggests clearly her asinine origin.

This reference leads us naturally to the consideration of Aristotle's views upon the subject of hybridism. He<sup>4</sup> held that animals were only fertile with each other when the duration of their gestation-period was the same and when their size was similar. The offspring would resemble either of the parents. The case of the fox and the dog was cited, and Aristotle elsewhere<sup>5</sup> spoke of the products of the intercourse of heterogeneous animals in Libya, Cyrene, and Laconia. In this relation, as in so many others, Aristotle's more correct views were soon lost; and Pliny,<sup>6</sup> for instance, speaks of a bondwoman who brought forth a serpent, and of Alcippe, who was delivered of an elephant, "marie that was a monstrous and prodigious token, and foreshewed some heavie

<sup>1</sup> Geoffroy Saint-Hilaire, "Description d'un monstre humain né avant l'ère Chrétienne, etc.," *Ann. des sc. nat.*, vii. p. 357, 1826.

<sup>2</sup> Ballantyne (J. W.), "Teratological Records of Chaldea," *Teratologia*, i. p. 139, 1894.

<sup>3</sup> Berger de Xivrey (J.), *Traditions tératologiques*, p. 34, Paris, 1836.

<sup>4</sup> Aristotle, *De generatione animalium*, lib. ii., c. 12.

<sup>5</sup> Aristotle, *De animalibus historiæ*, lib. viii., c. 27, p. 227. (Bohn's translation.) Also *De generatione animalium*, lib. ii. c. 9.

<sup>6</sup> Pliny, *Natural History* (Holland's translation), i. p. 157, London, 1601.



fortune that followed after." Pliny also states that "Duris maketh report, That certaine Indians engender with beasts, of which generation are bred certaine monstrous mungrels, halfe beasts and halfe men."

It is easy to imagine how such beliefs as those mentioned above grew and flourished in the period of intellectual darkness in Europe. Many traces of this are to be found in the writings of Vincent de Beauvais, of Bartholin, of Lycosthenes, of Rueff, and others. C. Stalpart vander Wiel, for instance, in his *Hondert seldzame Aanmerkingen*, pp. 234 and 248, Amsterdam, 1682, not only relates how a woman gave birth to a little dog ("Hondeken van een Vrouw geboren"), but even figures the prodigy, which seems really to have been a human otocephalic foetus without a lower jaw. During this epoch it would seem that if a woman gave birth to a foetus in any way resembling an animal she ran a very considerable risk of being burnt alive with her offspring, and with the animal who was supposed to have been her partner in the illicit commerce. Such a fate, Bartholin<sup>1</sup> tells us, befel a woman in Copenhagen, in the year 1683, as the result of the birth of an anencephalic foetus. Suspicion also fell upon the animal who brought forth a foetus in any way resembling the human type, *e.g.*, a hydrocephalic foal or calf; and I have already referred to the service which Albertus Magnus rendered to a shepherd when he announced that such a birth might be due to stellar influence, and not to the more popularly credited and criminal procedure.

With the revival of learning came attempts, not very active at first, to controvert the doctrine of the bestial origin of monstrosities, and the ancient views of Aristotle came again to the front, that animals could only be fertile with those of the same size whose period of utero-gestation was approximately of equal length. Martin del Rio,<sup>2</sup> a writer of the early part of the seventeenth century, while declaring that physically a cow could not give birth to a human foetus, was yet of opinion that something of this kind could happen through a diabolic agency. Licetus,<sup>3</sup> however, in five chapters in the second book of his work, *De monstribus*, opposed the doctrines of Del Rio, and endeavoured by copious references to cases, and by analogy with the vegetable kingdom, to prove that such unnatural unions may not only result in the birth of a human foetus or an animal, but also in the production of monstrous forms partaking of the characters of both. Neither the legal nor the theological side of this matter were neglected by the writers of this

<sup>1</sup> E. Martin, in his *Histoire des Monstres* (p. 80), refers to this statement by Bartholin, but he gives no reference; and although I have searched Bartholin's writings, I have found no trace.

<sup>2</sup> Del Rio (M.), *Disquisitionum magicarum*, lib. ii., quaest. 14, p. 331; Lovani, 1598-1600.

<sup>3</sup> Licetus (F.), *De monstribus*, lib. ii., c. 68, 69, 70, 71, and 72, pp. 213 to 231; Patavii, 1668.



century, and the question whether such offspring ought to be baptised caused much discussion.

Even near the close of the seventeenth century evidence is not wanting to show how persistent was the belief in this mode of origin of monstrosities; for instance, Paullinus,<sup>1</sup> in 1688, gravely writes of a "Monstrum canino-humanum cum flamma et fragore natum"; and Bartholin tells of a "puella ex cane nata" (*Hist. anat., Cent. V.*, p. 166, 1661). It is true that Ambrosinus,<sup>2</sup> in his edition of Aldrovandus' *Historia Monstrorum*, had brought in other factors, such as the influence of the maternal imagination, to explain such births; but his suggestions do not seem to have been taken up very widely.

It is not till the beginning of the eighteenth century that we find a strong protest being made against the belief in the hybridity theory of teratogenesis. Bianchi<sup>3</sup> of Turin was amongst the first to point out that when the product of human gestation had a rough resemblance to an animal form this resemblance might be due to a foetal disease, or the product itself might be a mole or retained portion of the placenta. Even at the present day, however, there still exists a strong popular belief in the old theory, and even in the ranks of the profession I have met with its adherents.

Now, there can be no doubt that the cases which gave rise to this belief and kept it in existence were those in which disease or deformity gave to the human foetus an animal appearance, or in which the young of one of the lower animals, through the existence of such a condition as hydrocephalus, came to bear a rough resemblance to the human form. At the same time, the theory has a modern and scientific side, of which a great deal may yet be heard. To quote from such a skilled teratologist as Mathias Duval,<sup>4</sup> writing as recently as 1895, hybridity is a phenomenon of which little is known in the higher forms of animal life, but some day its discussion may form an important chapter in teratology; for it is quite possible that sterility between animals of different species may be due, not to an absence of impregnation, but to such an abnormal development subsequent to impregnation as to cause arrest by its very abnormality. This belief gains some support from the experiments of Pfluger and Smith,<sup>5</sup> Born,<sup>6</sup> and Gebhardt,<sup>7</sup> on the production of bastards among the amphibia.

<sup>1</sup> Paullinus (C. F.), *Miscell. curios. med. phys.*, Dec. ii. Ann. vi.; Appendix, obs. xli. p. 48; Norimbergæ, 1688.

<sup>2</sup> Aldrovandus (U.), *Historia Monstrorum*, p. 385; Bononiæ, 1642.

<sup>3</sup> Bianchi (G. B.), "De naturali in humano corpore, vitiosa morboasque generatione historia," pt. ii. p. 238, Augustæ Taurinorum, 1741.

<sup>4</sup> Duval (M.), in Bouchard's *Traité de Pathologie générale*, i. p. 159, 1895.

<sup>5</sup> Pfluger and Smith, "Untersuchungen über Bastardirung," *Arch. f. ges. Physiol.*, xxxii. p. 519, 1883.

<sup>6</sup> Born, "Weitere Beiträge zur Bastardirung zwischen einheimischen Anurarten," *Arch. f. mikr. Anat.*, xxvii. p. 192, 1886.

<sup>7</sup> Gebhardt (W.), *Ueber die Bastardirung von Rana esculenta mit Rana arvalis*, Dissertation, Breslau, 1894.



Such, then, were the theories of the past, which regarded purely physical conditions as the causes of monstrosities; and with regard to them all it must be noted that the ideas underlying them exist still, but in an altered form, and expressed in different words. It will have been noticed also that there exists a much closer connexion between these theories of the past in their earliest form and the views of the present, than between the latter and the notions of the Middle Ages. The theories of Empedocles and Aristotle are, in other words, more nearly allied to those now in vogue than are the latter to those of Lycosthenes, Licetus, and Aldrovandus. I have regarded the discovery by means of the microscope of the human ova and spermatozoa as the boundary line between what are called theories of the past and those which I shall have soon to describe and designate theories of the present; but there can be no hard and fast dividing line in this matter, and it becomes an interesting subject for speculation to consider in what way the knowledge obtained from the use of the microscope might have influenced the teratogenic views of the early Greek philosophers.

I have now passed in review both the supernatural and the physical teratogenic theories of the past, and before proceeding to the discussion of another old yet ever new theory,—that, namely, of the effect of the imagination of the parents upon the infant *in utero*,—it must be pointed out that these hypotheses have not followed one another in chronological order, but have existed, more or less, side by side, and have even overlapped. For example, a belief in the teratogenic powers of the stars has been seen combating the notion of the hybrid origin of malformed infants, and this in its turn has been confronted with the view that the powers of evil are the potent factors in teratogenesis. At the same time, it is easy to understand how in certain epochs of the world's history certain opinions have been more widely held and more strongly insisted upon than in others.



## CHAPTER III.

CAUSES OF MONSTROSITIES; THEORIES OF THE PAST (*concluded*): MENTAL INFLUENCE.

DOUBTLESS some modern writers may be inclined to cavil at the position which is here assigned to the theory of the influence of the maternal imagination in teratogenesis, for it is placed with the notions of the past, and not with those of the present. But I think that the arrangement is warranted, for it must be admitted that the theory of maternal (or paternal) mental influence as originally enunciated is indefensible. At the same time, the belief has a modern side, infinitely less repulsive to the scientific sense of inquiry; this side has, I believe, a just claim to credit. The hypothesis as originally stated is, I humbly think, untenable; it is truly a theory of the past. In its modern form, and with certain limitations to be referred to later, it is both tenable and credible; in this sense it can be properly termed a theory of the present. Still, when reference is made to the maternal impression theory in teratogenesis, probably there is scarcely any one who thinks, of it in any sense save in that old and extravagant one which demands belief in an absolute similarity between the thing producing the impression and the defect or anomaly resulting therefrom. In its generally accepted and classic sense, therefore, the hypothesis is of the past; but, like others of these ancient doctrines, it has its less widely known but vastly more reasonable modern development. In accordance with these circumstances, it has been placed among the theories of the past, but in juxtaposition with those of the present.

As will be made abundantly evident when the history of the belief in maternal impressions comes under consideration, the notion is one of great antiquity; but it may here be pointed out that it is also one of practically world-wide distribution. Ploss<sup>1</sup> has succeeded in gathering together indications of its existence in such far apart lands as India, China, South America, Western Asia, and East Africa; and I have elsewhere<sup>2</sup> quoted from various works to show that maternal impressions are not unknown among the Esquimaux, the Loango negroes, and the old Japanese. It is also, of course, the common possession of the nations of Europe. In fact, it may safely be postulated that the belief in the potency of maternal impressions has a geographical distribution correspond-

<sup>1</sup> Ploss, H., *Das Weib.*, 2nd edit., i. p. 505, Leipzig, 1887.

<sup>2</sup> Ballantyne, J. W., *The Diseases of the Fætus*, i. pp. 30, 31, and 41, 1892.



ing with that of the human race, whilst in the matter of antiquity it is coeval with it.

It will now be well to trace so far as is possible the origin and growth of this ancient and well-nigh universal doctrine. In this way it will be learned that in its earliest beginnings it was not specially a teratogenic theory, but rather one used to explain how the young of men and of animals came to be of special colours, and especially of a tint differing from that of their parents; then it was accepted as the solution of the origin of mother's marks or *nævi*; then as a possible explanation of the birth of infants with hypertrichosis; and, finally, it came to be applied, and in most ingenious ways, to account for almost every kind of anomaly, malformation, and monstrosity. The story will be found to be one of no little interest, at times possibly also entertaining and even amusing.

#### *Among the Hebrews.*

Writers of all ages have commenced the history of maternal impressions with a reference to the patriarch Jacob and his triple artifice, by means of which he acquired a large number of speckled cattle of a vigorous breed. The sacred narrative tells<sup>1</sup> how Jacob first placed "rods of fresh poplar, and of the almond, and of the plane-tree," in which he had "peeled white strakes," before the flocks when they conceived at the water-troughs, "and the flocks brought forth ring-straked, speckled, and spotted"; having thus obtained some parti-coloured lambs, he put them (instead of the rods) before the flocks, and thus increased the number of such animals still more; and, finally, in order to get as vigorous as possible a breed of the parti-coloured, he put the peeled rods before only the stronger of the flock. "And the man increased exceedingly, and had much cattle, and maid-servants, and men-servants, and camels, and asses." From this it may be learned that Jacob was an expert stock-raiser well versed in all the notions of the age, which included a belief in the efficacy of maternal impressions upon the offspring at the time of conception. To attempt, as many have done, to use the narrative as a proof of the correctness of this ancient theory is manifestly unfair, for throughout the whole passage there is the thinly-veiled suggestion of an overruling Providence acting favourably to Jacob's plans.

#### *In Ancient Greece.*

Traces of this belief are also to be found in certain of the Greek writers, and Plutarch<sup>2</sup> states that Empedocles had remarked that

<sup>1</sup> Genesis, chap. xxx., verse 32 to end. The quotations are from the Authorised and Revised Versions; in the Septuagint it is not nearly so clearly expressed.

<sup>2</sup> Plutarch, *De placitis philos.*, lib. v., c. 12. Cited by Fienus (T.) in his *De viribus imaginationis*, p. 217, Lugd. Batav., 1635.



women gave birth to infants resembling the statues which they had found pleasure in regarding during pregnancy. Allusions to the effect of pictures and statues seen by women at the time of conception or during gestation are to be found also in the law of Lycurgus, which required the Spartan wives to look upon the representations of the strong and beautiful, *e.g.*, statues of Castor and Pollux; and in the story of Dionysius of Syracuse, who hung the picture of Jason in full view of his pregnant spouse (T. Fienus, *loc. cit.*). There is, however, no absolute proof that Hippocrates shared in these beliefs, for the story which St Jerome and others tell concerning the use he made of this notion in the defence of a woman accused of adultery is not to be found in the Hippocratic writings.<sup>1</sup> Further, the statement that "if a pregnant woman has a longing to eat earth and coals, and eats of them, the infant which is born, carries on its head the mark of these things," occurs in the treatise *De Superfœtatione*, which practically all commentators regard as not the work of the Father of Medicine himself.

#### *Among the Romans.*

The following quotation from Pliny's *Natural History* (Holland's translation, p. 161) demonstrates that among the Romans a belief in the efficacy of both the maternal and the paternal mind in the moulding of the fœtus was prevalent. The writer speaks of the black child of a white mother, and then goes on to say:—"Certes the cogitations and discourses of the mind make much for these similitudes and resemblances whereof wee speake: and so likewise many other accidents and occurrent objects, are thought to bee very strong and effectual therein, whether they come by sight, hearing, and calling to remembrance; or imaginations onely received, and deeply apprehended in the very act of generation, or the instant of conception. The wandering cogitation also and quicke spirit either of father or mother, flying too and fro all on a suddaine, from one thing to another, at the same time, is supposed to bee one cause of this impression, that maketh either the foresaid uniforme likenesse, or confusion and varietie." For this reason Pliny thinks that men are more unlike one another than other creatures: "For the nimble motions of the spirit, the quicke thoughts, the agilitie of the mind, the varietie of discourse in our wits, imprinteth diverse formes, and many markes of sundrie cogitations; whereas the imagine facultie of other living creatures is unmoveable, and alwaies continueth in one, in all it is alike, and the same still in everyone, which causeth them alwaies to engender like to themselves, each one in their severall kind."

Galen,<sup>2</sup> also, believed in the power of the maternal imagination

<sup>1</sup> Ballantyne (J. W.), "Ante-natal Pathology and Heredity in the Hippocratic Writings," *Teratologia*, ii. p. 279, 1895.

<sup>2</sup> Galenus, *De theriaca ad Pisonem liber*, c. xi.



when influenced by pictures, etc.; and Soranus of Ephesus<sup>1</sup> spoke of the ape-like children which were born to women who had looked at monkeys at the time of conception. Oppian,<sup>2</sup> in his *Cynegeticon*, gave some interesting details concerning the application of the belief in the breeding of horses and doves of particular colours. Such statements, however, were not confined to what may be called the scientific literature of the age; for in the well-known romance of Heliodorus,<sup>3</sup> the belief is adduced to explain the colour of Chariclea, the white daughter of the black king and queen of Ethiopia, the queen having regarded a statue of Andromeda at the time of impregnation. It may be mentioned that Quintilian, in his *Institutiones Oratoricæ*, referred to a similar tale, only in this instance the parents were white and the infant black, and the cause was the picture of a Moor.

### *Among the Jews and Early Christians.*

In the Talmud,<sup>4</sup> also, such stories are repeated, and there is an indication of a belief in the potency of impressions made in pregnancy *after* conception. The early Fathers of the Christian Church held similar opinions. St Jerome thought there was nothing strange in the infant bearing the impress of things seen or imagined at the moment of conception; and St Augustine, in his *Quæstiones in Genesim*, referred to the Biblical narrative of Jacob and his parti-coloured lambs.

### *In the Middle Ages.*

Between the fifth and the fifteenth centuries little is recorded of the belief in maternal impressions, although it cannot be doubted that it existed. It would seem that Marcus Damascenus gave origin to the oft-repeated tale of the birth of a hirsute infant consequent upon the mother regarding the picture of John the Baptist in his hairy garment. St Isidore, also, seems to have warned women against looking at monkeys, cynocephali, etc., during pregnancy. The Arabian physicians had little to say on the subject, but Avicenna laid stress upon the belief that infants resembled in colour, etc., the things seen by the parents at the time of conception; and gave credence to the ridiculous story of a hen sitting upon her eggs being frightened by a kite, with the result that the chicks had heads like falcons.

From what has been said it will have been gathered that prior to the fifteenth century the notion of maternal impressions was a

<sup>1</sup> Soranus, *Περὶ γυναικείων πάθων*, c. x.

<sup>2</sup> Oppian, *Κυνεγετικόν*, lib. i., v. 358.

<sup>3</sup> Heliodorus, *Æthiopica*, lib. iv., c. x.

<sup>4</sup> For Talmudic references, *vide* Preuss (J.), "Vom Versehen der Schwangeren," *Berlin. klinik*, Heft 51, 1892.



well-established one; but it is noteworthy that it does not seem to have been much employed to explain monstrosities, unless indeed we regard the abnormal colour of the skin, nævi, and hypertrichosis as teratological. Further, its efficacy, save at the moment of conception, was not widely recognised; indeed, there is only slight evidence to prove that it was ever supposed to be active in later pregnancy. Its existence, however, was admitted both in the human species and in some of the lower animals, and we read over and over again of the great influence of pictures and statues. The mental impression seems most often to have been one of admiration; rarely is the idea of fear or disgust hinted at.

With the Revival of Learning in Europe came a great extension of the doctrine of the influence of the maternal fancy (phantasia), or, as it was often called, "imaginatio gravidarum," "Einbildungskraft," and (more popularly) "Versehen."

### *In the Sixteenth Century.*

In a work on the "imagination," by Francisco Pico of Mirandola,<sup>1</sup> published in the early years of the sixteenth century, no mention is made of any peculiar properties of the fancy in pregnant women; and Taruffi (*Storia della Teratologia*, i. p. 231, 1881) is of opinion that the omission indicated that the author discredited the belief, not that he was unaware of it. Whether this be so or not, Martin Luther, in his work on Genesis, regarded the notion as a "res certa et conveniens cum doctrina medicorum"; he also told a story about a pregnant woman who was frightened by a mouse. Lycosthenes<sup>2</sup> indicated the popular belief when he related how in the year 1282 an infant was born with hair and claws like a bear, and how the Pope of the time straightway ordered the destruction of all pictures of bears in Rome. The child belonged to the well-known family of the Ursini. It may be noted that this story was frequently repeated by subsequent writers, who, however, did not all see in it an instance of such an innocent cause as the mother's imagination. Both Cardan<sup>3</sup> and Porta<sup>4</sup> were firm believers in the theory that if a pregnant woman longed for anything and touched a part of her body the fœtus would show a mark of the thing desired on the part corresponding to that touched by the mother (*chirapsy*). They also ventured an explanation to the effect that the spirit of the mother is united with that of the infant, and the heat, which is the instrument of the spirit, moves the blood (which is at once disturbed by the desire of the

<sup>1</sup> Francisco Pico of Mirandola, *Liber de imaginatione*, Venetiis, 1505.

<sup>2</sup> Lycosthenes (Conrad), *Prodigiorum ac Ostentorum Chronicon*, p. 445, Basileæ, 1557.

<sup>3</sup> Cardanus (J.), *Opera omnia*, De Sanitate tuenda, lib. i., c. 9, Lugduni, 1663.

<sup>4</sup> Porta (G. B.), *Magiæ naturæ*, etc., lib. ii., c. 23, Neapoli, 1558.



mother) into the corresponding part in the foetus. Luiz Mercado,<sup>1</sup> a Spaniard, had another theory of the *modus operandi*, for he thought that the imagination disturbed the action of the semen of one of the parents, and so led to the mark on the infant.

Lemnius,<sup>2</sup> in his interesting work, stated his preference for the doctrine of the maternal imagination over that of stellar influence; and Ambrose Paré,<sup>3</sup> in 1573, gave it as the fifth cause of monstrosities, mentioning the illustrative instances of black and hairy children already so often referred to. The latter writer also figured an infant with the face of a frog, which Bellanger, "a man of an acute wit," regarded as occasioned by the mother's holding a frog in her hand just before conception. Paré went on to say (I quote from Johnson's translation, p. 596):—"There are some who think the infant once formed in the Womb, which is done at the utmost within two and forty days after the conception, is in no danger of the Mother's imagination, neither of the seed of the Father which is cast into the Womb, because when it hath got a perfect figure it cannot be altered with any external form of things; which whether it be true or no, is not here to be inquired of: truly I think it best to keep the woman all the time she goeth with child, from the sight of such shapes and figures." Cautious Paré!

It is scarcely necessary to do more than mention some of the other references to maternal impressions found in the literature of the sixteenth century. Sebastian Munster,<sup>4</sup> for instance, tells how two women, one of them being pregnant, got their heads knocked together, and how in due time twins united by the vertices were born to one of them. J. Rueff<sup>5</sup> speaks of the grievous effects of terror induced by the sight of hares and other animals, and says—"Ex appetitu rursum et terroribus multi nascuntur, qui varias maculas et figuras corpori impressas habeant, puta, crinium, murium, variorum colorum, racemorum, flammaram, fructuum, rerumque aliarum." Jean Wier<sup>6</sup> and Cornelius Gemma,<sup>7</sup> and several others, participated in the popular belief, which even found its way into the non-medical literature of the time: witness the story of black parents and a white child in the twelfth canto of Tasso's "Jerusalem Delivered." This was indeed the age of the wonderful, and nothing seems to have been regarded as incredible. Profound indeed were the discussions regarding the cutting of a golden tooth

<sup>1</sup> Mercado (Mercatus) (L.), *De mulierum affectionibus*, etc., lib. iii., c. 7, Valladolid, 1579.

<sup>2</sup> Lemnius (L.), *De miraculis occultis naturæ*, lib. iv., c. 18, 1564.

<sup>3</sup> Paré (A.), *Des monstres*, Paris, 1573.

<sup>4</sup> Munster (S.), *Cosmographie universelle*, lib. iii., Paris, 1575.

<sup>5</sup> Rueff (J.), *De conceptu et generatione hominis*, etc., lib. v., c. 3, p. 46, Frankforti ad M., 1580.

<sup>6</sup> Wier (J.), *De præstigiis dæmonum*, lib. iv., c. 18, Basileæ, 1563.

<sup>7</sup> Gemma (C.), *Cosmocrítica*, Antwerpæ, 1575.



by an infant in Silesia, in which Horstius,<sup>1</sup> Ingolstetter,<sup>2</sup> and Ruland<sup>3</sup> took part; and in Weinrichius'<sup>4</sup> quaint work entitled *De ortu monstrorum commentarius*, we read at great length concerning "το φαντασικον" and its supposed effects, about "fœtus ranæ facies," about "infans facie cadaverosa," and so on.

*In the Seventeenth Century.*

In the succeeding century (the seventeenth) the belief in the teratogenic powers of maternal impressions reigned supreme. Scarcely a writer ventured to throw a doubt upon its accuracy, and the most far-fetched explanations of monstrosities and deformities were eagerly accepted by both the public and the profession. Credulity would indeed seem to have reached a maximum when it began to be asserted and believed that conception might occur through the imagination alone. Of course, little was at this time known of the physiology of generation and of intra-uterine life, else such assertions could scarcely have been entertained. Interesting instances illustrating this extraordinary development of the imagination theory were reported by Thomas Bartholin,<sup>5</sup> G. C. Petrus,<sup>6</sup> and E. S. Grass.<sup>7</sup> In the first of these we read how Magdalena of Auvermont gave birth to an infant although her husband had been absent from her for four years; and how the occurrence was explained by the fact that the lady had in her dreams imagined her husband to be present; and so the child (Emanuel) was conceived "sola imaginationis virtute." After matrons and medical men had given their evidence upon this matter, the Parliament of Grenoble in 1637 declared the child to be the legitimate son and heir of Hieronymus Augustus of Montleon, the husband of the aforesaid Magdalena.

Even in this credulous age, however, reports of cases like the above were rarities. Most authors were content to narrate how an already existing fœtus was altered; few had the courage to describe the creation of an embryo through the force of the imagination alone. Certain of the records of the time may here be briefly referred to.

In 1605 Riolan,<sup>8</sup> in connexion with a case of double fœtus,

<sup>1</sup> Horstius (J.), *De aureo dente maxillari pueri Silesii*, Lipsiæ, 1595.

<sup>2</sup> Ingolstetter (J.), *De aureo dente Silesii pueri*, Lipsiæ, 1596.

<sup>3</sup> Ruland (M.), *De dente aureo pueri Silesii*, Francof., 1597.

<sup>4</sup> Weinrichius (M.), *De ortu monstrorum commentarius*, c. 17, p. 158, Breslæ, 1595.

<sup>5</sup> Bartholin (T.), *Hist. anat. et med. rar.*, Cent. v. and vi., hist. lxi., p. 296, Hafniæ, 1661.

<sup>6</sup> Petrus (G. C.), *Conceptio hermaphroditica seu androgynea*, *Miscell. curios. phys.-med.*, Ann. II., obs. ciii., p. 303, Jenæ, 1671.

<sup>7</sup> Grass (E. S.), *Conceptus prodigiosus*, *Miscell. curios. phys.-med.*, Dec. II., Ann. X., obs. lvi., p. 102, Norimbergæ, 1692.

<sup>8</sup> Riolanus (J.), *De monstro nato Lutetiæ anno Domini 1605*, *Disput. philos.*, Parisiis, 1605.



referred to the imagination theory, stating his preference for it over the competitive notion of Satanic influence; the birth of a child resembling a demon was not due to the activity of an incubus, but to the influence upon the mother of pictures of diabolic creatures. Doubtless the women of that day were, or ought to have been, glad to welcome this change in the teratogenic doctrines of the time, for the substitution of the maternal-fancy theory for that of Satanic or bestial intercourse rendered the birth of a malformed foetus a misfortune, but not any longer a crime. Riolan also believed that while the imagination could alter the properties of the uterine contents, it could not change the species. Fienus<sup>1</sup> in his treatise on the powers of the imagination, devoted more than 150 pages to the discussion of maternal impressions and the various questions arising therefrom; but that he did much to clear up these matters can hardly be asserted. He related the story told by Philippus Meurs about the child with a mussel for a head, who nevertheless lived for eleven years, receiving liquid nourishment from a spoon into the gaping bivalve; of course the mother had longed for sea-mussels in her pregnancy. Concerning this extraordinary maid and her still more wonderful death (through the breaking of one of the shells), Fienus said "dico me non credere"; but he did not hesitate to accept many other marvellous tales.

Septalius<sup>2</sup> and Hildanus<sup>3</sup> also wrote upon maternal impressions; and Schenkus<sup>4</sup> and Bauhinus<sup>5</sup> frequently adduced them to account for various monstrosities. Licetus,<sup>6</sup> although holding more advanced views on ante-natal pathology, yet clung firmly to the theory of the mother's imagination in teratogenesis; but he restricted its power in certain directions, and did not believe that mutilated monstrosities and those showing excess of parts could be thus produced. He admitted the efficacy of the paternal imagination also (lib. ii., c. xlii.); but this could not be so powerful as the maternal, for the time of its action was limited to the venereal act.

It has been pointed out by Taruffi (*Storia della Teratologia*, i. p. 234) that Zacchia,<sup>7</sup> writing in 1621, had indicated weak points in the doctrine of the maternal imagination when he stated that if such things were true, then there would be no infants without marks, and some children would be spotted all over like

<sup>1</sup> Fienus (T.), *De viribus imaginationis tractatus*. Quæstiones xiii. to xxiii., Louvain, 1608.

<sup>2</sup> Septalius (L.), *De nævis*, Dordrecht, 1650.

<sup>3</sup> Fabricius de Hilden, *Observ. et cur. chirurg.*, Cent. iii., obs. 56, Francoforti, 1646.

<sup>4</sup> Schenkus (J. G.), *Monstrorum historia memorabilis*, Francofurti, 1609.

<sup>5</sup> Bauhinus (C.), *De hermaphroditorum monstrorumque partium natura*, 1614.

<sup>6</sup> Licetus (F.), *De monstrorum natura*, etc., lib. ii., c. ix., xi., xix., etc., Patavii, 1616.

<sup>7</sup> Zacchia (P.), *Quæstiones medico-legales, in quibus*, etc., i., lib. vii., Romæ, 1621.



leopards; but these arguments seem to have fallen on deaf ears, a fate which also met Santorelli's<sup>1</sup> statement, made thirty years later, that monstrosities were borne by women who had experienced no impression whatever. Whilst, however, one is willing to give to these Italian observers credit for critical views regarding the popular theory of their time, it must be confessed that their notions found little or no support till many years had passed. The writers who immediately followed held an almost unquestioning faith in the potency of the mother's imagination; and reference may here be made to Aldrovandi's<sup>2</sup> work and to that of Stengelius,<sup>3</sup> in both of which the matter is dealt with. Of course these authors recognised not only this but many theories of teratogenesis.

Towards the close of the seventeenth century observations on the supposed results of the mother's fancy multiplied enormously. Thus Kerkring (1)<sup>4</sup> puts on record the birth of what was evidently an anencephalic foetus, but whose appearance, taken in conjunction with the mother's history, led the midwives to call it a devil—"diabolum non hominem esse conclamitant mulierculæ." He also told of a woman whose occiput was fractured in her pregnancy; the infant's head had no occiput. Swammerdam (2) opened up new ground when he narrated how a clever woman counteracted her own impression: she saw a negro in her pregnancy, and to prevent her child being black she washed herself in warm water; the matter turned out well, for the infant (who, by the way, was born with teeth) was white save between the fingers and toes and in the grooves on the face, places which the mother in her washing had evidently neglected.

One of the most frequently quoted stories of maternal influence upon the foetus *in utero* is that taken from Malebranche's work (3), in which it is stated that a pregnant woman after having seen a criminal broken on the wheel, gave birth to an idiot boy, whose limbs were fractured. He also wrote of a woman who from much gazing at a picture of St Pius was delivered of an infant closely resembling the saint. "'Tis what all Paris may have seen as well as I, since it has been for a long time preserved in spirits of wine." With regard to the first of these tales, Malebranche had no difficulty in explaining all the phenomena to his own satisfaction. "Children," said he (to quote from Blondel's translation), "see what their Mothers see, they hear the same Cries, they receive the same Impressions of the Objects, and are moved by the same Passions.

<sup>1</sup> Santorelli (A. da N.), *Antepraxis medica*, lib. ii., c. xiii., par. 35, Neapoli, 1651.

<sup>2</sup> Aldrovandi (U.), *Monstrorum historia*, p. 384, Bononiæ, 1642.

<sup>3</sup> Stengelius (G.), *De monstribus et monstrosis quam mirabilis*, etc., p. 179, Ingolstadii, 1647.

<sup>4</sup> In order to avoid overloading the text, references from 1670 onwards are gathered together in one list and referred to by figures in brackets.



All the Blows given to the Malefactor did violently strike the Mother's Imagination, and, by a Counter-blow, the tender and soft Brain of the Child. The Fibres of the Child's Brain, not being able to resist the Torrent of the Spirits, were broken: That's the Reason why he came into the World without Understanding. The violent Course of the Mother's animal Spirits, went, with Force, from her Brains, to the several parts of her Body, which answered to the Parts of the Malefactor. 'Twas the same in the Child, but because the Bones of the Mother were capable to resist the Violence of the Spirits, they were not wounded. Perhaps she did not feel the least Pain; but this rapid Stream of the Spirits was capable to carry away the soft and tender Parts of the Bones of the Child." This sad result would have been avoided had the mother known and practised Malebranche's instructions—"si cette mère eut déterminé le mouvement de ses esprits vers quelque' autre partie de son corps en se chatouillant au ce force, son infant n'auroit point eu les os rompus."

Dolæus (17) attempted a more physiological explanation of the *modus operandi* of maternal impressions, and held that the image in the mind was involuntarily communicated to the animal spirits, which impressed it upon the foetus by means of the nerves of the uterus. The movements of the heart and intestines proved that the animal spirits were capable of involuntary motion. This theory was accepted by other writers, among whom was Bandiera (21), who, however, by bringing in the paternal imagination, which, of course, can only act at the time of conception, rather stultified the notion, for there is no nervous connexion at that epoch.

The remaining contributions of this century may now be summarized. Bayle (9) dealt with the matter of maternal impressions, and regarded it as an endless task; Boyle<sup>1</sup> repeated a tale about a speckled child whose mother had (before pregnancy!) gazed long and earnestly at some red pebble-stones near St Winifred's Well,—and yet his mind also conceived Boyle's Law of the relation between volume and pressure!; Diemerbroeck (13) was so sure of the theory that he employed it in his scheme of heredity; and Fidelis (4) used it to explain why deformed parents had not always deformed children. In the pages of a periodical called *Zodiacus medico-gallicus* Nicolas de Blegny (10) and Cuchotius (12) recorded further instances of maternal impressions. Finally, the volumes of the *Miscellanea curiosa* are full of cases of foetal monstrosities ascribed to the influence of the mother's mind and imagination. Amongst these may be mentioned the contributions of Ludovici (6), Segerus (7), Mercklinus (8), Sommerus (11), Albrecht (14), Fehrius (15), Göckelius (16), Hoffmannus (18), Lentilius (20), and Reiselius (22).

<sup>1</sup> Boyle (R.), *Exper. Philos.*, p. 151.



*In the Eighteenth Century.*

In the seventeenth century the attitude of the profession towards the doctrine of maternal impressions was one of blind credulity; but in the eighteenth this was quickly changed for one of sceptical criticism. Of course, there were still many who in the latter century believed in the efficacy of the mother's mind in moulding the unborn infant; but the prevailing opinion was one of grave doubt. It would have been strange indeed if this had not been so, for the discoveries of the close of the seventeenth century had done much to clear up many of the vexed questions of reproduction and antenatal physiology.

In the early years of the century, criticism was not yet rife. Düttel (24), for instance, in his work on foetal diseases, clearly stated his views: "So great," said he,<sup>1</sup> "is the sympathy between mothers and the foetuses which they carry in the uterus that they suffer closely with them, to such an extent that not only are the delicate fibrillæ of the infants excited to anomalous movements by every severe affection of the mind of the mother (*e.g.*, sorrow and anger), but, what is more, the formation of parts is altogether prevented, disturbed, or vitiated by the strong imagination of the mind." In the *Miscellanea curiosa* cases of maternal impression continued to be reported (23, 26, 35, 36, 38, 40, and 41); and in England Daniel Turner (28) stated very confidently his belief in such occurrences, for after enumerating most of the cases to which reference has been made above, he said: "Thus is it made apparent by a Multitude of Examples, how manifest and great an Empire the *Fantasy* of a pregnant Woman has over the Blood and Humours together with the Spirits of her Body, and how by their Ministry she is able to give not only monstrous Shapes and Figures to that of the more tender *Fœtus*, but to communicate Diseases also." He also related cases from his own practice of a raspberry mark near the eyebrow, of a currant-like excrescence on the internal canthus of the eye, etc. In the year 1726 the matter of maternal impressions was brought still more prominently before the profession and the public in England in connexion with the notorious case of an "Extraordinary Delivery of Rabbits," which was alleged to have occurred in the case of Maria Tofts of Godlyman (Godalming) in Surrey; she had had a great longing for "Rabbits" in early pregnancy. (Nos. 29, 30, 31, 32, and 33).

It is probable that the "Godlyman" case, in conjunction with the appearance of Turner's appreciation of the doctrine of maternal impressions, stirred up Blondel (34) to write his famous criticism thereupon; but already in the year 1712 Nigrisoli (27) of Ferrara had argued against the popular belief, and had pointed out that the foetus was entirely separated from the mother, that monstro-

<sup>1</sup> Ballantyne (J. W.), "The First Monograph on Foetal Diseases," *Teratologia*, i. p. 41, 1894.



sities occurred in animals in whom they could scarcely be ascribed to imagination, and that in the human subject deformities were met with for which no disturbing impression could be alleged. To Blondel (34), however, belongs the credit of dealing to the maternal impression theory the most deadly blow it had yet received. Very skilfully did this writer marshal his facts; and with no small degree of humour, and now and then some biting sarcasm, did he state his arguments and refute the assertions of those whom he delighted to dub the "imaginationists." In the first instance, his satire was specially directed against Mr Daniel Turner; but he did not spare other, older, and more widely-known exponents of the imagination theory. The first edition of Blondel's work (34) was published anonymously in 1727, at least on the title-page the author was simply described as "a member of the College of Physicians"; but in the second issue (37) of the book, in which were many additions and amplifications of the argument, the writer openly avowed himself, not "out of ostentation," as he said, but to show "that I dare face the enemy."

Blondel arranged his facts and arguments with intent to prove that the current theory was unsupported by experience, by reason, and by anatomy. With regard to experience, he showed that impressions often occurred which were not followed by marks or anomalies in the foetus, and that deformities were met with in cases in which no impression was alleged. Further, he analysed in detail the exceptional cases in which it had been maintained that a definite impression had resulted in the production of a similar mark on the infant; and under such pithily descriptive epithets as "Parey's Frog," "Miss Muscle and the Grenadier," "the Baker bit," "Sir Kenelm Digby's Patch," etc., he subjected to much ridicule the illustrative instances gathered (mostly from Fienus) with great care and apparently with almost perfect faith by Daniel Turner. Having dismissed these, Blondel turned his attention to the story of Jacob and his rods, which curiously enough seems greatly to have exercised him. Most will agree that he was at altogether unnecessary pains to explain away this particular case. The author concluded that there "are so many odds against imagination that the cases related in its favour can never over-balance those which are against it," and in his opinion they "may be compared to an accidental hit of a dream or the predictions of a Fortune-teller, which, now and then, are accomplished."

Blondel, then, having "entirely beat the Imaginationists out of their Entrenchments of Experience," attempted to show that reason also was against the popular belief. Conception, the growth of the embryo, and the determination of its sex were all outside the power of the mother's will. "How," he said, "can anybody believe, without reflecting upon the Wisdom of God, that it is left to her to disfigure the child, and to spoil the regular Work of Nature?" Again, since the woman cannot by her imagination mark her own



body, it does not seem probable that she should be able to act thus on her foetus. Other arguments were advanced, and then the writer pointed out that there exists no communication of nerves between the mother and foetus, and so there could be no communication of thoughts, as alleged by Malebranche and others. In his efforts to absolutely extinguish any flickering flames of belief in the imagination theory, Blondel adopted the erroneous doctrine of the pre-existence of all the parts of the foetus somewhere before conception. By what means, then, can the mother's imagination obliterate the lineaments of the foetus, which were pre-existent to conception and subsisting ever since the creation of the world? Finally, anatomical reasons are adduced to show that there is no direct circulation of blood between mother and foetus, and Blondel refers to the much more probable natural causes of foetal marks, such as intra-uterine diseases or traumatism and heredity..

Blondel's work, which I have thus attempted to epitomize, produced a great effect upon medical opinion all over Europe, and soon numbered adherents in nearly every civilized country. In France, for instance, not only did translations of the English physician's work appear, but Bellet (48) also wrote a book to combat the popular belief in impressions. In Germany, also, Haller (56) to a large extent threw the weight of his authority into the scale against the popular theory; and, in Russia, Roederer (58) did likewise, though with less effect. In Scotland Alexander Monro (39), in his essays on the nutrition of foetuses, showed clearly that he was an opponent of the maternal imagination theory, for he wrote (in 1734) as follows:—"The Liquors sent into the *Foetus* by the umbilical Vein not having their propelling Force communicated from the Mother, the State of the Mother's Pulse cannot affect the Child otherwise than by occasioning Abortion, or vitiating the Fluids that are to be absorbed; and therefore we may be convinced, how vain it is to pretend to account in a physical Way for the Impressions said to be made on Children by the Imaginations of the Mothers." Monro's correct views on foetal physiology along with their bearing on impressions seem, however, to have been overlooked by succeeding writers. Vari (62), in Italy, was at first a supporter of Blondel's position, but afterwards through a personal experience came to change his views. Plancus (55), another Italian, entirely sided with Blondel.

Whilst, however, the spirit of criticism was thus infused into the subject, there was still in the minds of many authorities a firm belief in the potency of maternal impressions as teratogenic factors. Superville (44), for instance, after relating how seven pigs taken from a freshly slaughtered sow all showed the bloody mark of the knife about their necks, proceeded to state his adherence to the theory of the influence of the "disturbed and disordered imagination of females." He referred to certain objections to the belief, and then said,—“I own I do not comprehend it neither. It



does not follow from thence, that we ought to reject as false all that our Reason cannot penetrate into." Gregory (45), writing soon after, seems to have had even less doubt, for he told how a pregnant woman "took prodigious notice" of a monkey with a hood turning on a stick, and how the foetus *in utero* turned over and over in like manner (for were there not twists in the umbilical cord?), and when born was seen to resemble closely a hooded monkey. Nicolai (50) tried to refute Blondel's opinions; but (54) had to admit that monstrosities did not resemble the subjects of the impression.

It must also be borne in mind in estimating the influence of the writings of Blondel and his followers that on the Continent the great weight of Boerhaave's authority (49) had been in favour of the old theory, with certain reservations regarding the sort of impression and its mode of incidence. Boerhaave's commentator, Van Swieten (43), seems to have been much struck by the life-like representation of a caterpillar on the neck of a young girl whose mother had in her pregnancy been impressed by a real caterpillar crawling on her neck. Another defender of the imagination theory was Krause (59), whose dissertation obtained special honour at the Imperial Academy of Science in St Petersburg; he alleged the existence of a nervous communication between the mother's uterus, the placenta, and the foetus, and had no difficulty in understanding how disturbances of the mother could deform the infant, especially since the organs of the latter were so tender.

Boerhaave, however, was not always so fortunate as to have a commentator willing to accept all his views on the subject of maternal impressions. Albert von Haller (66), in fact, did much to support Blondel's criticism, whilst he also established it on more scientific arguments. For instance, he maintained that if there existed a nervous communication between mother and foetus, then the gathering together of the placental nerves in the umbilical cord would constitute so evident a strand of nerve tissue that no observer could possibly overlook it. If, again, the communication was a vascular one—and this might be admitted—how could images of things be transmitted by means of a column of liquid in a tube. The birth of twins of different colour was explicable in a more prosaic manner than by the invocation of the mother's imagination. Nævi, according to Haller, were due to skin disease, and monstrosities were the result of foetal maladies. It does not appear that this author was altogether opposed to the doctrine of impressions, for he seems to have been struck by the fact that children resemble their parents, and to have regarded it as an argument in favour of the theory. Smellie (57), who lived about the same time, was, doubtless, sceptical also, for after noting two cases, he wrote: "Notwithstanding these examples, I have delivered many women of children who retained no marks, although the



mothers had been frightened and surprised by disagreeable objects, and were extremely apprehensive of such consequences."

Morgagni (63) was yet another well-known writer of this period who hesitated about throwing overboard the theory of impressions; he believed that while most cases in which a foetal defect resembled a maternal impression were accidental coincidences, yet some contained another element which he freely confessed that he did not comprehend.

Between the years 1760 and 1780 it ought to be noted that several popular statements of the anti-imaginationist side of the matter were put before the British public in the form of "letters" or "essays" from anonymous authors, addressed to "the ladies" or to "a married lady" (*vide* Nos. 64, 65, and 71). In these works the arguments used by the writers to convince their fair readers are often interesting and even amusing. In one (65), published in 1765, the author says, "a mark which has been foretold has once in 1000 times happened to answer its description; another effect of chance, which may serve to support the prejudice of those who do not reason, but can have no influence on those who, like you, madam, are only convinced by truth." Another author (71), writing in 1772, sums up as follows: "The same chain of ideas, that shows the impropriety of believing the cure of a toothache by a charm; the destruction of warts by turning thief, and stealing raw meat; the cure of the cramp by wearing rosemary, or placing the soles of our shoes uppermost when we go to bed: I say, the same chain of ideas that shows the impropriety of believing these absurdities, will, when applied with a real desire to be informed, whether the imagination in pregnant women possesses the powers ascribed, convince the enquirer that the tales told of the mother's imagination exerted on the foetus, are a collection of falsities formed by superstition and ignorance, and continued by prejudice and credulity."

The last years of the eighteenth century did little to settle the question of the potency of the mother's imagination on the foetal form. We find, in fact, that the minds of the writers of the time were greatly exercised with the side question—a theological one—concerning the result which an acceptance of the imagination theory would have upon the idea formed of the Creator of the Universe. To the discussion of this matter Rickmann (70), Arnold (72), Engelhardt (82), and others devoted themselves; but into their arguments it is unnecessary to enter. Other writers, some for and some against the popular theory, were Eller (68), Kooy (69), Schönwald (73), Schenk (74), Jeunet (75), Bablot (77), Hoffmann (78), Fielitz (79), and Schumann (80); but the enumeration of their names must suffice for the purposes of this sketch.

It may be of interest to the curious to know that near the close of the eighteenth century the money value of a maternal impression (of a patriotic kind) was fixed at 400 francs per annum; for



Geoffroy Saint-Hilaire (*Histoire des Anomalies*, i. p. 332, 1832) records that in the third year of the French Republic an infant was born with the representation of a Phrygian cap of liberty on the left breast, and to the mother the Government awarded the above sum, presumably for patriotism!

*In the Nineteenth Century.*

The nineteenth century opened with the question of maternal impressions still unsolved. Medical opinion took one of three lines: complete belief in the potency of a mother's imagination to mark her foetus in exact resemblance with the object acting upon her mind; or complete disbelief in any such power; or an intermediate line of partial acceptance of the doctrine of maternal mental influence over the infant,—an attempt to reconcile the traditional belief with the spirit of modern scientific inquiry.

It now became increasingly difficult for the trained physician to accept the old doctrine, for the reseaches of the eighteenth century had demonstrated that there was no direct communication between the circulatory system of the mother and that of her foetus, and in the early part of the nineteenth it became evident that no demonstration of a structural nervous union could be given. On the other hand, the effect of these anatomical discoveries concerning the connexion between mother and unborn infant was to some degree discounted by the enunciation of animal magnetism by Mesmer, and its partial acceptance by the medical profession; for if its tenets were correct, there was no longer any need for the demonstration of nerves in the umbilical cord.

In the first year of the century Desgranges (84) published his communication in support of the maternal imagination theory, specially in reference to *nævi materni*, and he has been followed by a long series of writers, some favourable, some inimical, to the doctrine. Besides the authors who have made special contributions to this subject, nearly every one who has written on midwifery, surgery, diseases of children, and dermatology, has ranged himself amongst the believers, the unbelievers, or the neutrals. An enormous literature has, therefore, gathered around the question of the mother and her influence upon her unborn child, and it becomes impossible to do more than point out certain of the more important articles which have dealt with the matter.

If we consider first what the teratologists of the nineteenth century have said on the subject, we shall find a very marked leaning towards the total condemnation of the theory of maternal impressions. Jens Bang (86), it is true, supported the old doctrine, and Jouard (90) took up an intermediate position; but nearly every one else has showed great scepticism, some even passing the subject over in complete silence. Tiedemann (97), in



his work on acephalic foetuses, pointed out that only in one case was an impression recorded; further, he insisted that the fact that one twin was commonly normal whilst the other was so deformed was a strong argument against the theory; and, finally, he propounded the question, What imagination of the mother could be at work to produce in the infant a one-horned uterus or an intestinal diverticulum? Zimmer (89) and Clesius (94) also opposed the imagination theory, and Herholdt (113) entered at great length into its history. We find Etienne G. Saint-Hilaire (111) taking an intermediate position, whilst he pointed out that prolonged moral impressions could have little or no teratogenic effect, as shown by the very small number of monstrosities born in such a large city as Paris. He also noted three cases in which a sudden and sharp impression was the cause of anencephaly, not through the imagination alone, but on account of the sudden uterine contraction thereby produced, and the consequent pressure on the ovum or embryo. He thought that prolonged emotions might weaken the foetus without making it actually monstrous. Isidore G. Saint-Hilaire (124) adopted largely the views of his father in this matter; but he more clearly defined the sphere of action of an impression. Violent and sudden impressions may cause monstrosities in the manner above indicated; moderate or feeble, but long-continued impressions may also, it cannot be denied, produce malformed and even monstrous infants; but it cannot be believed that slight and transient desires, feelings of disgust or of fear, etc., have any influence upon the form of the unborn infant. "*Il est surtout contraire à toutes les données de la science et de la raison, de croire qu'un objet vu, craint ou désiré par la mère, puisse venir, pour ainsi dire, se peindre sur le corps de l'enfant qu'elle porte dans son sein; et la saine physiologie ne peut voir dans cette ancienne croyance qu'un préjugé aussi absurde, et quelquefois aussi dangereux qu'il est ancien.*"

Vrolik, another well-known teratologist, was more clearly an unbeliever than were the Saint-Hilaires, for he admitted nothing further than that a nutritive disturbance in the mother following a severe shock might lead to a defective development of the foetus. Förster (201) enumerated eight arguments against the impression theory, including the statement that most malformations develop in the first month, nay, even in the first week of pregnancy, and therefore at a time when the mother commonly does not know that she is pregnant. He also noted that impressions were common while monstrosities were rare, that there was no direct nervous communication between mother and foetus, and that one twin might be normal and the other malformed. Wonderful stories impressed Förster not at all: "*die Literatur ist voll von solchen Fällen, noch mehr aber die Köpfe der Hebammen und alten Weiber weiblichen und männlichen Geschlechtes.*"

Of the more recent teratologists nearly all have treated the



subject of the influence of the maternal imagination as a silly fable; and in the works of Ahlfeld and Hirst and Piersol there is no reference to it, whilst in those of Taruffi, Guinard, and Blanc it is simply considered from a historical standpoint. E. Martin (259), alone, has argued in favour of a modified form of the old belief. He has stated that imagination plays an undoubted part in the procreation of monstrous forms; but he has also insisted that this part is a mechanical one,—that through the nervous system the uterus is thrown into contraction, and thus undue pressure is brought to bear on the embryo. The occasional occurrence of foetal malformations which resemble the objects causing the maternal nervous disturbance is purely coincidental. Martin seems also to regard the mother's mental state during pregnancy as in some degree modified so as to be more susceptible to impressions.

Alongside of this almost total abandonment of the imagination theory by the teratologists of the nineteenth century, we have to place the extraordinary rejuvenation of the ancient doctrine among the leaders of the medical profession in the United States of America. Between 1839 (the year in which the report of the "Snake-man," Robert H. Copeland, whose mother, when pregnant, had been struck by a rattlesnake, appeared) and the present time papers dealing with maternal impressions, to the number of 143, have been published in American journals. Not only have the contributions been many, but they have also, with few exceptions, been favourable to the imagination theory. Further, amongst those who have most warmly supported the old doctrine were such acute thinkers and weighty authorities as Fordyce Barker (294), Samuel C. Busey (295), and William Goodell (216). Fordyce Barker thought "that the weight of authority must be conceded to be in favour of the doctrine that maternal impressions may affect the development, form, and character of the foetus," and even went so far as to believe that "these causes may act effectively on the ovules before fecundation," alleging in proof the famous "Dundreary Case." Barker also included telegony, or the influence of a previous sire, in the sphere of maternal impressions, a question with which J. Brunton Blaikie has recently dealt (*Teratologia*, ii. 170, 1895). Goodell was, "to a certain extent," converted from a sceptic into a believer by a case of pre-natal circumcision which occurred in his own practice.

It must not, however, be thought that the theory of maternal impressions was unanimously accepted by the profession in the States. On the contrary, J. G. Fisher (213) wrote at length against the popular opinion, but did not add any novel arguments; and Dugas (202), Norman Bridge (223), and Conant (199) were all strong in their opposition. Still, it is evident that at the present time the theory is held strongly by a great many medical men of note on the other side of the Atlantic; for Hubert Work (369),



writing as recently as October 1894, was able to report that out of thirteen physicians (including Penrose, Goodell, Matthew D. Mann, Hatfield, Cooke Hirst, W. A. Edwards, and A. T. King) whose opinion he asked, only one (Hatfield) was emphatic in his disbelief of the statement that "pronounced impressions made upon the mind of a pregnant woman predispose to bodily defects and birth-marks in the child."

The trend of opinion in America is also learned from the study of Dabney's contribution (317) to Keating's *Cyclopædia of the Diseases of Children*, and Edward P. Davis' to Norris' *Text-book of Obstetrics* (p. 213, 1896). Finally, to quote from popular literature, Oliver Wendell Holmes had not a little to say about the result of an "impression" in his fascinating novel *Elsie Venner*. This is by no means the only instance of the belief entering into the fiction of past and present times; for allusions to it are found in Shakespeare's *Merchant of Venice* (Act I., Sc. 3), Scott's *Fortunes of Nigel*, and Sterne's *Tristram Shandy*, while from a casual survey of modern literature I have noted references thereto in Blackmore's *Lorna Doone*, in Henty's *Rujub the Juggler*, in Merriman's *From one Generation to another*, in Egerton's *Keynotes*, and in Cobban's *Red Sultan*.

Whilst the teratologists of this century have practically abandoned the imagination theory, and whilst American writers have in large degree resuscitated the doctrine, surgeons, obstetricians, physiologists, and dermatologists in Europe have held very various opinions thereupon. In Germany, for instance, in the first half of the century there were many who wrote on the power of maternal impressions, among whom were Harting (88), Merle (92), Klein (99), Gittermann (103), Hirsch (104), Wesener (105), Schneider (108, 115, 118), Keyler (120), Braun (123), Späth (125), Kœhler (135), Pauli (136), Rubner (137), Solbrig (143), Droste (153), Hoffmann (154), Straube (157), and Leopold (162). All did not support the old belief; but many did so, and some even went to ridiculous lengths, such as to affirm that the infant's feet were deformed by the mother wearing tight shoes in her pregnancy (108), and to say that the sight by a woman of a one-armed man at the eighth month of her pregnancy could cause the birth of a foetus with one arm wanting. Others, such as Jörg (96) and Meissner (109), argued against the theory, the latter bringing forward some strong clinical evidence. J. Müller (139), the physiologist, also, was a strong opponent of the theory; but Burdach (128), another physiologist, supported it, and thought that the relation between mother and foetus was an occult one, like animal magnetism. In the second half of this century a comparatively small number of German writers have specially written on the subject (including Brach (164), Wagner (166), Ritter (168), van Praag (170), Tassius (172), Willige (175), Adler (176), Santlus (182), Heidelberg (184), Upmann (189), Clemens (190),



Roth (288), Wolff (348), Preuss (356), and the text-book writers); but save in the period 1850 to 1860 the general feeling has been strongly opposed to the ancient doctrine.

In France and Belgium the general trend of opinion during the last hundred years has been much the same as in Germany. Amongst the special writers on the subject must be named Desgranges (84), Martin (85), Clarae-Faget (91), Girard (98), Levêque-Lasource (100), Demangeon (114), Bérard (121), Burggraeve (141), Steinbrenner (144), Guislain (146), Schoenfeld (147), Pigeolet (152), van Camp (159), Bayard (163), Turck (177), Schrevens (217), Liebrecht (232), Loin (255), Liégey (258), Mijnlief (333), Delassus (337), and Variot (346). Burggraeve (141) attempted to give a more scientific aspect to the old theory by combining it with the known facts of embryology: he related how a woman at the third month of pregnancy saw a pig with its throat cut, and feared that her infant might be affected; the child showed a cleft in the throat which the author regarded as due to the want of union of the branchial arches which were separate at the time of the impression. Guislain (146) reported (amongst others) a curious case of aural deformity following a "longing," and Bourgeois (195) concluded that "les impressions profondes ou vivaces de l'imagination occasionnent quelquefois chez l'enfant des vices de conformation." In 1876 Liebrecht (232) wrote in support of the theory of impressions; and as recently as 1891 Delassus (237) related two cases (one of hare-lip and one of anencephaly) which seemed to have confirmed him in his belief in the old doctrine.

In Italy, also, the power of the imagination of the mother in teratogenesis has found defenders and opponents and critics, to some of whom Taruffi (*Storia della Teratologia*, i. p. 242) refers. For instance, Monteggia (87) put on record a case of intra-uterine amputation alleged to be due to the mother seeing many cases of amputations; Barbieri argued against the belief, and suggested more natural explanations of foetal states, and Vannoni (162a) hinted that possibly a predisposing condition was needed in mother and foetus before an impression could become efficient. Fenoglio (106), Viparelli (149), and others contributed further to the literature of the subject in Italy. In Poland, Neugebauer was a believer, as Drzewiecki (339) tells us.

With regard to Great Britain, it would seem that the influence of Blondel (37), Munro (39), and Smellie (57) has been largely effective in preventing a wide acceptance of the imagination theory in the ranks of the profession. Alleged cases have from time to time appeared in the *Lancet* (e.g., those reported by Hoare (116), Canton (129), Rankin (130), Wansbrough (132), O'Shea (155), Dunn (156), Beale (192 and 198), Child (206), Daly (209), and others); the *British Medical Journal* (e.g., those by Curran (203), Houghton (204), Graham (207), Thompson (222), Clapper-



ton (224), Huntley (225), R. J. Lee (226), Sandham (228), Jenkyns (372), Jones (373), and others); the *Medical Times*, the *Dublin Medical Press* (e.g., 140), and the *Glasgow Medical Journal* (e.g., 353); but although these contributions have been fairly numerous, the feeling amongst obstetrical teachers has been inimical to the notion of maternal influence. Ryan (119), for instance, was strongly opposed to it, and so have been many others. Montgomery (182*a*) was an exception, for he wrote, "I cannot help thinking it quite consistent with reason and the present state of our knowledge to believe that a very powerful impression on the mother's mind or nervous system may injuriously affect the foetus, still lodged in her womb, actually a part of herself, and deriving its supply of life from her blood; and this, the more especially, as many instances have been witnessed in which the child *after birth* has suffered seriously by being suckled by a woman labouring under some strong mental impression."

The matter was brought up by myself on two occasions (335, 349) at meetings of the Edinburgh Obstetrical Society, with the general result that no decisive proof for or against was forthcoming, and that the question was still to be regarded as *sub judice*. Barnes is content to leave the problem unsolved; but Ashburton Thompson (248) would seem to have been a believer. Much more might be said concerning British contributions to this vexed question, but it must suffice to note that Everard Home (110) was a supporter of the doctrine, and that Arthur Mitchell (290) may be said to have demonstrated the potency of mental emotion in the causation of idiocy.

Such is, in outline, the history of this teratogenetic theory, extraordinary alike whether its truth be affirmed or denied; wonderful alike in its wide extension in space and time, and its firm hold upon the minds of both profession and laity. To those who wish to see it dead it is most disappointingly vital, to those who wish to demonstrate its truth most strikingly destitute of scientific proof. In its support is a marvellous mass of evidence of the *post hoc ergo propter hoc* kind; arrayed against it are the scientific theories of biology which have been gradually and laboriously built up by the savants of this and of other ages.

From the standpoint of the student of antenatal pathology the theory of maternal impressions must be regarded as a great misfortune. Many instructive cases of foetal disease and deformity have been practically lost to science through the absorption of the observer's mind in ideas of the mental process in the mother which could have caused the state of her infant, and through his desire to trace in the morbid foetal condition a resemblance, often far-fetched indeed, to some animal, vegetable, or mineral. In this sense the theory has been the grave in which a great deal of foetal pathology has been buried; for instead of a case being entitled one



of anencephaly, or of foetal ichthyosis, or of hirsuties or hairy naevus, it has been simply labelled "a curious instance of maternal impressions," "a striking case of the influence of the mother's mind on the foetus," etc. Further, the material thus hidden away is in most cases permanently lost; for a reference to the report usually gives us no anatomical or pathological details to enable us to identify the malady or the malformation, but simply tells us that the infant had a head like a cat or a rat, or was hairy like a bear, or had scales like an alligator or a snake.

The theory has had a maleficent effect on the progress of the study of antenatal pathology. Of that there can be no doubt. But the question whether there is or is not any truth in the theory still remains to be settled. In the historical sketch which has been given I have indicated most of the arguments which the supporters and the opponents of the doctrine have adduced; these I need not again refer to, but may simply state briefly what I regard as the correct view to take of "maternal impressions." In order to centralize our knowledge on the subject, I may ask myself two questions:—(1.) Does a definite impression upon a pregnant woman's mind often or ever cause a defect in the foetus closely resembling the thing producing the impression? and (2.) Has the state of the mother's mind during gestation any effect upon her unborn infant's development?

The first question I answer in the negative, and the second affirmatively. Since I wrote upon the subject some years ago I have very carefully examined the evidence upon which several alleged cases have been founded, I have had opportunities of attending confinements in which all the elements regarded as suitable for the production of the results of an impression were present and in which the children were free from anything at all resembling the impression, and I have very fully acquainted myself with the voluminous literature of the subject. The conclusion drawn is that the cases which have been advanced to prove the potency of maternal impressions have been accidental coincidences, and not the effects of the alleged causes. Their great number may be adduced to prove that the doctrine must contain an element of truth; but it has to be pointed out that, numerous as they are, the cases in which nothing of the kind happened are vastly more numerous. Further, although I do not wish to lay too much stress upon this, no adequate scientific explanation of the *modus operandi* of such impressions has ever been advanced. Whilst I am willing to admit that the mother's nervous system is often in a peculiar state during pregnancy, and whilst I fully recognise the possibility of the mother affecting the foetus with a disease, and *vice versa*, I regard it as impossible for (*e.g.*) the sight of a mutilated individual to be so transmitted mentally by the mother as to cause a foetal amputation resulting in a similar deformity in utero. At the same time,



I must concede that perhaps one case in a hundred presents phenomena which it is very difficult entirely to explain away. One such case I have myself met with; but it seemed to me reasonable enough to think that a more rational explanation of it existed, although as yet unknown, than the influence of the mother's imagination.

With regard to the second question, I think there can be no doubt that prolonged or strongly-marked mental states of the mother may affect the development of the foetus in her uterus. That such can produce abortion none, I fancy, will deny; and that short of producing miscarriage they can also lead, through vascular and nutritive disturbances, to irregularities in embryogenesis is eminently probable. In Paris, it is said, the children that were conceived during the disastrous siege of the Franco-Prussian war can be recognised by bodily and mental stigmata so marked that they have been dubbed "enfants du siège." In reference to this phenomenon Féré (369*a*) says "les enfants qui ont été conçus et portés à certaines époques troublées offrent en grand nombre des troubles de nutrition, des malformations et en particulier des altérations des fonctions du système nerveux." Of course it must be admitted that the poor or bad food and the defective hygiene of such seasons were also operative, still it is reasonable to believe that in part the results were due to the continued and severe terror and constant anxiety incident to a time of siege in modern warfare. In the same way the results are not always teratological, but may, as Féré has also shown (377), be of the nature of sterility, abortion, premature labour, mortality, congenital debility, and retarded growth and development. There are then many causes at work and many resulting phenomena; but amongst the former it is fair to reckon mental emotion, and among the latter monstrosities. To this extent I believe in the old doctrine of maternal impressions; this is, I think, the one grain of truth in an immense mass of fiction and accidental coincidence. The conclusion is also in accordance with the results of experimental teratogeny.

*Note.*—In order that more light may be thrown upon this matter, cases in which mental impressions in pregnancy were followed by the birth of infants in any way abnormal ought to be put on record. For instance, a woman, pregnant four or five weeks, was greatly impressed by the sight of a child with a hare-lip; at the full time all her friends came together to see an infant born similarly affected, but the offspring showed not a hare-lip but a large nævus on the neck (Féré, "Un fait pour servir à l'histoire des bouffées de chaleur et des rougeurs morbides," *Compt. rend. Soc. de biol.*, Oct. 1894). It is by no means certain that this was an instance of cause and effect, but such cases are far worthier of record than are those in which an impression is said to reproduce itself, as regards form and situation, on the infant's body.



## BIBLIOGRAPHY.

[This bibliography must not be regarded as exhaustive ; to have made it so would have entailed the naming of almost every text-book in Midwifery, Pediatrics, Dermatology, and Surgery.]

1. KERCKRINGIUS (T.).—"Monstrum cacodaemonis picturae, quam humanae figurae similis." In his *Specilegium anatomicum*, obs. xxiii. p. 56, 1670. Illustrated. Also, "Imaginationis prodigium," *Ibid.*, obs. lxiv. p. 129. Illustrated.
2. SWAMMERDAM (J.).—*Uteri muliebris fabrica*, p. 29, Leidae, 1672.
3. MALEBRANCHE (N.).—*Recherche de la vérité*, lib. ii., c. 7, Paris, 1674.
4. FIDELIS (F.).—*De relationibus medicorum*, lib. iii., c. 4, p. 405, Lipsiae, 1674.
5. BARTHOLINUS (T.).—"Gravidarum imaginatio," *Acta med. et phil.*, 1673, Hafn., ii. pp. 1-3, 1675.
6. LUDOVICI (D. D.).—"De singulari gravidæ imaginatione et rostro leporino singulari," *Misc. Acad. nat. curios.*, 1673-4, Francof. et Lips., Ann. iv.-v., obs. 208, pp. 293-295, 1676.
7. SEGERUS (G.).—"Gangraena ex terrore materno embryoni impressa," *Misc. Acad. nat. curios.*, 1673-4, Francof. et Lips., Ann. iv.-v., obs. 147, p. 153, 1676.
8. MERCKLINUS (G. A.).—"De gravidæ imaginatione foetui noxia," *Misc. Acad. nat. curios.*, 1677, Vratisl. et Bregae, viii., obs. 46, pp. 73-75, 1678.
9. BAYLE (F.).—*Dissertationes medicae, etc.*, Diss. iii. p. 116, Hagae-Comitis, 1678.
10. BLEGNY (N. DE).—"Vires imaginationis in gravida," *Zodiacus med.-gall.*, 1679, Geneva, i. p. 61, 1680 ; "De viribus imaginationis in praegnante, aliud exemplum," *Ibid.*, p. 62.
11. SOMMERUS (J. G.).—"Imaginationis effectus ex terrore matris in recens nato notatus," *Misc. Acad. nat. curios.*, 1682, Norimb., dec. 2, i. p. 113, 1683.
12. CUCHOTIUS.—"De vi imaginationis in gravida et foetu monstroso," *Zodiacus med.-gall.*, 1683, Geneva, v. p. 249, 1685.
13. DIEMERBROECK (I. DE).—*Opera omnia. Anat.*, lib. i., c. 28, p. 165b, Utrecht, 1685.
14. ALBRECHT (J. P.).—"De imaginatione gravidarum," *Misc. Acad. nat. curios.*, 1687, Norimb., dec. 2, Ann. vi., obs. 14, p. 40, 1688.
15. FEHRIUS (J. L.).—"De imaginatione forti in gravidis foetui plurimum noxia," *Misc. Acad. nat. curios.*, 1687, Norimb., dec. 2, Ann. vi., obs. 30, p. 84, 1688.
16. GÖCKELIUS (E.).—"Infans ex fortissima matris imaginatione, monstrosa Umbilici relaxatione ac intestinorum extra Corpus propendentium prolapsu, natus," *Misc. Acad. nat. curios.*, 1687, Norimb., dec. 2, Ann. vi., obs. 126, p. 263, 1688.
17. DOLÆUS (J.).—*Encyclopædia chirurgica*, Francofurti, 1689.
18. HOFFMANNUS (J. M.).—"De foetu monstroso ex imaginatione matris," *Misc. Acad. nat. curios.*, 1689, Norimb., dec. 2, viii. p. 483-485, 1690. Illustrated.
19. SINIBALDUS (J.).—"An Parentum imaginatio ad foetus generationem concutit Problema," in his *Apollo Bifrons*, p. 133, Romae, 1690.
20. LENTILIUS (R.).—"De ictu bombardæ et gladii, proli per impressionem matris impacta," *Misc. Acad. nat. curios.*, 1694, Lips. et Francof., dec. 3, ii., obs. 117, pp. 176-181, 1695.
21. BANDIERA (G. G.).—"Delle voglie che s'imprimono nel feto rinchiuso nell' utero, etc.," *Galleria di Minerva*, iii., pt. 4, p. 101, Venezia, 1695.



22. REISELIUS (S.).—"De cerebello extra cranium post terrorem gravidæ a fele imposito," *Misc. Acad. nat. curios.*, 1683, dec. 2, ii. pp. 272-275, Norimb., 1698.
23. GAHLRIEP (G. C.).—"De maternæ phantasie in fœtum despotico quasi imperio," *Misc. Acad. nat. curios.*, 1699, dec. 3, vii. and viii. p. 87, Norimb., 1702.
24. DÜTTEL (P. J.).—"De morbis fœtum in utero materno," *Diss. inaug.*, p. 3, Halæ Magdeburgicæ, 1702.
25. ZOUTMANNUS (J.).—"De imaginationis maternæ viribus in fœtum," *Dissertation*, Lugd. Bat., 1702.
26. HOTTINGER (J. H.).—"De monstro humano absque sexu, pedibus, etc. in excrescentiam caudiformem desinente," *Misc. Acad. nat. curios.*, dec. 3, ix. and x., obs. ccxxxiii., p. 413, Norimb., 1706.
27. NIGRISOLI (F. M.).—"Intorno alla generazione dei viventi," p. 5, Ferrara, 1712.
28. TURNER (D.).—"A treatise of diseases incident to the Skin, part 1, c. xii., London, 1714.
29. ST ANDRÉ (N.).—"A short narrative of an extraordinary delivery of Rabbits perform'd by Mr John Howard, Surgeon at Guildford," 2nd edit., London, 1727.
30. AHLERS (C.).—"Some observations concerning the woman of Godlyman in Surrey . . . tending to prove her extraordinary deliveries to be a cheat and imposture," London, 1726.
31. BRAITHWAITE (T.).—"Remarks on a short narrative of an extraordinary delivery of Rabbits," etc., London, 1726.
32. "GULLIVER" (L.).—"The anatomist dissected: or the man-midwife finely brought to bed. Being an examination of the conduct of Mr St Andre, etc.," 2nd edit., Westminster, 1727.
33. MANNINGHAM (Sir R.).—"An exact Diary of what was observ'd during a close attendance upon Mary Toft, the pretended Rabbet-Breeder," London, 1726.
34. ANONYMOUS.—"The strength of imagination in pregnant women examin'd; and the opinion that marks and deformities in children arise from thence, demonstrated to be a vulgar error." By a Member of the College of Physicians, London, 1727. (The author was Blondel.)
35. LINCKIUS (J. H.).—"Fœtus humanus monstrosus similitudinem leonis habere, sed perperam, putatus," *Acta Acad. nat. curios.*, i., obs. lxxiv., p. 128, Norimb., 1727.
36. ZVINGER (D. T.).—"Gemellæ, quarum altera nigra, altera alba," *Acta Acad. nat. curios.*, i., obs. lxxvii. p. 143, Norimb., 1727.
37. BLONDEL (J. A.).—"The power of the mother's imagination over the fœtus examin'd." In answer to Dr Daniel Turner's book, entitled: "A defence of the XIIth chapter of the first part of a treatise De morbis cutaneis," London, 1729.
38. ALBRECHT (J. S.).—"De fœtu abortivo, scroti virilis naevum in nucha gestante," *Acta Acad. nat. curios.*, iii., obs. lxxxviii., p. 290, Norimb., 1733.
39. MONRO (A.).—"Practical corollaries from the Essay on the Nutrition of the Fœtuses of Viviparous Animals." *Med. Essays and Observ.*, ii. p. 238, Edinburgh, 1734.
40. ALBRECHT (J. S.).—"De monstroso gemellorum abortu salutari," *Acta Acad. nat. curios.*, iv., obs. civ., p. 411, Norimb., 1737.
41. ACOLUTHUS (J. C.).—"Insignis deformitas digitorum in manibus puellæ, ex terrore matris gravidæ," *Acta Acad. nat. curios.*, v., obs. xlvi. p. 181, Norimb., 1740.
42. BIANCHI (J. B.).—"De naturali in humano corpore vitiosa, morbosaque generatione historia," Aug. Turinos, 1741.
43. VAN SWIETEN (G.).—"Commentaria in H. Boerhaave Aphorismos," iii., pt. 1. par, 1075, Viennæ, 1743.



44. SUPERVILLE (D. DE).—"Some Reflections on Generation, and on Monsters, with a Description of some particular Monsters," *Philos. Trans.*, xli. (for 1740), pt. 1. No. 456, p. 306, London, 1744.
45. GREGORY (W.).—"An account of a monstrous Foetus, resembling a hooded monkey," *Philos. Trans.*, xli. (for 1741), pt. 2, No. 461, p. 764, London 1744.
46. WOENSEL (J. VAN).—"De vitiosa digitorum conformatione ex praegnantis matris terrore," *Acta Acad. nat. curios.*, vi. p. 243, Norimb., 1742.
47. HUBER (J. J.).—"De miris vis externae ac imprimis imaginationis in mulieres gravidas indeque in embryones effectibus," Cassel, 1743.
48. BELLETT (I.).—"Lettres sur le pouvoir de l'imagination des femmes enceintes. Où l'on combat le préjugé qui attribue à l'imagination des mères le pouvoir d'imprimer sur le corps des enfans renfermés dans leur sein la figure des objets qui les ont frappés," Paris, 1745.
49. BOERHAAVE (H.).—"Praelectiones academicae in proprias institutiones," (edition by A. von Haller), iv., pt. 2, p. 261, Taurini, 1742-45.
50. NICOLAI (E. A.).—"Gedancken von der Erzeugung des Kindes im Mutterleibe," Halle, 1746.
51. ANDRIESSEN (J. J.).—"De maternarum imaginationum et animi pathematum in foetum efficacia," *Dissertation*, Traj. ad Rhenum, 1748.
52. HUBER (J. J.).—"Observationes atque cogitationes nonnullae de monstis," Cassel, 1748.
53. MATERNUS DE CILANO (G. C.).—"De foetu cum duabus cotyledonibus vertici adnatis excluso," *Acta Acad. nat. curios.*, viii., p. 343, Norimb., 1748.
54. NICOLAI (E. A.).—"Gedancken von der Erzeugung der Misgeburthen und Mondkälber," p. 64, Halle, 1749.
55. PLANCUS (J.).—"De monstis ac monstrosis quibusdam, etc.," Venetiis, 1749.
56. HALLER (A. VON).—"Descriptio fetus bicipitis," in *Opuscula sua anatomica*, p. 150, Gottingae, 1751.
57. SMELLIE (W.).—"Treatise of Midwifery," ii., cases 89 and 90, London, 1754.
58. ROEDERER (J. G.).—"De vi imaginationis in foetum negato quando gravidae mens a causâ quâcunque violentiore commovetur," St Petersburg, 1756.
59. KRAUSE (K. C.).—"Quaenam sit causa proxima mutans corpus foetus, non matris gravidae, hujus mente a causa quadam violentiore commota," St Petersburg, 1756. (German translation by Wichmann, under title "Abhandlung von den Muttermälern," in 1758.)
60. CORVELLI (G. S.).—"An stigmata foetus a phantasia matris," Pisis, 1757.
61. LUDWIG (C. G.).—" [Pr.] de fallaci judicio vulgi super vi imaginationis maternae in foetum," Lipsiae [1759].
62. VARI (I.).—"Ragionamento in aggiunta alla Dissertazione," del Signor G. Blondel, p. 175, Ferrara, 1760.
63. MORGAGNI (J. B.).—"De sedibus et causis morborum," Epist. 48, Venetiis, 1761.
64. ANONYMOUS.—"Effects of imagination on pregnant women disproved, in a letter from an eminent physician to a married lady," *Gentleman's Mag. and Hist. Chron.*, xxxiv., p. 455, London, 1764.
65. ANONYMOUS.—"Letters on the force of the imagination in pregnant women. Wherein it is proved, by incontestible arguments, drawn from both reason and experience, that it is a ridiculous prejudice to suppose it possible for a pregnant woman to mark her child with the figure of any object she has longed for." London, 1765.
66. HALLER (A. VON).—"Elementa Physiologiae," viii., lib. 29, p. 129, Bern, 1766.
67. KALTSCHMIED (C. F.).—" [Pr.] de embryone hernioso trium mensium," Jenae [1767].



68. ELLER.—“Recherches sur la force de l'imagination des femmes enceintes sur le fœtus, à l'occasion d'un chien monstrueux,” *Mém. Acad. roy. de Prusse*, v. p. 166, Avignon, 1768. Illustrated.
69. KOOY (A.).—“De imaginatione gravidarum,” *Dissertation*, Lugd. Bat., 1768.
70. RICKMANN (C.).—“Von der Unwahrheit des Versehens und der Hervorbringung der Muttermahle durch die Einbildungskraft,” Jena, 1770.
71. ANONYMOUS.—“An essay on the force of the imagination in pregnant women,” London, 1772.
72. ARNOLD.—Ged. von der Zuverlässigkeit der Meinung: Die Mutter wirke in der Bildg. d. Frucht durch ihre Einbildg.,” Leipzig, 1775.
73. SCHONWALD (C. G.).—“Nachricht von einer schwangern Frau, welche sich an einem Affen versehen, und wodurch an dem Kinde eine besondere widernatürliche Bildung verursacht worden,” *Berl. Samml. z. Beförd. d. Arzneyw.*, vi. p. 565, and viii. p. 56, Berlin, 1774 and 1776. Illustrated.
74. SCHENK (F. C.).—“Vis ac potentia animi gravidæ mulieris in fœtum denuo asserta et vindicata,” *Dissertation*, Lipsiæ [1786].
75. JEUNET.—“Réflexions sur le préjugé que l'imagination des mères peut influer sur les enfans, de manière à produire sur leurs corps des taches, ou d'autres difformités,” *Journ. de méd., chir., pharm.*, etc., lxxi. p. 418, Paris, 1787.
76. KRAUSE (K. C.).—“Von der Wirkung und dem Einflusse der Einbildungskraft der Mutter auf die Frucht, aus Gründen und häufigen Erfahrungen erwiesen,” Leipzig, 1787.
77. BABLOT (B.).—“Sur le pouvoir de l'imagination des femmes enceintes,” *Thesis*, Paris, 1788.
78. HOFFMANNUS (C. L.).—“Disquisitio, an malæ conformationes fœtuum, labia leporina, excrescentiæ variæ, naevique materni a matris imaginatione originem ducant,” in his *Opusc. lat.*, p. 193, Monast. Westphal., 1789.
79. FIELITZ.—“Etwas vom dem sogenannten Versehen,” *Arch. f. d. Geburtsh.*, ii., 4st., p. 73, Jena, 1789-90.
80. SCHUMANN (G. A.).—“De vi imaginationis gravidæ in fœtum,” *Dissertation*, Vitebergæ [1790].
81. SOEMMERING (S. T.).—“Abbildungen und Beschreibungen einiger Missgeburten,” § 83, Mainz, 1791.
82. ENGELHARDT (J. P.).—“Morbus hominum a prima conformatione usque ad partum,” pp. 11 and 14, *Diss. Inaug.*, Jenæ, 1792.
83. WELGE (J. C.).—“Ueber die Wirkung der Einbildungskraft der Schwangeren auf einzelne Theile ihrer Frucht,” *Stark's Archiv für d. Geburtshilfe, Frauenz. u. neugeb. Kinder-Krankh.*, v., st. 3, p. 569, Jena, 1794.
84. DESGRANGES (J. B.).—“Observations sur le pouvoir ou l'influence de l'imagination des femmes enceintes sur le fœtus,” *Rec. d. actes Soc. de Santé de Lyon*, ii. p. 69, 1801.
85. MARTIN.—“Rapport sur le mémoire du citoyen Desgranges, de Morges, en Suisse, dans lequel il établit, par plusieurs observations, que les taches des enfans, nævi materni, sont produites par l'imagination de la mère,” *Rec. d. actes Soc. de Santé de Lyon*, ii. p. 83, 1801.
86. BANG (J.).—“Abhandlung über eine Missgeburt,” (Transl.), Kopenhagen and Leipzig, 1801.
87. MONTEGGIA (G. B.).—“Instituzioni chirurgiche,” v., c. 28, art. 722, Milan, 1803-1816.
88. HARTING (H. F.).—“De imaginationis maternæ in fœtum efficacia,” *Diss.*, Gottingæ, 1805.
89. ZIMMER (J. C.).—“Physiologische Untersuchungen über Missgeburten,” p. 35, Rudolstadt, 1806.
90. JOUARD.—“Des monstruosités et bizarreries de la nature,” Paris, 1806.
91. CLARAE-FAGET (A. J. C. J.).—“L'imagination des femmes enceintes contribue-t-elle aux défauts corporels que les enfans apportent en venant au monde ?” *Thèse*, Paris, 1809.



92. MERLE (F. X.).—"De matris imaginatione in foetus formationem efficaci." *Diss.*, Augustae Vindelicorum, 1810.
93. ANONYMOUS.—"Betrachtungen über die Einwirkung von Seiten der Mutter auf die Frucht," *Ασκληπιειον*, i. pp. 145, 177, 193, Berl., 1811.
94. CLESIIUS (J.).—"Etwas für Eheleute über Entstehung und Verhütung der Missgeburten," p. 40, Hadamar, 1812.
95. MARTIN.—"Lettre au secrétaire général sur un vice de conformation," *Journ. gén. de méd., chir., et pharm.*, xlv. p. 21, Paris, 1812.
96. JÖRG (J. C. G.).—"Schriften zur Beförderung der Kenntniss des menschlichen Weibes," pt. 1, pp. 70-109, Nürnberg., 1812.
97. TIEDEMANN (F.).—"Anatomie der kopflosen Missgeburten," par. 88, p. 100, Landshut, 1813.
98. GIRARD.—"Les difformités que les enfans apportent en naissant, ont-elles été déterminées par les impressions que les mères ont ressenties pendant leurs grossesses?" *Journ. gén. de méd., chir., et pharm.*, xlvi. p. 13, Paris, 1813.
99. KLEIN (C.).—"Auch etwas über das sogenannte Versehen der Schwangern," *Journ. f. Geburtsh.*, i. p. 259, Frankf. a. M., 1813-1815.
100. LEVÉQUE-LASOURCE.—"Des signes de naissance, ou de l'influence de l'imagination et des maladies sur la formation du foetus humain et ses difformités," *Journ. de méd., chir., pharm., etc.*, xxxiii. p. 27, Paris, 1815.
101. PASCALIS (F.).—"Nævi Materni; or remarks on the respective influence of Imagination and Disease in the Formation and Deformities of the Human Foetus," *Med. Reposit.*, N.S., ii. p. 1, N. Y., 1815. Illustrated.
102. VIEILLARD (J. N. A.).—"De l'influence des passions de la mère sur le foetus contenu dans son sein." *Thèse*, Paris, 1815.
103. GITTERMANN (J. W.).—"Ueber das sogenannte Versehen des Schwangeren Weibes," *Journ. f. Geburtsh.*, ii. p. 390, Frankf. a. M., 1815-1818.
104. HIRSCH (G.).—"Von der Einwirkung der Einbildungskraft der Schwangeren auf den Fötus, oder von dem Versehen." *Diss.*, Würzburg, 1818.
105. WESENER.—"Ein Paar Worte über Muttermähler und das Versehen der Schwangeren, als oftmalige Ursache derselben; nebst Beschreibung und Abbildung eines sehr hässlichen Muttermahls," *Journ. d. pract. Heilk.*, xlvii., 4 st., p. 26, Berlin, 1818.
- 105A. SALGUES (J. V. A.).—"Traité des erreurs et préjugés répandus dans les diverses classes de la société," Paris, 1818.
106. FENOGLIO (G. C.).—"Effetti dell' immaginazione materno sul feto." *Ann. univ. di med.*, xxiv. p. 157, Milano, 1822.
107. TOONE (J.).—"Influence of the Maternal Imagination on the Foetus," *Lond. Med. Reposit.*, N.S., i. p. 478, 1824.
108. SCHNEIDER.—"Besonderer Nachtheil der engen Schuhe für Schwangere," *Ztschr. f. d. Staatsarznk.*, ix. p. 37, Erlangen, 1825.
109. MEISSNER (F. L.).—"Forschungen des Neunzehnten Jahrhunderts," etc., i. p. 50, Leipzig, 1826. (Also in iii. p. 4, and iv. p. 58.)
110. HOME (E.).—"On the Existence of Nerves in the Placenta," *Phil. Trans.*, p. 66, London, 1825, illustrated; also *Rev. in Edinb. Med. and Surg. Journ.*, xxv. p. 134, 1826.
111. GEOFFROY SAINT-HILAIRE (E.).—Article "Monstre" in *Dict. classique d'histoire naturelle*, xi. p. 40, 1827.
112. MOMBERT (P.).—"De imaginationis maternae vi in foetum." *Diss.*, Marburgi, 1827.
113. HERHOLDT (J. D.).—"Betragtninger over Misfostere i Almindelighed." Kjöbenhavn, 1828.
114. DEMANGEON (J. D.).—"De l'imagination considérée dans ses effets directs . . . et indirects sur les produits de la gestation," Paris, 1829.
115. SCHNEIDER.—"Ueber Versehen der Menschen und Thiere," *Journ. f. Geburtsh.*, Frankf. a. M., x. p. 86, 1831; xvi. p. 121, 1837. Illustrated.



116. HOARE (J.).—"Extraordinary circumstance" [child would not speak to any male], *Lancet*, i. for 1831-2, p. 441.
117. WINSLOW (F.).—"An inquiry into the probability of the Mind of the Mother influencing the Health and Formation of the Fœtus in utero," *London Med. and Surg. Journ.*, i. p. 621, 1832.
118. SCHNEIDER.—"Merkwürdige Einwirkung der Einbildungskraft einer Mutter auf ihr noch im Fruchthälter befindliches Kind," *Wchnl. Beitr. z. med. u. chir. Klin.*, ii. p. 369, Leipzig, 1833.
119. RYAN.—"On the Physical Education and Diseases of Infants and Children; Maternal Influence on the Embryo; Monstrosities," *London Med. and Surg. Journ.*, iv. p. 170, 1833-4.
120. KEYLER.—"Ein Beitrag zur Geschichte des Versehens der Schwangern," *Med. Cor.-Bl. d. württemb. ärztl. Ver.*, iii. p. 295, Stuttgart, 1834.
121. BÉRARD (J. B.).—"Causes de la monstruosité et autres anomalies de l'organisation humaine rapportées vulgairement à l'influence de l'imagination maternelle." *Thèse*, Paris, 1835.
122. ANDREAE, SOMMER, and KLUGE.—"Beiträge zur Lehre von dem sogenannten Versehen der Schwangern," *Med. Ztg.*, v. p. 189, Berlin, 1836.
123. BRAUN.—"Ueber das Versehen der Schwangern, und die dagegen geheischten polizeilichen Maassregeln," *Ztschr. f. d. Staatsarznk*, xxxi. p. 296, Erlangen, 1836.
124. SAINT-HILAIRE (I. GEOFFROY).—*Histoire . . . des Anomalies*, iii. p. 540, Paris, 1836.
125. SPÄTH.—"Beiträge zur Geschichte des Versehens der Schwangern," *Med. Cor.-Bl. d. württemb. ärztl. Ver.*, vii. p. 46, Stuttgart, 1837.
126. WEBB (N. S.).—"Extraordinary case of a Child, in utero, affected by the injury of its Mother by Burning," *Transylv. Journ. Med.*, x. p. 418, Lexington, Ky., 1837.
127. RIDGE (D.).—"Death of a Child from Fright of the Mother," *London Med. Gaz.*, xxi. p. 193, 1837-8.
128. BURDACH (C. F.).—"Die Physiologie als Erfahrungswissenschaft," 2nd edit. (von Baer), ii. p. 122, Leipzig, 1837.
129. CANTON (E.).—"Monstrous Birth; does the Mind of the Mother influence the Formation of her Offspring?" *Lancet*, i. p. 771, 1838-9.
130. RANKIN (D. R.).—"The Influence of the Imagination on the Fœtus in utero," *Lancet*, i. for 1838-9, p. 835.
131. THOMSON (F. H.).—"Influence of Imagination on the Development of the Fœtus exerted at the period of Conception or afterwards," *London Med. Gaz.*, xxiii. p. 764, 1838-9.
132. WANSBROUGH (T. W.).—"Supposed Effects of Fright of the Mother on the Fœtus," *Lancet*, i. for 1838-9, p. 759.
133. ANONYMOUS.—"A Physiological Phenomenon, or the Snake Man, Robert H. Copeland," *Boston Med. and Surg. Journ.*, xx. p. 98, 1839.
134. H. (B.).—"Embryotic Influences," *Boston Med. and Surg. Journ.*, xx. p. 361, 1839.
135. KOEHLER (F. W.).—"Ueber das sogenannte Versehen der Schwangern," *Journ. d. Chir. u. Augenh.*, xxviii. p. 466, Berlin, 1839.
136. PAULI (F.).—"Das Versehen der Schwangern," *N. Ztschr. f. Geburtsh.*, vii. p. 259, Berlin, 1839.
137. RUBNER (C. F. H. G.).—"Ueber das sogenannte Versehen der Schwangern," *Diss.*, Erlangen, 1839.
138. T. (W. J.).—"A case illustrative of the Influence of the Mother upon the Fœtus in utero," *Med. Times*, i. p. 235, London, 1839.
139. MÜLLER (J.).—"Handbuch der Physiologie des Menschen," ii. p. 574, Koblenz, 1840.
140. NEILL (H.).—"Influence of the Mother's Imagination on the Fœtus in utero," *Dublin Med. Press*, iv. p. 243, 1840.



141. BURGGRAEVE (A.).—"De l'influence de l'imagination de la mère dans la production de la monstruosité," *Ann. de gynéc. et pédiat.*, 2 s., i. p. 115, Bruxelles, 1840-41.
142. S. (L. P.).—"Influence of Maternal Feelings; Acephalous Child," *Boston Med. and Surg. Journ.*, xxiv. p. 72, 1841.
143. SOLBRIG.—"Ueber das Versehen der Schwangern," *Med. Cor.-Bl. bayer. Aerzte*, ii. p. 33, Erlangen, 1841.
144. STEINBRENNER (C.).—"Influence des affections morales vives de la mère sur la conformation et le développement du fœtus," *Expérience*, vii. p. 257, Paris, 1841.
145. FEUCHTERSLEBEN (E. F. VON).—"Die Frage vom Versehen der Schwangern, zergliedert," *Verhandl. d. k. k. Gesellsch. d. Aerzte zu Wien*, i. p. 420, 1842.
146. GUISLAIN.—"De l'influence des actes sensoriaux de la mère sur le développement du fœtus," *Ann. Soc. de méd. de Gand*, x. pp. 205-280, 1842. "Rap. de Burggræve," *Bull. Soc. méd. de Gand*, viii. p. 29, 1842.
147. SCHOENFELD (M.).—"Opinion sur les effets du moral de la mère sur le développement du fœtus," *Ann. Soc. de méd. de Gand*, x. p. 169, 1842; "Rap. de Burggræve," *Bull. Soc. de méd. de Gand*, viii. p. 29, 1842.
148. TUBBS (W. J.).—"Influence of Mental Impressions on the Fœtus in utero," *Prov. Med. and Surg. Journ.*, v. p. 268, London, 1842.
149. VIPARELLI (F.).—"Sulla influenza che ha sul germe la fantasia d'una pregnante," *Diss.*, Naples, 1842.
150. KESTIVEN (W. B.).—"Effect of Maternal Imagination on the Fœtus," *Med. Times*, vii. p. 126, London, 1842-3.
151. BUCHMÜLLER (F.).—"Beitrag zur Thatsache über das sogenannte Versehen bei Schwangeren," *Oesterr. med. Wochnschr.*, p. 790, Wien, 1843.
152. PIGEOLET.—"Grossesse de six mois, frayeur de la mère suivie de maladie et de mort du fœtus; accouchement à terme," *Arch. de la méd. belge*, xi. p. 77, Bruxelles, 1843.
153. DROSTE (A.).—"Unbestreitbare Fälle von sogenanntem Versehen der Schwangeren," *Ztschr. f. d. ges. Med.*, xxv. p. 289, Hamburg, 1844.
154. HOFFMANN.—"Angeborene Missbildung in Folge von Versehen der Schwangeren," *Med. Ztg.*, xiii. p. 95, Berlin, 1844.
155. O'SHEA (M. D.).—"Influence of Maternal Impressions on the Fœtus," *Lancet*, i. for 1844, p. 544.
156. DUNN.—"Influence of the Mother on the Fœtus," *Lancet*, i. for 1845, p. 425.
157. STRAUBE (H.).—"De vi imaginationis maternae in foetum," *Diss.*, Berolini [1846].
158. BRAUN.—"Die Phantasieen der Aerzte in Betreff des Versehens der Schwangeren," *Ztschr. f. d. Staatsarznk.*, liii. p. 473, Erlangen, 1847.
159. VAN CAMP.—"Influence des impressions morales de la mère sur la produit de la conception," *Ann. Soc. de méd. d'Anvers*, iv. p. 462, 1847.
160. BURDON.—"On the causes of Monstrous Births, and especially upon the supposed Influence of the Imagination of the Parturient Woman," *Dublin Med. Press*, xx. p. 337, 1848.
161. BIRD (F.).—"Ueber den Einfluss der Einbildungskraft einer Mutter auf die Frucht," *Allg. Ztschr. f. Psychiat.*, vi. p. 35, Berlin, 1849.
162. LEOPOLD.—"Vom Versehen Schwangerer," *Wochnschr. f. d. ges. Heilk.*, xv. p. 114, Berlin, 1849.
- 162A. VANNONI (P.).—"Sull'ernia cerebrale anteriore e posteriore," *Gaz. med. Toscana*, 2 s., i. p. 145, Firenze, 1850.
163. BAYARD (H.).—"Considérations médico-légales sur l'influence des impressions physiques et morales pendant la grossesse," *Ann. d'hyg.*, xlv. p. 145, Paris, 1851.
164. BRACH (B.).—"Das Versehen der Schwangern," *N. Ztschr. f. Geburtshk.*, xxix. pp. 1-54, Berlin, 1851.



165. FEARN (R. L.).—"Case where the Impressions received by a Mother, during her Pregnancy affected the Child in utero," *Proc. Med. Assoc. Alabama*, 1850, p. 9, Mobile, 1851.
166. WAGNER.—"Das Versehen der Schwangern," *N. Ztschr. f. Geburtsk.*, xxx. p. 52, Berlin, 1851.
167. BRAMAN (I. G.).—"Influence of the Imagination or Will upon the Pregnant Woman," *Boston Med. and Surg. Journ.*, xlv. p. 398, 1852.
168. RITTER (B.).—"Zur Würdigung des Volksglaubens an das Versehen der Schwangeren, von Seite der Medicinalpolizei," *Ver. deutsche Ztschr. f. d. Staats-Arznk.*, xi. p. 215, Freiburg i. Br., 1852.
169. SLUSSER (L.).—"Influence of the Imagination of the Mother upon the Fœtus," *Med. Exam.*, N.S. viii. p. 344, Philadelphia, 1852.
170. VAN PRAAG (J. L.).—"Bemerkungen zu der Abhandlung;" "Das Versehen der Schwangeren von Dr Brach," *Monatschr. f. Geburtsk. u Frauenkr.*, ii. p. 198, Berlin, 1853.
171. STORER.—"Cases of Arrest of Development, Blemishes, etc., in Infants, attributed to strong mental action in the Mother while Pregnant; discussion upon the question whether such action of the Mind be ever a cause of such observed results," *Amer. Journ. Med. Sc.*, N.S., xxv. p. 356, Philadelphia, 1853.
172. TASSIUS.—"Das Versehen der Schwangeren," *Ztschr. f. d. Staatsarznk.*, Erlangen, 1853, p. 44. Ergänzshft., 224.
173. HARTWELL (J. M.).—"Maternal Influence on the Fœtus, as exhibited in a Cat," *Nelson's North. Lancet*, viii. p. 126, Plattsburg, 1853-4.
174. WALKER (J.).—"Incurable Disease of the Heart in a Child, the result of Fright on the part of the Mother," *Nelson's North. Lancet*, viii. p. 191, Plattsburg, 1853-4.
175. WILLIGE (F.).—"Einiges über das sogenannte Versehen der Schwangeren," *Ztschr. d. deutsch. Chir.-Ver.*, viii. p. 365, Magdeburg, 1854.
176. ADLER.—"Versehen in der Schwangerschaft," *Cor.-Bl. d. deutsch. Gesellsch. f. Psychiat.*, ii. p. 161, Neuwied, 1855.
177. TURCK (L.).—"De la puissance de l'imagination maternelle sur la production des monstres," *Rev. de therap. méd.-chir.* (iii.), p. 600, Paris, 1855.
178. FRARIERE (A. DE).—"Education antérieure; influences maternelles pendant la gestation, etc," Paris, 1855.
179. DAVIDSON (A. A.).—"Effect of the Mind on Fœtus," *Nashville Journ. Med. and Surg.*, N.S., xi. p. 317, 1856.
180. M'GINTIE (E.).—"Case of Arrest of Development in a Child caused by a Mental Emotion in the Mother," *St Louis Med. and Surg. Journ.*, xiv. p. 218, 1856.
181. VOLTOLINI.—"Vom Versehen der Schwangeren," *Cor.-Bl. d. deutsch. Gesellsch. f. Psychiat.*, iii. p. 107, Neuwied, 1856.
182. SANTLUS.—"Zur Lehre von den angeborenen Bildungsfehlern und dem Einfluss der Einbildungskraft auf die Entwicklung," *Journ. f. Kinderkr.*, xxvi. p. 194, Erlangen, 1856.
- 182A. MONTGOMERY (W. F.).—"The Signs and Symptoms of Pregnancy," 2nd edition, p. 17, London, 1856.
183. HEDDENS (W. J.).—"Remarkable case of Mental Influence of the Mother upon a Fœtus in utero," *Amer. Journ. Med. Sc.*, N.S., xxxiii. p. 558, 1857.
184. HEIDELBERG (B. A.).—"Beitrag zu dem sogenannten Versehen während der Schwangerschaft," *Org. f. d. ges. Heilk.*, vi. p. 87, Berlin, 1857.
185. KERR (S. L.).—"Mental Influence of Mother on Fœtus in utero exerted through two successive Pregnancies," *Amer. Journ. Med. Sc.*, N.S., xxxiv. p. 285, Philadelphia, 1857.
186. MOORE (W. P.).—"Influence of the Mother upon the Fœtus in utero," *South Journ. Med. and Phys. Sc.*, vi. p. 120, Knoxville, 1857; also *Nashville Journ. Med. and Surg.*, xiii. p. 34, 1857.



187. ANONYMOUS.—"Vom Versehen der Schwangern," *Bl. f. gerichtl. Anthropol.*, viii., 6 Heft, p. 48, Nürnberg, 1857.
188. KENNARD (T.).—"Mental Influence of the Mother exerted on the Fœtus in utero," *St Louis Med. and Surg. Journ.*, xvi. p. 199, 1858.
189. UPMANN.—"Das Versehen der Schwangern," *Cor.-Bl. d. deutsch. Gesellsch. f. Psychiat.*, v. p. 185, Neuwied, 1858.
190. CLEMENS (T.).—"Die angeborenen Bildungsfehler und die Unabhängigkeit ihres Entstehens vom Seelenleben der Mutter," *Monatschr. f. Geburtsk. u. Frauenkr.*, xiii. p. 376, Berlin, 1859.
191. WOODWARD (B.).—"Powerful Mental Impressions a cause of Deformity of the Fœtus in utero," *Med. and Surg. Reporter*, iii. p. 26, Philadelphia, 1859-60.
192. BEALE (J. S.).—"Monstrosity and Maternal Impression," *Lancet*, ii. for 1860, p. 430.
193. GUDGER (M. W.).—"On the Influence of the Mother's Mind on the Fœtus in utero," *Nashville Journ. Med. and Surg.*, xix. p. 124, 1860.
194. WATSON (J. M.).—"On the Influence of the Mother's Mind on the Fœtus in utero," *Nashville Journ. Med. and Surg.*, xviii. p. 97, 1860.
195. BOURGEOIS (L. X.).—"De l'influence des maladies de la femme pendant la grossesse, etc.," *Mém. de l'Acad. de Méd.*, xxv. p. 444, Paris, 1861.
196. DAVIES (N. M.).—"Influence of the Mother's Mind upon the Fœtus in utero," *Nashville Journ. Med. and Surg.*, N.S., xx. p. 412, 1861.
197. TOLAND (H. H.).—"On the Influence of Mental Impressions experienced by the Mother during Pregnancy, both on the Physical and Mental Development of the Child," *Pacific Med. and Surg. Journ.*, v. p. 297, San Francisco, 1862-3.
198. BEALE (J. S.).—"Case of Maternal Impression," *Lancet*, ii. for 1863, p. 27.
199. CONANT (D. S.).—"The Science, Causes, and Anatomical Peculiarities of Human Monstrosities," *Trans. N. York Acad. Med.*, ii. pp. 267-298, 1857-1863.
200. WHITELAW (W.).—"Mind and Matter; the Influence of Mental Impressions on the Fœtus in utero," *Glasgow Med. Journ.*, N.S., xi. p. 165, 1863-64.
201. FÖRSTER (A.).—"Die Missbildungen des Menschen," 2nd edit., p. 4, Jena, 1865.
202. DUGAS (L. A.).—"Remarks upon the supposed Influence of the Mother on the production of Nævi Materni, or Congenital Marks, and other Deformities," *South. Med. and Surg. Journ.*, 3 S., i. p. 317, Augusta, 1866-7.
203. CURRAN (J. W.).—"Case of Monstrosity dependent on Mental Shock," *Brit. Med. Journ.*, ii. for 1867, p. 468.
204. HOUGHTON (J. H.).—"Maternal Impression," *Brit. Med. Journ.*, ii. for 1867, p. 468.
205. ATWOOL (H. C.).—"Education anterior to Birth," *Quart. Journ. Psych. Med.*, ii. p. 322, New York, 1868.
206. CHILD (E.).—"A Case of Maternal Impression," *Lancet*, ii. for 1868, p. 599.
207. GRAHAM (T. H.).—"Effects of Mental Shock upon the Fœtus in the Fifth Month of Pregnancy," *Brit. Med. Journ.*, i. for 1868, p. 51.
208. HAMMOND (W. A.).—"On the Influence of the Maternal Mind over the Offspring during Pregnancy and Lactation," *Quart. Journ. Psych. Med.*, ii. p. 1, New York, 1868.
209. DALY (F. H.).—"A Case of Maternal Impression," *Lancet*, i. for 1869, p. 110.
210. HOBBS (W.).—"The Influence of the Mind of the Mother upon the Fœtus in utero," *Cincin. Lancet and Obs.*, xii. p. 605, 1869.
211. VANNUYS (D. H.).—"Uterine Sympathy; a Case," *Cincin. Med. Repert.*, ii. p. 235, 1869.



212. WARING-CURRAN (J.).—"On Maternal Impressions," *Med. Press and Circ.*, viii. p. 320, London, 1869.
213. FISHER (G. J.).—"Does Maternal Mental Influence have any Constructive or Destructive Power in the Production of Malformation or Monstrosities at any stage of Embryonic Development?" *Amer. Journ. Insan.*, xxvi. p. 241, Utica, 1869-70.
214. WILLIAMSON (T. S.).—"Influence of the Mother's Mind on the Fœtus in utero," *Nashville Journ. Med. and Surg.*, N.S., v. p. 276, 1869-70.
215. MINOT.—"Deformity in the Fœtus apparently produced by Mental Impression on the Mother," *Boston Med. and Surg. Journ.*, lxxxiii. p. 344, 1870.
216. GOODELL.—"Case of Birth-mark from Maternal Impressions," *Amer. Journ. Obst.*, iv. p. 131, 1871.
217. SCHREVEVS (E.).—"Observation tendant à prouver l'influence des impressions morales de la mère sur le développement du fœtus," *Bull. Soc. de Méd. de Gand.*, xxxviii. pp. 327, 330, and 333, 1871.
218. BAILEY (F. K.).—"Maternal Influence upon the Fœtus in utero," *Med and Surg. Reporter*, xxviii. p. 420, Philadelphia, 1873.
219. ATKINSON (W. B.) and Others.—"Remarks upon Mother's Marks and Fœtal Deformities, with Cases," *Phila. Med. Times*, iv. p. 715, 1873-4.
220. STAPLES (F.).—"Congenital Deformity from Impression upon the Mind of the Mother," *Northwest. Med. and Surg. Journ.*, iv. p. 317, St Paul, Minn., 1873-4.
221. LEDERER.—"Das Versehen bei schwangeren Frauen," *Wien. Med. Presse*, xv. p. 1220, 1874.
222. THOMPSON (C. M.).—"Maternal Impressions on the Fœtus in utero," *Brit. Med. Journ.*, i. for 1874, p. 469.
223. BRIDGE (N.).—"Do Mental Emotions in a Pregnant Woman produce Deformity in her Child?" *Chicago Med. Journ. and Exam.*, xxxii., p. 577, 1875.
224. CLAPPERTON (J.).—"Maternal Impressions," *Brit. Med. Journ.*, i. for 1875, p. 169.
225. HUNTLEY (R.).—"Maternal Impressions," *Brit. Med. Journ.*, i. for 1875, p. 267.
226. LEE (R. J.).—"Maternal Impressions," *Brit. Med. Journ.*, i. for 1875, p. 166.
227. ORMROD (F.).—"Influence of Mental Impressions on the Fœtus," *Lancet*, i. for 1875, p. 393.
228. SANDHAM (W. H.).—"Maternal Impressions," *Brit. Med. Journ.*, i. for 1875, p. 499.
229. COLEMAN (R. T.).—"Fœtal Deformity; Hernia Cerebri; so-called Hermaphrodism; Maternal Impression?" *Virginia Med. Month.*, ii. p. 828, Richmond, 1875-6.
230. JOYNES (L. S.).—"Effect of Mental Impressions, affecting the Parents, upon the Physical and Mental Condition of the Child," *Virginia Med. Month.*, ii. p. 831, Richmond, 1875-6.
231. GRANVILLE (J. M.).—"Ideation in utero," *Lancet*, ii. for 1876, p. 851.
232. LIEBRECHT (P.).—"Observation d'un cas de difformité congénitale du nez, avec quelques réflexions sur l'influence des impressions maternelles sur la conformation du fœtus," *Journ. de méd. chir. et pharmacol.*, lxiii. pp. 10, 109, Bruxelles, 1876.
233. SCOTT (M. P.).—"The Influence of Maternal Impressions during the Pregnant State on the Production of Deformities in the Offspring," *Balt. Phys. and Surg.*, v. p. 46, 1876.
234. WADDEL (T.).—"Maternal Impressions," *Detroit Rev. Med. and Pharm.*, xi. p. 723, 1876.
235. SEGUIN (E.).—"On Maternal Impressions affecting the Fœtus," *Phila. Med. Times*, vii. p. 121, 1876-7.



236. TAYLOR (W. T.).—"On Maternal Impressions affecting the Fœtus," *Phila. Med. Times*, vii. p. 73, 1876-7.
237. HILL (J. L.).—"Maternal Impressions on the Fœtus," *Med. and Surg. Reporter*, xxxvi. p. 73, Philadelphia, 1877.
238. HUNT (S. H.).—"Maternal Impressions on the Fœtus," *Trans. Med. Soc. N. Jersey*, p. 226, Newark, 1877.
239. LEE (R. J.).—"Maternal Impressions," *Lancet*, ii. for 1877, p. 651.
240. MAGILL.—"Maternal Impressions," *Trans. Med. Soc. Penn.*, xi., pt. 2, p. 665, Philadelphia, 1877.
241. SOUTHARD (L.).—"Maternal Impressions on the Fœtus," *Trans. Med. Soc. N. Jersey*, p. 188, Newark, 1877.
242. DOW (T. C.).—"Fœtus in utero; with Remarks on Paternal and Maternal Influences," *Virginia Med. Month.*, iv. p. 182, Richmond, 1877-8.
243. BARRE (E.).—"Influence de causes extérieures sur le produit de la conception," *Union méd.*, 3 S., xxvi. p. 455, Paris, 1878.
244. JAMESON (H.).—"Influence of the Maternal Mind on the Fœtus in utero," *Amer. Pract.*, xviii. p. 76, Louisville, 1878.
245. MACKAY (H. M.).—"Two Cases of Maternal Impressions," *Canada Lancet*, x. p. 234, Toronto, 1878.
246. PAYNE (R. L.).—"Influences which act upon the Child before Birth," *Trans. Med. Soc. N. Car.*, xxv. p. 86, Wilmington, 1878.
247. SMITH (T. J.).—"Effects of Maternal Impressions on Fœtus in utero," *Trans. Med. Soc. N. Jersey*, p. 278, Newark, 1878.
248. THOMPSON (A.).—"Two Children Congenitally Deformed: the Maternal Impressions to which the Deformities were attributed by the Mothers," *Trans. Obst. Soc. Lond.* (1877), xix. p. 94, 1878.
249. WRIGHT (C. O.).—"Maternal Impressions affecting the Fœtus in utero," *Amer. Journ. Obst.*, xi. p. 634, 1878.
250. BAKER (C. O.).—"Maternal Impressions," *Obst. Gaz.*, i. p. 347, Cincinnati, 1878-9.
251. PARK (R.).—"Maternal Impressions; Mother's Marks: An Exposé of a popular Fallacy," *South. Clinic*, i. p. 161, Richmond, 1878-9.
252. TATUM (J. S.).—"Congenital Hydrocephalus and Maternal Impressions on the Fœtus," *South. Pract.*, i. p. 363, Nashville, 1879.
253. WENDEL (R. S.).—"Maternal Impressions," *Louisville Med. News*, viii. p. 223, 1879.
254. HOPE (W. T.).—"Congenital Deformity probably due to Maternal Impression," *Virginia Med. Month.*, vi. p. 882, Richmond, 1879-80.
255. LOIN.—"D'une femme qui prétend avoir été vivement impressionnée pendant une représentation du cirque à la vue d'un clown, et qui a mis au monde un enfant ressemblant d'une manière frappante à un clown," *Presse méd. belge*, xxxi. p. 61, Bruxelles, 1879-80.
256. FINK (J. W.).—"Deformities in Fœtal Development," *Trans. Illinois Med. Soc.*, xxx. p. 141, Chicago, 1880.
257. FURMAN (W. B.).—"Effects of Maternal Impressions on the Fœtus in utero," *St Louis Med. and Surg. Journ.*, xxxviii. p. 456, 1880.
258. LIÉGEY.—"Observations relatives à l'influence que peuvent avoir sur les enfants les émotions et les préoccupations vives des femmes enceintes," *Journ. de méd. chir. et pharmacol.*, lxxi. p. 355, Bruxelles, 1880.
259. MARTIN (E.).—*Histoire des Monstres*, p. 266, Paris, 1880.
260. RAMSEY (D. W.).—"Effects of Strange Sightings on Pregnancy," *Med. Brief*, viii. p. 462, St Louis, 1880.
261. SEDGWICK (W.).—"Maternal Impressions," *Proc. Roy. Med. and Chir. Soc. Lond.* (1875-80), viii. p. 262, 1880.
262. STEVENS (R. H.).—"Mother's Marks," *Michigan Med. News*, iii. p. 263, Detroit, 1880.
263. WILSON (T.).—"On the Influence of Maternal Shock on the Production of Fœtal Monstrosities," *Obst. Journ. Gr. Brit.*, viii. p. 331, 1880.



264. PUREFOY (R. D.).—"On a Case of Arrested Development," *Proc. Dubl. Obst. Soc.*, xliii. p. 140, 1880-1.
265. BOLTON (J. B.).—"Maternal Impressions," *St Louis Med. and Surg. Journ.*, xli. p. 437, 1881.
266. BURCHMORE (J. H.).—"A well-marked Case of Maternal Impression," *Med. and Surg. Reporter*, xlv. p. 138, Philadelphia, 1881.
267. DEWEY (G. M.).—"Mother's Marks: Can Mental Emotions of the Mother affect the Fœtus?" *St Louis Med. and Surg. Journ.*, xli. p. 587, 1881.
268. DICKINSON.—"Maternal Impressions," *St Louis Med. and Surg. Journ.*, xli. p. 160, 1881.
269. DIXON (A.).—"Arrest of Evolution *versus* Maternal Impressions," *Indiana Med. Reporter*, ii. p. 4, Evansville, 1881.
270. DOTY (L. L.).—"Maternal Impression," *Med. and Surg. Reporter*, xlv. p. 26, Philadelphia, 1881.
271. M'DADE (G. W.).—"Maternal Impressions," *Louisville Med. News*, xi. p. 293, 1881.
272. MILLER (C. H.).—"Maternal Impressions and their influence on the Fœtus, with Cases," *Obst. Gaz.*, iv. p. 65, Cincinnati, 1881.
273. MILLER (C. H.).—"Maternal Longings and their influence on the Fœtus in utero," *Med. and Surg. Reporter*, xlv. p. 80, Philadelphia, 1881.
274. RAWLINS (J. S.).—"Maternal Impressions," *Med. and Surg. Reporter*, xlv. p. 671, Philadelphia, 1881.
275. SHIVERS (C. H.).—"More about Maternal Impressions," *Med. and Surg. Reporter*, xlv. p. 137, Philadelphia, 1881.
276. STOCKARD (C. C.).—"Maternal Impressions," *St Louis Med. and Surg. Journ.*, xli. p. 101, 1881.
277. STOCKSLAGER (S. O.).—"Maternal Impressions," *Chicago Med. Journ. and Exam.*, xliii. p. 313, 1881.
278. PRENTISS (D. W.).—"Influence of Maternal Impressions on the Fœtus," *Phila. Med. Times*, xii. p. 385, 1881-2.
279. TAYLOR (W. T.).—"A Case of Maternal Impressions," *Phila. Med. Times*, xii. p. 307, 1881-2.
280. HALDEMANN (J. S.).—"Relation of an Acephalous Fœtus to Maternal Impressions," *Obst. Gaz.*, v. p. 233, Cincinnati, 1882.
281. JOHNSTON.—"Effect of Mental Impressions on the Fœtus in utero," *St Louis Med. and Surg. Journ.*, xliii. p. 616, 1882.
282. M'COY (A.).—"Maternal Impressions," *Louisville Med. News*, xiv. p. 32, 1882.
283. MAUGHS.—"Maternal Impressions," *St Louis Med. and Surg. Journ.*, xliii. p. 596, 1882.
284. TAYLOR (W. T.).—"A Maternal Impression," *Phila. Med. Times*, xiii. p. 155, 1882-3.
285. BASKETT (N. M.).—"Do Maternal Impressions influence the Growth of the Embryo?" *St Louis Cour. Med.*, x. p. 193, 1883.
286. GRINSTEAD (W. F.).—"Child's Marks," *St Louis Cour. Med.*, ix. p. 118, 1883.
287. MILLER (C. H.).—"Some Facts regarding Maternal Impressions," *South. Clinic*, vi. p. 95, Richmond, 1883.
288. ROTH (T.).—"Ueber das Versehen und mechanische Einwirkungen auf Schwangere und über deren Einfluss auf die normale Ausbildung des Embryos," *Arch. f. path. Anat.*, xci. p. 571, Berlin, 1883.
289. O'REILLY (J. H.).—"Fetal Monstrosities; referring especially to the Influence of Maternal Impressions," *Med. Herald*, v. p. 160, Louisville, 1883-4.
290. MITCHELL (A.).—"Strong Mental Emotion affecting Pregnant Women as a Cause of Idiocy in the Offspring," *Trans. Obst. Soc. Lond.* (1884), xxvi. p. 124, 1885.
291. JONES (F. M.).—"Maternal Impressions," *Med. Summary*, vii. p. 1, Philadelphia, 1885-6.



292. MUSSON.—[The Influence of Maternal Emotion on the Ovum,] *St Thomas's Hosp. Rep.*, 1884, N.S., xiv. p. 30, London, 1886.
293. SWIFT (W. J.).—"Maternal Impressions on the Fœtus," *N. York Med. Journ.*, xliv. p. 407, 1886; also *Alabama Med. and Surg. Journ.*, i. p. 365, 1886.
294. BARKER (F.).—"The Influence of Maternal Impressions on the Fetus," *Transactions of the American Gynecological Society* (1886), xi. p. 152, New York, 1887.
295. BUSEY (S. C.).—"Maternal Impressions," *Trans. Amer. Gynec. Soc.* (1886), xi. p. 176, New York, 1887.
296. DIXON (A.).—"Arrest of Evolution *versus* Maternal Impressions," *Amer. Pract. and News*, N.S., iv. p. 353, Louisville, 1887.
297. GREENLEY (T. B.).—"Maternal Impressions on the Fetus," *Amer. Pract. and News*, N.S., iv. p. 257, Louisville, 1887.
298. KENEFICK (T. A.).—"Maternal Impressions on the Fœtus in utero," *Boston Med. and Surg. Journ.*, cxvii. p. 639, 1887.
299. STEDMAN (T. L.).—"The Influence of Maternal Impressions in the Etiology of Congenital Deformities," *Med. Rec.*, xxxi. p. 4, New York, 1887.
300. TAYLOR (W. T.).—"Maternal Impressions affecting the Fœtus," *Trans. Internat. Med. Cong.*, ii. p. 432, Washington, 1887.
301. EVANS (W. T.).—"Maternal Impression on the Fetus in utero," *Columbus Med. Journ.*, vi. p. 348, 1887-8.
302. TALBOT (R. B.).—"Maternal Impressions affecting the Fœtus," *Post-Graduate*, iii. p. 199, New York, 1887-8.
303. CLASSEN (F. L.).—"The Influence of Maternal Impressions on the Fœtus," *Albany Med. Ann.*, ix. p. 329, 1888.
304. GRANDIN (E. H.).—"Maternal Impressions," *Amer. Journ. Obst.*, xxi. p. 1172, 1888.
305. HARVEY (J. G.).—"Circumcised by a Maternal Impression," *Med. Rec.*, xxxiv. p. 535, New York, 1888.
306. LEE (R. J.).—"Note on a Case of Mental Defects in a Child, due to Maternal Disturbance caused by a Dream," *Med. Press and Circ.*, N.S., xlv. p. 505, London, 1888.
307. LOWMAN (W. R.).—"Lusus Naturæ; Abortion," *Trans. South Car. Med. Assoc.*, p. 137, Charleston, 1888.
308. LOWREY (M. G.).—"Circumcision by Maternal Impression," *Med. Rec.*, xxxiv. p. 718, New York, 1888.
309. MORTON (R.).—"Maternal Shock and Infantile Neurosis," *Med. Press and Circ.*, N.S., xlv. p. 585, London, 1888.
310. SCHENK (W. L.).—"Monstrosities and Maternal Impressions," *Journ. Amer. Med. Assoc.*, xi. p. 646, Chicago, 1888.
311. WEBSTER (W.).—"Maternal Impressions or Influence upon the Child in utero," *Proc. Homœop. Med. Soc.*, xxiv. p. 48, Ohio, 1888.
312. MORRIS (J.).—"Maternal Impressions," *Maryland Med. Journ.*, xx. p. 413, Baltimore, 1888-9.
313. BEALE (G. B.).—"Maternal Impressions," *Lancet*, i. for 1889, p. 919.
314. BINGWOOD (J.).—"Maternal Impressions," *Med. Press and Circ.*, N. S., xlvii. p. 46, London, 1889.
315. COOK (G. W.).—"Do Maternal Mental Impressions affect the Fœtus in utero?" *Amer. Journ. Obst.*, xxii. p. 931, New York, 1889.
316. CRAVENS (T. A.).—"Maternal Impressions," *South Calif. Pract.*, iv. p. 4, Los Angeles, 1889.
317. DABNEY (W. C.).—"Maternal Impressions," in *Keating's Cyclopædia of the Diseases of Children*, i. p. 191, 1889.
318. FORT (J. M.).—"Do Maternal Impressions affect the Fœtus in utero?" *Journ. Amer. Med. Assoc.*, xii. p. 541, Chicago, 1889.
319. GROSS (R.).—"Maternal Impressions," *Med. Rec.*, xxxv. p. 43, New York, 1889.



320. HEINRICIUS (G.).—"Eperimentelle und klinische Untersuchungen über Circulations—und Respirations—Verhältnisse der Mutter und Frucht," *Diss.*, Helsingfors, 1889.
321. LEGGATT (A. B.).—"Maternal Impressions," *Med. Rec.*, xxxv. p. 290, New York, 1889.
322. LOWMAN (W. R.).—"Résumé on Maternal Impressions," *Med. Rec.*, xxxvi. p. 176, New York, 1889.
323. MASON (R. O.).—"Another View of Maternal Impressions," *Med. Rec.*, xxxv. p. 537, New York, 1889.
324. RICHARDS (J. N.).—"Maternal Impressions," *Trans. Lehigh Valley Med. Assoc.*, i. p. 97, Easton, 1889.
325. SPITZKA (E. C.).—"A Monstrosity attributed to a Maternal Impression," *Proc. New York Path. Soc.* (1888), p. 153, 1889.
326. STRALEY (S. T.).—"A few Cases of Maternal Impressions transferred," *Med. Reg.*, v. p. 57, Philadelphia, 1889.
327. WETHERBY (J.).—"Maternal Impressions," *Med. Rec.*, xxxvi. p. 316, New York, 1889.
328. DENTON (A. N.).—"Changes upon the Body of the Fœtus by Mental Impressions," *Daniel's Texas Med. Journ.*, v. p. 201, Austin, 1889-90.
329. BROWN (W. A.).—"Maternal Impressions," *South Calif. Pract.*, v. p. 323, Los Angeles, 1890.
330. BUCKEL (C. ANNETTE).—"Do Maternal Impressions affect the Fœtus in utero to produce Monstrosities and so-called Mother's Marks?" *Pacific Med. Journ.*, xxxiii. p. 65, 1890.
331. COOK (G. W.).—"Do Maternal Impressions affect the Fœtus in utero?" *Trans. Wash. Obst. and Gynec. Soc.*, 1887-9, ii. p. 277, New York, 1890.
332. DIXON (A.).—"Arrest of Evolution *versus* Maternal Impressions," *West. Med. Reporter*, xii. p. 237, Chicago, 1890.
333. MIJNLIEFF (A.).—"De l'influence des impressions psychiques sur la marche de la grossesse, et la mort intra-utérine du fœtus : une observation à l'appui ; quelques considérations sur la stricture de l'utérus, etc.," *N. Arch. d'obst. et de gynéc.*, v. p. 209, Paris, 1890.
334. OVEREND (E. J.).—"Maternal Impressions," *Pacific Med. Journ.*, xxxiii. p. 70, 1890.
335. BALLANTYNE (J. W.).—"Maternal Impressions," *Edin. Med. Journ.*, xxxvi. p. 624, 1890-1.
336. WRIGHT (T. J.).—"Maternal Impressions," *Journ. Med. Soc. Arkansas*, i. No. 2, p. 8, Little Rock, 1890-1.
337. DELASSUS.—"Émotions maternelles et monstruosities fœtales (deux faits)," *Arch. de tocol. et de gynéc.*, xviii. p. 923, Paris, 1891.
338. DRZEWIECKI (J.).—"Ueber den Einfluss der Eindrücke der Mutter auf den Fötus, oder das sogenannte 'Versehen' der Schwangeren," *Wien. med. Wochenschr.*, xli. pp. 1809 and 1856, 1891.
339. DRZEWIECKI (J.).—"The Influence of Maternal Impressions upon the Fœtus," *Med. Rec.*, xl. p. 529, New York, 1891.
340. FENWICK (K. N.).—"Maternal Impression," *Med. Rec.*, xl. p. 494, New York, 1891.
341. HERR (F. C.).—"Maternal Impression," *Med. Rec.*, xl. p. 659, New York, 1891.
342. KLINE (H. D.).—"Do Maternal Impressions affect the Fœtus?" *Toledo Med. and Surg. Reporter*, iv. p. 28, 1891.
343. LEE (H. B.).—"Maternal Impression," *Med. Rec.*, xl. p. 509, New York, 1891.
344. MACKAY (A.).—"Maternal Impressions," *Lancet*, ii. for 1891, p. 1388.
345. MASON (R. O.).—"A Case relating to the Influence of Maternal Impressions upon the Fœtus," *Med. Rec.*, xl. p. 42, New York, 1891.
346. VARIOT (G.).—"Origine des préjugés populaires sur les envies," *Bull. Soc. d'anthrop. de Paris*, 4 S., ii. p. 458, 1891.



347. WERTHEIMER (E.) and MEYER (G.).—"Nouveau fait relatif aux échanges entre la mère et le fœtus," *Arch. de physiol. norm. et path.*, 5 S., iii. p. 204, Paris, 1891.
348. WOLFF.—"Mütterlicher Einfluss?" *Centralbl. f. Gynäk.*, xv. p. 964, Leipzig, 1891.
349. BALLANTYNE (J. W.).—"A series of Thirteen Cases of Alleged Maternal Impression," *Edin. Med. Journ.*, xxxvii. p. 1025, 1891-2.
350. DRZEWIECKI (J.).—"L'influence des impressions maternelles sur le fœtus," *Rev. de l'hypnot. et psychol. physiol.*, vi. p. 196, Paris, 1891-2.
351. BROWN (W. M.).—"Monstrosities and Maternal Impressions," *Med. World*, x. p. 242, Philadelphia, 1892.
352. CURRIER (J. M.).—"Influence of the Mental State over the Fœtus," *Med. and Surg. Reporter*, lxvii. p. 968, Philadelphia, 1892.
353. HALKET (G.).—"Infantile Deformities and Maternal Impressions and Emotions," *Glasgow Med. Journ.*, xxxvi. p. 8, 1892.
354. METTLER (L. H.).—"The other side of the Maternal Impression Question," *Med. Rec.*, xli. p. 26, New York, 1892.
355. PARVIN (T.).—"The influence of Maternal Impressions upon the Fœtus," *Internat. Med. Mag.*, i. p. 487, Philadelphia, 1892.
356. PREUSS (J.).—"Vom Versehen der Schwangeren; ein historischkritische Studie," *Berlin. Klinik*, Hft. li. pp. 1-50, 1892.
357. SCHENK (J.).—"A Child without Arms or Legs—Maternal Impressions," *Journ. Amer. Med. Assoc.*, xviii. p. 314, 1892.
358. WILLIAMS (H. S.).—"The Question of Maternal Impressions," *Trans. New York Med. Assoc.*, ix. p. 135, 1892.
359. DAVIS (J. S.).—"Two Cases of Congenital Malformation attributed to Maternal Impressions," *Alabama Med. and Surg. Age*, v. p. 482, 1892-3.
360. DEWEES (W. B.).—"Maternal Impression as a cause of Anencephalus," *Univ. Med. Mag.*, v. p. 788, Philadelphia, 1892-3.
361. LANCASTER (R. A.).—"Case of Maternal (or Paternal) Impression," *Virginia Med. Month.*, xix. p. 235, Richmond, 1892-3.
362. WEST (G. R.).—"Maternal Impressions," *Virginia Med. Month.*, xix. p. 115, 1892-3.
363. LICORISH (R. F.).—"Maternal Impressions again," *Med. Rec.*, xliii. p. 253, New York, 1893.
364. ROSS (F. W. F.).—"A Maternal Impression (!)," *Brit. Med. Journ.*, i. for 1893, p. 1161.
365. GARTHRIGHT (R. H.).—"Case of Maternal Impressions," *Virginia Med. Month.*, xx. p. 846, Richmond, 1893-4.
366. ELLIOT (S. B.).—"Pre-natal influence," *Arena*, ix. p. 417, 1894; also in his *Ædæology*.
367. HATFIELD (M. P.).—"Maternal Impressions," *Trans. Illinois Med. Soc.*, xlv. p. 297, Chicago, 1894.
368. WOLFF (J.).—"Kasuistischer Beitrag zur Lehre vom Versehen der Schwangeren nebst Bemerkungen über Hyperdaktylie," *Deutsche med. Ztg.*, xv. pp. 553 and 565, Berlin, 1894.
369. WORK (H.).—"Maternal Impressions," *Med. News*, lxv. p. 451, Philadelphia, 1894.
- 369A. FÉRÉ (CH.).—*La Famille Néuropathique*, p. 22, Paris, 1894.
370. CLEMENS (T.).—"Noch ein interessanter Beitrag zum Capitel des Versehens," *Allg. med. Centr. Ztg.*, lxiv. p. 805, Berlin, 1895.
371. COKENOWER (J. W.).—"Can Maternal Mental Emotions produce Malformations, Deformities, or Birth-Marks?" *Internat. Journ. Surg.*, viii. p. 136, New York, 1895.
372. JENKYNs (J.).—"Maternal Impressions," *Brit. Med. Journ.*, i. for 1895, p. 474.
373. JONES (H. L.).—"Maternal Impression," *Brit. Med. Journ.*, i. for 1895, p. 417.



374. MALONEY (F. W.).—"Maternal Impressions," *Med. Rec.*, xlviii. p. 465, New York, 1895.
375. MARTIGNY (A. L. DE).—"Des émotions vives chez la femme enceinte, comme cause de la monstruosité," *La Clinique* (Canada), ii. p. 143, 1895.
376. MERTZ (C. H.).—"An Unusual Deformity (Maternal Influences)," *Med. Progress*, xi. p. 181, Louisville, 1895.
377. FÉRÉ (CH.).—"Essai expérimental sur les rapports étiologiques, de l'infécondité, des monstruosités, de l'avortement, de la morti-natalité, du retard de développement, et de la débilité congénitale," *Teratologia*, ii. p. 245, 1895.
378. M'CABE (W. O.).—"A Monstrosity: Maternal Impression;" *Virginia Med. Month.*, xxii. p. 307, Richmond, 1895-6.
379. SMITH (T.).—"On a Local Vascular Disturbance of the Fœtus, probably due to the Injection of Tuberculin in the Pregnant Cow," *N. Y. Med. Journ.*, lxi. p. 233, 1895.
380. CONKLIN (W. L.).—"A Pseudencephalic Monster," *Buffalo Med. Journ.*, xxxv. p. 638, 1896. Illustrated.
381. STAHL (F. A.).—"Maternal Impressions and their Significance: with Presentation of a Case of Anencephalia et Acrania," *Am. Journ. Obst.*, xxxiii. p. 501, 1896. Illustrated.







