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THE LAWS OF
TRANSMISSION OF RESEMBLANCE
FROM PARENTS TO THEIR CHILDREN.

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Infantem plus ex matre quam a patre habere.
Mares similes matri, femine similes patri generentur.†
Mas avo materno similis; Femella avo similis paterno.‡*

THE question of resemblance of children to their parents is one in which many ancient and a few modern authors have found a field for much close observation and profound philosophy, carrying their discussions and deductions to all possible degrees of differentiation and detail. Some of their reasons and conclusions as to causes are scarcely plausible, but many of them bear evidence of close observation and careful consideration, for modern research has in several instances discovered proximate causes which fully corroborate these ancient opinions.

Aside from the physiological and philosophical, this question of resemblance has a practical bearing, and that is in regard to the estimate one may make of the prospect individuals may have of longevity, from an examination of their family history, determining from this their resemblance to their ancestors, and judging of their likelihood or predisposition to hereditary or acquired affections. §

In order to avail one's self of the advantages of a knowledge of this subject, it is necessary to be conversant with the laws which govern the transmission of resemblance, and this is the province of our paper to determine. Ludovicus Mercatus || says that there are three similitudes of children to their parents: Prima quidem est in specie, secunda in sexu; tertia verò et ultima in proprietatibus individualibus. The last division comprehends all that we shall have to say on the subject. Several authors have given us works on hereditary diseases, some of which I have named below. ¶ We cannot enter very far into

this feature of resemblance, and have therefore cited only such cases as bear upon the practical part of the topic under discussion.

It is the object, then, of this paper to bring before the reader such facts as are at hand to determine the general laws which are brought to issue in the following questions:—

1. Do children derive their resemblance and inherit diseases more frequently or more easily from their mothers than from their fathers?

2. Are males more apt to inherit the diseases of their mothers, and females those of their fathers; or is the reverse the case?

3. What are the laws of physical and physiognomical inheritance?

4. Is there any constant relationship between the physiognomical resemblance of an individual to an ancestor, and the likelihood of this individual being afflicted or dying of the same constitutional or acquired disease? If so, is a physiognomical resemblance an indication of a likelihood to the same constitutional affections, or the reverse?

The various aspects of resemblance by relationship are as follows:—

In general:—

1. Children resemble their mothers more than their fathers.

2. Males resemble their mothers, and females their fathers.

3. When children do not resemble their parents, but their grandparents, males resemble their maternal grandfather, and females their paternal grandmother.

Exceptionally:—

1. Children resemble their fathers more than their mothers.

2. Males resemble their fathers, and females their mothers.

3. Male resembles paternal grandparent, female maternal grandparent.

4. Offspring resembles male by whom female was previously impregnated more than its natural father.

I propose to discuss the laws of resemblance as laid down in the three first hypotheses.

Aristotle* teaches that in general children resemble their fathers more than their mothers, and Harvey † theorizes as to the cause. Ambrose Paré ‡ is of the same opinion, and advances as a reason, that "in concubitu" the mind of the woman is more fixed on the man than that of the man on the woman. This explanation may hold in a few exceptional cases, for we not unfre-

* Galen apud Jacob Rufus, De Muliebribus, Lib. i., c. vi. Ext. in Israel Spachius, Harmonie Gynæcorum, p. 171, b.

† Socrates apud Aristotelem, De Generat. Animal., Lib. iv., c. iii. Duval's Aristotelis Opera Omnia, etc. Paris, 1654, fol., vol. ii., p. 675, d.

‡ Ludovicus Bonacinius, Enneas Muliebris, Ext. in Spachius, op. cit., p. 145-6.

§ I have a case in mind, in which a professor in one of our first Medical Schools, who was a medical director of an assurance company, withheld his decision on an application for a large sum until the question of physiognomical resemblance to either parent was settled.

¶ De Mulierum Affect., Lib. iii., cap. vi. Spachius, op. cit., p. 107-9-10.

¶ Mandinus Mundinus wrote a work (De Genitura pro Galenicis adversus Peripateticos, etc., Venetiis, 1622, 4to), in which he discusses—in qua nova præsertim dogmata spectantia ad factum generationem, similitudines, morbos, hereditarios, nota corporis, facultatem formatricem callidi nativi, animarumque corruptibilem originem, refeluntur, etc. etc.

Desmutius de Mara wrote on Pathologia Hereditaria Generalis, Sive, de Morbis Hereditariis. Dublin, 1619.

Robertus Lyonnet published a dissertation, De Morbis Hereditariis, Lutetiae, 1646, 4to. Prosper Lucas, of recent times, has given us a work on Physical Transmissions, Traité physiologique et philosophique, l'Heredité Naturelle, Paris, 1847-50. None of these, I regret to say, have been within my reach.

* Lib. De Generat. Animal., Lib. iv.

† Anatomical Exercises on the Generation of Animals, etc. London, 1651. Sydenham Soc. Edit., Lond., 1847.

‡ De Hominis Generat., cap. i., Ext. in Spachius: Harm. Gynæcorum, p. 404, c.

quently read of cases in which the female produces offspring resembling a male of whom she may have been enamored but who was not the father of the product. This influence of imagination or impressions on the mother is familiar to all, in the practice of Jacob, who placed rods of different colors before his ewes that they might bear speckled lambs. (Gen. chap. xxx., v. 37-41.) This view of the matter, however, is not to be taken as the rule, any more than the curious notion of Dr. Erasmus Darwin,* who ascribed the large proportion of male births in Rome at a certain period to the prevalence of certain ornaments at the orgies of Bacchus.

Prichard † says that "children resemble, in feature and constitution, both parents, but I think more generally the father. In the breeding of horses and oxen great importance is attached, by experienced propagators, to the male. In sheep it is commonly observed that black rams beget black lambs. In the human species, also, the complexion chiefly follows that of the father; and I believe it to be a general fact that the offspring of a black father and a white mother is much darker than the progeny of a white father and a dark mother."

The son is more likely to have the moral excellence of his mother, while his bent or inclination or genius (vocation best suited) will come from the father, modified in quantity and quality by the mother. The general mental qualifications will be of the type (kind) of the father, modified in quantity and quality by the mother. Sons are thus usually able to follow their father's vocation better than others of a different character.

Sir Anthony Carlisle says that a schoolmaster informed him that his scholars whose fathers were mechanics learned mathematics better than classics, while those whose fathers were classical scholars learned foreign and dead languages better than mathematics.

Those who maintain that children derive more of their qualities from their fathers than from their mothers have given no substantial reasons nor sufficient number of examples in support of their position to convince us that this is the general law. The truth of the matter seems to indicate that such cases as appear to conform to this view are exceptional, and often come from coupling unequally-bred individuals, the male, in such cases, having the prepotency in transmission. In breeding animals this fact is often taken advantage of as a matter of economy. One well-bred male may transmit his superior qualities to a large number of offspring in a single season, while the female can give any qualities she may possess to but few, generally only one product.

In selecting animals for breeding, "economical purposes have made the male in general the most important, simply because he serves for a considerable number of females. The consequence of this has been that more attention has been paid to the blood or purity of race of the stallion, bull, ram, and boar than to that of their females; and hence it may be the case that these males more frequently transmit their qualities to the offspring than do the inferior female with which they are often made to breed. But this circumstance can scarcely be adduced as a proof that the male, *cæteris paribus*, influences the offspring more than the female." †

According to Mr. Youatt, § the relative influence of

each parent, in breeding, on the offspring depends most upon the mother, where the parents are equally well bred, other things being the same; but the high-bred male pairing with the half-bred female will have a preponderating influence on the offspring.* Socrates and Coriscus are of the opinion that children generally resemble their mothers more than their fathers, and this appears to be in harmony with the teaching of our most eminent physiologists and scientists.

Linnæus conceived the character of the male parent predominated in the exterior parts both of plants and animals, and the same opinions have been generally entertained by more modern naturalists.

Mr. Knight † seems to differ somewhat from this opinion of Linnæus, "for I have observed," says he, "that seedling plants, when propagated from male and female parents of distinct characters and permanent habits, generally, though with some few exceptions, inherit much more of the character of the female than of the male parent, and the same remark is applicable in some respects to the animal world."

"Mr. Cline, the eminent surgeon, has observed," says Mr. Knight, † "in a communication to the Board of Agriculture, that if the male and female parent differ considerably in size, the dimensions of the foetus, at the birth, will be regulated much more by the size of the female than of the male parent."

According to Earl Spenser, § Mr. Cline believes "that it is always desirable that the male should be smaller than the female." The Earl is of the opposite opinion, and I think justly so, if we are guided by the fact that males are always naturally larger than females.

The comparative influence of the male and female in transmitting hereditary disease is one of great interest, particularly in regard to syphilis. In this last-named affection, authorities differ greatly,—from the view of M. Cullerier, || who believes that it is never transmitted from the father to his offspring, to that of Mr. Hutchinson, ¶ who is of the opinion that the father can transmit the disease in as severe a form as the mother. M. Cullerier is supported in his view of the relative power of transmission, by the one or the other parent, by MM. Notta ** and Follin. †† Prof. Boeck †† and Mr. Morgan §§ believe that the father rarely transmits the disease, and Dr. John S. Parry ||| says, after a very careful review of these opinions, and well-weighed deductions from his own observations and experience: "I cannot but believe that the mother is much more likely than the father to transmit syphilis to the children, and that, as Mr. Morgan says, the influence of the father has been exaggerated."

Mr. J. B. Thomson, in his papers "On the Comparative Influence of the Male and Female Parent upon the Offspring," ¶¶ advances the opinion that it is the male

* Galenus etiam hujus rei gratia eleganter monet, *infantem plus ex matre quam à patre habere*. (1) eo quòd primum semina menstruis augetur, mox his in utero nutriatur factus, rursus natum alatur lacte; et quemadmodum quævis stirpes plus ex terra quam parente planta habent, ita infantes plus ex genitrice."—Apud Jacob Ruffus, De Muliebribus, Lib. i., c. vi. Ext. in Spachius, Gyneciorum, p. 171, B.

† On the Comparative Influence of Male and Female Parents on Offspring, Philos. Trans., 1809, p. 333.

‡ Idem, p. 335.

§ Journ. Roy. Agric. Soc., 1840, vol. i., pt. 1., p. 25.

|| Mémoires de la Soc. de Chir. de Paris, t. iv., 1855; quoted in Dr. and For. Med. Chir. Rev., v. xix., pp. 156-8, 1857; also, Archiv. Gén. de Méd., Sept., 1854.

¶ Dis. of Eye and Ear in Inherited Syphilis, 8vo, Lond., 1863, p. 268.

** Archiv. Gén. de Méd., March, 1860.

†† Med. Times and Gaz., Aug., 1860, pp. 116-17.

‡‡ Amer. Jour. Syphilis and Dermat., Jan., 1870, p. 16.

§§ Pract. Lessons in the Nature and Treatm. of Contag. Dis., Lond., 1872, p. —.

|| Two Lectures on Inherited Syphilis, Philad. Med. Times, 1872; and Pamphlet, pp. 35, 12mo, Philad., 1872, pp. 23-4-5-6-7.

¶¶ Edinb. Med. and Surg. Jour., pp. 601-4, 1858-9.

(1) Italicized by the writer.

* Zoonomia; or the Laws of Organic Life, in 2 vols. Dublin, 1800. Vol. 1., p. 534 et seq.

† Researches into the Physical History of Mankind, vol. ii., p. 551.

‡ Allen Thomson, Cyclic. Anat. and Phys., vol. ii., p. 472.

§ Stock Manual, 1841, p. 524.

chiefly who is concerned in the transmission of hereditary disease. This *opinion*, however, is not supported by facts which warrant us in accepting this view of the matter, and is directly opposed to the deductions from the many cases detailed by Mr. Sedgwick* and others cited in this paper.

In hospital practice Dr. Garrod † found gout to be hereditary in 50 per cent. of the cases observed, and in private practice the percentage was still higher. He cites a case in which it had been hereditary for upwards of four centuries (probably fifteen generations); the eldest son having been invariably afflicted with the gout when he came into possession of the family estate. Scudamore ‡ records 522 cases of gout, in 332 of which it was hereditary.

Rheumatism is also subject to hereditary transmission.

The writer knows of a case where a father died of Bright's disease at 56, his son at 35, and another son is threatened with it at the 35th year. Two daughters and three other brothers have not been affected. There is still another case in my mind of a son who inherits the same disease apparently from his father.

When visiting the rooms of the Historical Society of Pennsylvania, my attention was fixed at the first glance on a portrait of one of our revolutionary generals of superior family, that bore such a striking and unmistakable likeness to a young acquaintance of mine that I was anxious to know the relationship, and have recently learned that it was his great-grandfather, and doubly so, for his father and mother were first cousins both of the same name, equally related to the gentleman represented in this portrait.

The strikingly characteristic feature in this family is the marked fulness of the lower eyelid, and arched eyebrows, which were intensified in this young man, because of the double descent through his father and mother. All the males and some of the females in this family died of apoplexy. I have not learned whether the characteristic features in this family are transmitted directly from male to male, or by atavism descent through the females; it certainly continues in the male line.

Dr. Tripe expresses his "belief that male infants are predisposed to disease in a far greater ratio than females, especially during intra-uterine life; that this predisposition, which in extra-uterine life is more marked during the first month, gradually diminishes after the child ceases to obtain its nutrition direct from its mother, and is almost removed shortly after the ordinary age of weaning, viz., at one year and a quarter. From these considerations we infer that the greater mortality rate of males during the first years of life depends on some influence derived from one or the other or both of its parents, but most probably chiefly, if not entirely, from the mother. . . . The greater longevity of females certainly points to another vital difference in the sexes; and it may perhaps be true that one cause (greater vitality of the female sex) induces the large differential mortality which we have shown to exist." §

This view is fully confirmed in the author's last paper on the "Relative Viability of the Sexes, particularly with regard to the relative liability to the inheritance

of certain transmitted diseases—considered in relation to the selection of Life Insurance risks, with a view of exhibiting the unjustness of the practice of charging higher rates for women;"* also in his paper on "Statistics of Marriages, Births and Deaths in Philadelphia for the 11 years ending 1871." Penn. Monthly, September, 1873.

"There are family diseases, just as there are family likenesses, manners, and peculiarities; and what is remarkable, they are more liable to be communicated by the mother than the father, as if it were her special prerogative to impress her vices, as well as her virtues, upon her descendants." † "Possibly diseases transmissible from either parent will be more likely to be developed in those children who partake most of the *vis insita*, as of the physiognomy of that parent; but we do not know that the observation of our readers will be found to confirm this statement of the author." ‡

Mr. Sedgwick observes that, "in many cases where the disease is limited in its appearance to one sex, its transmission is restricted to the other. From a careful analysis of a large number of cases, I am at present disposed to think that sexual limitation in the transmission of diseases is more common in females than in males. In several of the cases I have mentioned, where the appearance of the disease has been strictly limited to the males, its transmission has been quite as strictly limited to the female sex, occasioning the phenomenon of *double atavism*, as where neither sons nor daughters ever inherit their father's disease, but only the grandsons in the third and fifth generations, by transmission through the females of the second and fourth generations." § In a note he states that "in the report of a case of hereditary malformation of the hands, affecting ten generations of the same family, it is stated 'that it was the women only who had the misfortune of entailing this defect on their offspring.'" ¶

"Altogether, the male parent exercises more influence upon the irritability, and the female more on the sensibility. Fabricius is not therefore far from the truth ¶ when he says, that we inherit from our fathers the tastes and cachexies; from our mothers, the spasms, melancholy, vivacity, and intellectual faculties; or Gleichen,** in assuring us that the male determines the bony frame, and the female the eyes. Following Linneus, in hybrid vegetables: the sexual organs resemble more the mother, the corolla and in general the exterior parts the father. In like manner, following the observations of Senff, gardener of Koenigsberg, the leaves are more like the father than the fruit. Girou says that the mother has more influence upon the plasticity, and the father upon the exterior vitality; †† this assertion does not rest on sufficient proofs. We have need of new facts before we can affirm that the mother determines more the viscera, as Vicq d' Azyr pretends having remarked, and that it is she principally who assures the longevity, as Sinclair †† contends." §§

Cultivators and scientists have frequently called attention to the laws of resemblance which seem to prevail in the production of hybrid plants. Dr. Herbert, ||

* N. Y. Medical Record, June 16 and July 16, 1873, pp. 297-302, and 353-45.

† Prof. Samuel D. Gross, M.D., LL.D., D.C.L., Oxon. A System of Surgery, etc., in two vols., Phila., 1859 and 1872.

‡ British and Foreign Medico-Chir. Rev., vol. xxvii., 1861, p. 882. Review of the above.

§ Op. cit., p. 210.

¶ Edinb. Med. and Surg. Jour., vol. iv., p. 252, 1808.

‡ Resultate naturhistorischer Forschungen, p. 60.

** Ueber die Samenentstehung, p. 43.

†† De la Génération, p. 129.

‡‡ Principes d'Hygiène, Extraits du code de Santé, Genève, 1823. (?)

§§ Burdach, Physiologic, v. II., p. 206.

|| Jour. Horticult. Soc., vol. II.

* Op. cit., p. 210.

† The Nature and Treatment of Gout and Rheumatic Gout, p. 251-3, 1859.

‡ A Treatise on the Nature and Cure of Gout and Gravel, 4th edit., p. 55, 1823.

§ British and Foreign Medico-Chir. Review, April, 1857, pp. 469-70.

¶ On the Relative Mortality of Males and Females under five years of age."

according to Sedgwick, "established it as a law with respect to amaryllaceous hybrids, 'that they resembled their mother in foliage and stem, or the organs of vegetation; and their father in flower, or organs of reproduction.'" Fries-Morel* states that in carnations the hybrids resemble the mother in form and the father in color. According to De Candolle,† Gaërtner, Wiegman, and Knight have remarked that many vegetable hybrids have a tendency to return, after a time, to the maternal, but never, as a rule, to the paternal type.‡ The views of Lindley seem to be opposed to those of Dr. Herbert, for he has it that vegetable hybrids resemble the male parent most in foliage and the female most in flower.

"Five or six hundred domestic animals," says Girou,§ "comprising mammifers and birds, which are born annually under my eyes, and my relations with cultivators, who have made the education of beasts the principal object of their life, have furnished me with frequent occasion to observe the resemblance of fathers and mothers with their products.

"The products of domestic animals resemble, in general, more the father than the mother, by the head, the members, the color, the character, in a word, by all that which belongs to the exterior life; nevertheless, under the same relations, the female, more than the male, resembles the father, and the male, more than the female, resembles the mother. The same products resemble in general also more the mother than to the father, by the height, the length of the hair, the dimensions of the pelvis, finally by all that which is under the influence of the exterior life, or of nutrition; but under these relations the male, more than the female, resembles the father, and the female, more than the male, resembles the mother.

"The fœtus often resembles, by the exterior life, the paternal grandfather; and under the same relation, the daughter sometimes resembles the maternal grandmother; even when the father resembles his proper mother, and the mother her proper father.

"I have never seen a resemblance to the paternal grandfather in the grandsons, nor to the maternal grandfather in the granddaughters, when the father does not resemble his proper mother, or the mother her proper father.

"At some period after the epoch of birth, the sons who resemble from the first their mother, and the daughters who resemble their father, acquire sometimes from the resemblance, the one with her father and the other with his mother; that metamorphosis is more frequent and more pronounced in the sons than in the daughters.

"The sons never pass from the resemblance of the father to that of the mother, nor the daughters from the resemblance with the mother to that of the father.

"Several naturalists have recognized the general influence of the father on the exterior life and the mother on the interior life. In speaking of mules, Vicq d'Azyr said: 'It seems that the exterior and the extremities are modified by the father, and that the entrails are the emanation of the mother.'

"The chasseurs have adopted the proverb, *Chien de chienne et chienne de chien*, to express the fact that they find the qualities of the mothers in the sons, and those of the fathers in the daughters.

"A hunting bitch with a double nose, the issue of a father with a double nose and mother with the usual form of nose, was fecundated by a common dog, and of eight young, of the same pregnancy, four were males with double noses, and four females with a common nose.

"Of four colts by an Arabian mare, three males had the hair of their mother, and one female that of the father.

"As far as the size or stature of the offspring is concerned, it seems to be pretty well ascertained by facts known to the breeders of cattle and horses, that this depends in a great measure on the mother."*

According to Mr. Thos. Andrew Knight, an intelligent gentleman, who gave much time to experiments in connection with the breeding of cattle, we are told that "in viviparous animals the size of the fœtus is affected by the influence of the male parent, and in some instances not inconsiderably; but the size and form of the eggs of birds do not appear to be in any degree changed or modified by the influence of the male; and therefore the size of the offspring at birth must be regulated wholly by the female parent."†

In multiparous animals it is often observed that the influence of one parent preponderates in a part of the progeny, and of the other in another part of it. Thus it happens when a pointer and a setter breed together, it is not unusual to find part of the whelps almost perfect pointers, and the remainder as nearly true setters.‡ It being a fact, then, that brothers and sisters of the same pregnancy in multiparous animals do not resemble one another, it is not at all strange that products of uniparous animals, born at distant periods, should so frequently be dissimilar.

"It has long been a prevalent idea," says Carpenter,§ "that certain parts of the organism of the offspring are derived from the male, and certain other parts from the female parent; and although no universal rule can be laid down upon this point, yet the independent observations which have been made by numerous practical 'breeders' of domestic animals (both mammals and birds) seem to establish that such a *tendency* has a real existence; the characters of the *animal* portion of the fabric being especially (but not exclusively) derived from the *male* parent, and those of the *organic* apparatus being in like manner derived from the *female* parent. The former will be chiefly manifested in the external appearance, in the general configuration of the head and limbs, in the organs of the senses (including the skin), and in the locomotive apparatus; whilst the latter show themselves in the size of the body (which is primarily determined by the viscera contained in the trunk), and in the mode in which the vital functions are performed. Thus the *mule*, which is the product of the male ass and the mare, is essentially a *modified ass*, having the general configuration of its sire (slightly varied by equine peculiarities), but having the rounder trunk and larger size of its dam; on the other hand, the *hinny*, which is the offspring of the stallion and the she-ass, is essentially a *modified horse*, having the general configuration of the horse (though with a slight admixture of asinine features), but being a much smaller animal than its sire, and thus approaching its dam in size, as well as in the comparative narrowness of its trunk."

The same distinguished authority cites "a case in which a setter-bitch, having been 'lined' by a pointer,

* Ann. de la Soc. d'Hortic. de Paris, p. 112, 1828.

† Physiologie Végétale, tome II., 1802, p. 714.

‡ Sedgwick, op. cit., July, 1803, p. 182. See also Sagaret, Considérations sur la Production des Hybrides, etc. Annales des Sci. Natur., tome VIII., 1826.

§ Observations sur les ressemblances entre les descendants et leur ascendants. Annales des Sci. Naturelles, t. v., 1825, pp. 40-40.

* Studies in Physiology and Medicine, by R. J. Graves, Lond., 1868, p. 137.

† Philosoph. Trans., 1809, p. 393.

‡ Quarterly Journal of Royal Agricultural Soc., vol. I.

§ Physiology, p. 765.

bore three pups; two of these (one a male) seemed exclusively to resemble the father, appearing to be perfect pointers in configuration, and growing up with the habits of that race; whilst the third (a female) seemed equally to resemble its mother, being apparently a true setter both in structure and instinct. Yet, notwithstanding this apparent restriction, it subsequently appeared that the pointer-pups must have something of the setter in their constitution, and the setter-pups something of the pointer. For one of the pointer-pups (a male) having been matched at the proper age with a pointer-bitch of pure breed, one of the pups borne by the latter was a *true setter*, exactly resembling its paternal grandmother, and another was *setter-marked*; and the setter-pup (a female) having been lined by a setter-dog of pure breed, there were among its litter of pups two *pointers* resembling their maternal grandfather. The same variety presents itself to even a greater degree in the human species. . .

"One of the most remarkable cases of this kind known to the author, is that of two sisters who seem to resemble each other in no one point of configuration or mental character; but of whom one bears a most striking resemblance, both in person and in mind, to her father; whilst the other no less strikingly resembles her mother. The only peculiarities which at all indicate their relationship are a gouty diathesis which they both inherit from their father, and an idiosyncrasy in regard to opium, of which neither is able to take even a small dose (in any form whatever) without violent vomiting."*

Mr. Orton † "refers to Mr. Bakewell's Dishley sheep, as deriving and maintaining their celebrity through the ewes. And he adduces an observation which, if well founded, is of great pathological importance, and of especial interest to members of the medical profession, as well as to the directors of associations for life insurance. It is this: that diseases of the vital organs (and it may be presumed, therefore, diseases primarily involving the vital functions of nutrition and secretion) are transmitted oftener, and in a more intense form and degree, on the side of the mother than that of the father. And he adds that, in the matter of life insurance, he has long been in the habit of judging of the value of a life by the family history on the female (mother's) side. ‡ In perfect accordance with this position, and, if well founded, in their degree confirmatory of it, two observations may be cited: the *first*, that the daughters of a woman who has herself borne a large family, are often equally prolific as their mother, a fact, if it be one, not without interest to those to whom an heir-male of their own body is an object; the *second*, that the daughters of mothers that have borne twins oftener than other females give birth to twins.

"In connection with this branch of his subject, Mr. Orton draws a distinction between a part or organ, including its vital endowments, and the *quality* of the organ and its endowments. And while maintaining that the 'outer' structures are chiefly furnished by the male parent, he equally holds that the *quality* of these, as of all the organs, comes mainly from the female. By *quality*, he obviously means what the older physiologists included under the term *vis vita*,

or what in ordinary language is called *stamina*. It is not, for example, the special endowments of the nervous and muscular systems, the powers of contractility and nervous agency, considered *per se*, which he says are given by the female, but the quality of these is now defined and may be good or bad. This allegation he illustrates by a reference to the 'short-horns,' and Mr. Bakewell's breed of sheep. But it will perhaps be best understood by a reference to the horse. 'The Arab,' he says, 'will let you have his stallion, but his mare at no price. He cultivates *endurance* and *bottom*, and the female gives them. He does not know the law we are promulgating; but he acts as if he did, for experience has taught him. The English breeder, on the other hand, values the stallion. He cultivates *speed*, and finds that the sire gives the locomotive organs; consequently his value, just the reverse of the Arab; his mare is easily got at, but his stallion is priceless.'"

Dr. Harvey,* declining to give an opinion regarding it (Mr. Orton's theory), says: "It may be remarked in passing, that while *talent* is notoriously in the male line, it has often been observed of individuals that have risen to distinction among their fellow-men, either by their *power* of intellect or *force* of character, that they have owed their pre-eminence to their mother."

According to Dr. Harvey, † "Mr. Orton's argument is, that in the reproduction of the animal species there is no casual blending of the parts and qualities of the two parents, but that each parent contributes to the formation of certain structures, and to the development of certain qualities. And, advancing a step further, he maintains that the male parent chiefly determines the external character, the general appearance, in fact, the outward structures and locomotive powers of the offspring (*e.g.*, the brain, nerves, organs of sense, and skin, and likewise the bones and muscles, more particularly of the limbs), while the female parent chiefly determines the internal structures and the general size and quality, mainly furnishing the vital organs (*e.g.*, the heart, lungs, glands, and digestive organs), and giving tone and character to the vital functions of growth, nutrition, and secretion."

This, then, is the law which Mr. Orton, of Sunderland (a practical breeder of animals), claims to have worked out by independent observation, though he accredits the discovery to the late Mr. Alexander Walker. ‡

"It is an error to suppose that the male transmits certain characters and the female other characters; though, no doubt, from unknown causes, one sex sometimes has a stronger power of transmission than the other, . . . for certainly they (the sexual elements) do not in ordinary cases differ in their power of giving character to the embryo." §

Concerning the cause of the exterior or animal life following that of the father, and the interior or vegetative resembling that of the mother, the following may serve to explain:

"While the fœtus is developed from that part of the ovum called by physiologists the *germinal* membrane, this membrane itself consists of *two* layers, an outer and an inner, called respectively the *serous* and the *mucous*. Of these layers, each gives origin to a special set or system of organs; the outer (or serous)

* Op. cit., p. 785.

† Dr. Harvey's review of Mr. Orton's paper on the "Physiology of Breeding" (Newcastle Chronicle, March 10, 1854), in Edinb. Med. Jour., August, 1854, pp. 113-4.

‡ I have interpolated the word *mother's*, because I believe it makes the meaning of the author more explicit. He probably refers to the examination of *men*, who, according to the views advanced in this paper, resemble their mothers more than their fathers. But if he were examining women, it is probable that he would pay more attention to the father's side.

* Op. cit., p. 114.

† Alexander Harvey, M.D., "On the Relative Influence of the Male and Female Parents in the Reproduction of the Animal Species." Edinburgh Monthly Medical Journal, August, 1854. Review of Mr. Orton's article on the "Physiology of Breeding," in Newcastle Chronicle of March 10, 1854.

‡ Intermarriage, etc. Lond. and Phila., 8vo.

§ Darwin, An. and Pl., vol. ii., p. 300.

to the brain, nerves, organs of sense, and integuments, and likewise to the bones and muscles; the inner (or mucous) to the lungs, glands, digestive organs, etc.

"That is to say, the outer layer gives rise to the whole set of organs concerned in the strictly *animal* functions, while the inner layer gives origin to those concerned in the strictly *vital* functions."*

The heart and blood-vessels, according to this authority, "would appear to be either the joint production of the two layers or to originate in an intermediate layer subsequently developed and called the *vascular* layer. He suggests, however, that the vascular system may stand in the same subordinate relation to the vital organs and their functions as the osseous system does to the muscular.

The fact of the father influencing most the exterior organs, and the mother most the interior, is ascribed to the discoveries of Bischoff, Wagner, and Newport, that the spermatozoa do not appear to penetrate beyond the *exterior* layer of the germinal membranes from which the exterior organs take their origin. Dr. Harvey says: "As the spermatozoon comes first into contact with the *exterior* of the ovum and disappears while lying there, it seems not unreasonable to suppose that its influence while extending to the outer layer may be in a great measure confined to it."

Dr. Mapother explains this phenomenon in much the same way. According to this authority "the influence of the male has been said to bear more upon the apparatus of animal life, as the spermatozoa do not probably reach deeper in the ovum than the serous layer of the germinal membrane, while the mother is more apt to share peculiarities in the organs of vegetative life." †

WHY CHILDREN RESEMBLE THEIR MOTHERS MORE THAN THEIR FATHERS.

Buffon says: "The molecules furnished by the father ought to procure his resemblance, if they are more abundant than those of the mother, and when the father furnishes less it leaves the infant more of the resemblance of the mother, which latter occurs very frequently."

Darwin has progressed but little further, where he suggests that the resemblance of offspring to one parent in one part, and the other in another part, is not difficult to understand on the admission that the gemmules in the fertilized germ are superabundant in number, and that those derived from one parent have some advantage in number, affinity, or vigor over those derived from the other parent. ‡

These explanations are scarcely more definite, and little different from the ancient opinions on the same subject, a sample of which we give from Lactantius: § *Similitudines autem in corporibus filiorum sic fieri putant. [Varro scilicet et Aristoteles] cum semina inter se permixta coalescunt, si virile superaverit, patri similem provenire, seu marem seu foeminam. Si mulibre prevaluerit, progeniem respondere maternam. ||*

* Alexander Harvey, M.D., "On the Relative Influence of Male and Female Parents, etc." Edin. Med. Jour., August, 1854, pp. 115-6.

† Physiology, p. 375.

‡ Animals and Plants under Domestic, vol. II., p. 386.

§ De Officio Dei, cap. 12. Compare also Lucretius, De Rerum Natura, B. iv.

|| Dr. Allen, of Lowell, Massachusetts, very properly calls attention to the great want of rules whereby we may judge of resemblance and constitutional predisposition. He says: "It is true that the general fact of resemblance of children to parents has long been admitted; but then we have no guide or rules whereby every feature and shade of this likeness can be traced out between the offspring and the parent, or dissimilarity accounted for. While in books and journals there are many admissions that there is, and must be, much truth in this law of resemblance, you may search medical and other libraries through and

"Even in hybrid plants, Koelreuter says he has produced or diminished paternal resemblance by increasing the quantity of impregnating dust," while Mr. Knight says: "Except in cases where superfœtation took place, I have invariably found the effect of a very large or a very small quantity of pollen to be invariably the same in its influence on the offspring."*

It is well enough to observe here that the discrepancy between these observers may very possibly be due to the time or *degree of maturation of the ovules*, when the pollen was applied.

It is quite possible that great inequality in the ages of the parents may have some effect in determining the resemblance to either parent, as some authors attribute defects in children to this cause, and Hoffacker and Saddler have shown that the proportion of sexes born to such parents differs very considerably from that among couples of nearly the same ages.

Helvetius, Weikard, and others, thought that the resemblance of children to their parents depended less upon hereditary transmission than upon education, imitation, and other analogous exterior circumstances. Burdach † very properly remarks, that "with the excellent intention of raising a man, which is free to all who desire to make use of that liberty, it is too far from the truth to hazard that hypothesis; for hereditary qualities have really more control over our constitution and our character than all the influences from without, physical and moral. As the children of a marriage often differ altogether the one from the others, in regard to constitution, inclinations, and propensities, although having all been raised under circumstances equally good," etc.

Congenital conditions are not the only ones which are subject to hereditary transmission; the same thing happens equally to those which are accidentally acquired or have been subject to the will. It is not rare to see mastiffs, ‡ dogs, and cats, born with a short tail resembling the acquired malformation in their parents. §

It seems, therefore, from all the authorities cited, to be pretty generally believed that mothers impress their children, of both sexes, with their physical and moral peculiarities, their constitutional tendencies and hereditary diseases and defects; in short, a general resemblance more marked than that derived from their fathers; and it is not at all surprising that this should be so, for the child is for a considerable period, amounting to at least two years, under the exclusive control and influence of the mother and her varying physical condition during this time.

In the first place, it may be well to inquire, when and where either parent begins to impress the product with a resemblance to themselves. For convenience, we may divide the time and place of impression into four parts, viz.: 1. Impression on either element before fecundation. 2. Impression from the instant of fecundation until the product leaves the Graafian follicle. 3. During gestation. 4. During lactation. At each one of these periods the ovum or product of conception usually receives impressions, but most in

through without finding a single treatise or scarcely an essay that discusses this topic in an intelligible manner. But it is an encouraging fact that the most progressive men in the medical profession, both in Great Britain and in our own country, are waking up to the truth and importance of this subject, especially as it is manifested in the transmission of disease. A careful inquiry into the diseases of a person's parents and ancestors enables one to understand more distinctly what are his predispositions to particular diseases, and what are constitutional and what are not.—Nathan Allen, M.D., LL.D., "Hereditary Influence in the Improvement of Stock," &c. 1872, pp. 30, p. 10.

* Thomas Andrew Knight, Philos. Trans., 1809, p. 394, "Influence of Male and Female Parents on their Offspring."

† Physiologie, v. ii., p. 248.

‡ Der Naturforscher, t. xv., p. 25.

§ Burdach, Physiol., v. ii., p. 251.

the second, or indeed principally there, as some authors have it, for they say that both resemblance and hereditary disease are communicated during this period. Constitutional diseases and peculiarities are probably communicated during this time, though the period of gestation must be reckoned to have great influence on the tastes, inclinations, and *qualities* of the physical and mental faculties.

It is quite probable that the ova of the female have an initial existence, as primordial cells or germs, at a very early period in the life of the child, and are in some degree capable of receiving and retaining impressions which may influence the products derived from them.

On the other hand, the spermatozoa are probably not in a condition, (if indeed they have an existence,) much before puberty to receive or retain the result of impressions made upon the man. So then, before impregnation, the female element has, in all probability, been subjected to the varying physical conditions of the woman for a much greater length of time than the male element has been to the varying physical states of the man; and the former is, moreover, much more susceptible to such impressions than the latter. Some may think that the ova are not susceptible of being influenced by such methods as I have suggested; to these I can only point to the great difference in appearance, constitution, viability, tastes and inclinations of children by the same parents, while twins are proverbially alike in some one if not all these particulars.

Dr. Martin Barry, in his observations on the "*direction*" of development as influencing the "*individual peculiarities of structure*," says: "Strictly speaking, therefore, no two individuals of different births can have the same parentage; for though the *individuality* of the parent, or of each parent, does not change, yet as *individuals*, the parents are continually changing.

"The more nearly *contemporaneous* separation of their elements, and the contemporaneous derivation of nourishment from the maternal fluids, during foetal life—but especially the former—are perhaps the causes why twins are sometimes so much alike in individual structure; and *super-fetation* may be, in part at least, the cause why this is not always the case.

"There is, however, another cause why individuals, even of the same birth, should differ, viz.: the different periods, at which the maternal portion of the germs may have been first secreted in the ovary; for, though continually renewed, they must have in consequence a more or less peculiar state of being."* This point is well illustrated in the frequency of differences in color, constitution, etc., in the young of the same birth in multiparous animals.

We conclude, therefore, that there are few, if any, physical, moral or mental acts of a woman's life that are not without some influence, however inappreciable, on every child which she may subsequently bear. And every *succeeding* child is influenced by the impressions left on the maternal organism by each and every *preceding* child, though they may all have been of the same father, and this influence is increased with the number of fathers. This brings us to the subject of resemblance of a child by a second husband to the first, which is not within the limits of the subject under discussion.

After or at the time of impregnation, the father begins to exert a combined influence with the mother, though this influence is much less considerable than that of the female, for in addition to the influence exerted before impregnation, she has begun a new pro-

cess which only ceases at the completion of the term of gestation. During lactation, the child is impressed in some degree, however slight, by the varying conditions of the mother. Through this source it may imbibed cachexias, diseases, tastes, and inclinations. Indeed, some writers have made this an argument against the use of the milk of the lower animals, lest the child should be brutalized by such food. Tupper* contends that children are even educated in their mother's milk. Every child a woman bears inoculates, so to speak, her constitution with some of the peculiarities of the father of the product, and, other things being equal, it is probable that the greater the number of children the greater will be the impression made upon her system by the husband, until she will finally come to resemble † him in some degree at least. This influence is probably greater in the cases of gestations with daughters than with sons, for three reasons, viz.: 1. The father's influence begins earlier in the case of female conceptions, as the ovum is fecundated at an earlier period of development. 2. Female fetuses sap the vitality of the mother more than males. 3. Daughters resemble the father more than sons. From these reasons, then, it is only fair to infer that a woman who had borne a certain number of daughters ought to resemble their father more than after bearing the same number of sons. The husband will therefore lose a part of his individuality, or rather his wife will have acquired a share of it. If this be true, the younger children ought to resemble the father more than the elder, and, if the mother's system can be inoculated with his defects and diseases, even though they be constitutional, as is certainly the case in syphilis, it is only fair to infer that the younger children would be more likely to inherit a predisposition to these affections than the elder, ‡ and consequently have relatively a lower viability.

This fact of a woman acquiring a resemblance to her husband might be used as an argument against the propriety of a widow marrying her deceased husband's brother, though it would not materially affect the propriety of a widower marrying his deceased wife's sister.

It is well known also that women sometimes become masculine, and females of the lower animals take on secondary sexual characters of the male, though the reverse seldom, if ever, happens.

I am told that Mr. Tylor§ has ingeniously explained some apparent anomalies in the prohibition of consanguineous marriages not extending equally to the relatives on both the male and female sides. Though I have not seen this work, I imagine it refers to the matter just mentioned.

Mr. Clark, a breeder of fighting cocks, "found, after repeated trials, that there was a greater reduction of weight in the young from a father paired with his daughter, than from a mother with her son." ¶ From this it would appear that there is a greater resemblance between the father and daughter than between the mother and son.

* Proverbial Philosophy.

† Yet in the long years liker must they grow;
The man be more of woman, she of man;

Till at the last she set herself to man
Like perfect music unto noble words;

Distinct in individualities,
But like each other, even as those who love.

—Tennyson's Princess.

‡ The relative viability of younger and elder children will be fully discussed in a forthcoming paper on the "Physical Aspects of Primogeniture."

§ Early History of Man, Lond., 1865, ch. x.

¶ Darwin, Var. Anim. and Plants under Domestic., vol. ii., p. 125. .J

* On Unity of Structure in the Animal Kingdom, in Edinb. New Philos. Jour., 1837, vol. xxii., p. 133.

Gaertner * repeatedly found that when a hybrid was used as the father, and either one of the pure parent-species or a third species was used as the mother, the offspring were more variable than when the same hybrid was used as the mother and either pure parent or the same third species as the father.

Sedgwick, after referring to the transmission of hypopadiaz by females, is of the opinion that "it cannot at present be satisfactorily decided whether such interruptions in the transmission of peculiarities thus necessarily limited to the male sex are equally liable to occur in those peculiar to females by transmission through males. It is well known that the power of giving a copious supply of milk may be transmitted by the bull as well as by the cow; but my observations on this subject lead me to infer that, in all cases of interrupted descent in hereditary disease, the transmission by females is more common than by males, and that as regards the class now under consideration, it may be asserted, in general terms, that whilst there is little difficulty on the part of females to transmit diseases and defects of exclusively male organs, there are very few, or rather scarcely any, corresponding cases in which the reverse occurs." †

ATAVISM.

Atavism, from *atavus*, an ancestor, is a term applied to the resemblance of a child to the grandparents or more remote ancestors, rather than to its own parents. Rückschlag in German, Pas-en-arrière in French, and Reversion in English, are synonymous terms.

Atavism is a word, like Idiosyncrasy or Catalysis, with a conventional meaning, expressive of a condition, without embodying in any degree an explanation of the cause. Indeed, no explanation of the proximate cause has ever been given, to my knowledge, though evolutionists have been satisfied in ascribing atavism to "*reversion*," which, though new, is scarcely an improvement on the ancient term, as it only means a turning back to an original condition, which would seem to indicate a deterioration or inferior degree of development, an inference manifestly incorrect.

The true cause of atavism is a *dynamic* one, just as I shall show, in a succeeding article, that "the cause of the rotation of, and nearly equal number of, sexes in births" is a dynamic one, the fetus *in utero* impressing the mother in a *greater and lesser degree alternately*,—one sapping the vitality of the mother in a greater degree, and the next succeeding one in a lesser degree. I cannot stop now to discuss this theory further, but must refer the reader to the article above mentioned.

Atavism, however, is usually subject to *sexual differentiation*, which fully confirms the view I have given of the proximate cause. This will be explained further on.

Atavism, then, is due to the dynamic force in one generation exhausting itself in the next, then regaining, then losing, in a series of alternations. This dynamic difference in the resultant, so to speak, of the elements uniting to form a new being, finds an explanation in the different states or conditions of development, or degrees of maturity of the ovum at the time of fecundation (the variations in the law are explained by differences in nutrition before and after fecundation).

Darwin ‡ says: "When one parent alone displays some newly acquired and generally inheritable character, and the offspring do not inherit it, the cause may lie in the other parent having the power of prepotent

transmission. But when both parents are similarly characterized, and the child does not, whatever the cause may be, inherit the character in question, but resembles its grandparents, we have one of the simplest cases of reversion. We continually see another and even more simple case of atavism, though not generally included under this head, namely, when the son more closely resembles his maternal than his paternal grandsire in some male attribute, as in peculiarity in the beard of man, the horns of the bull, the hackles or comb of the cock, or as in certain diseases necessarily confined to the male sex; for the mother cannot possess or exhibit such male attributes, yet the child has inherited them, through her blood, from his maternal grandsire."

"Atavism, or the principle of latent inheritance, is a normal phenomenon in certain forms of disease, as in color-blindness and the hemorrhagic diathesis, in which it is associated with sexual limitation, and pursues for the most part a very regular course. It is well known that in these two forms of disease the order observed, both in their development and transmission, is usually complete, so that whilst the disease in each case shows itself only in the males of the first, third, and fifth generations, its transmission is effected only by the females of the second and fourth generations; and as this occurred also in my case of ichthyosis and in other diseases already noticed, the question naturally presents itself whether in those cases in which two or more members of the same family are affected, without any evidence of the occurrence of the same disease in preceding generations, it may, notwithstanding, have occurred without being recorded." *

Sedgwick states, in opposition somewhat to M. Girou's † opinion on this subject, "that although the principle of atavism is intimately associated with that of sexual limitation, both in natural as well as in morbid development, yet it is far more common in the latter than in the former state." ‡

"M. Girou endeavored to show that children naturally resembled their grandparents of the same sex, and that the transmission of this family likeness was effected through parents of the opposite sex. It is, however, quite evident that although such atavistic resemblances may often be noticed, yet contrary facts can be so readily adduced as to disprove the general application of the above principle in the normal development of the human race." . . . In connection also with this subject, it may be observed that in the offspring of dissimilar parents there is never, as a rule, complete fusion of the two parents, but a distribution of the characters peculiar to each; and although this is less strongly marked in the offspring of the human race than it is in that of the lower animals—as, for example, in the case of some hermaphrodite insects, in which family quarterings may result from specific distinctions of sex being associated without fusion in the same specimen—yet, as regards the inheritance of disease, it will be found that the morbid characteristics of one or the other parent are either completely repeated or completely absent, but not fused together in the offspring. This is what is meant in inheritance by the doctrine of 'election,' which is based on the observation that certain attributes of organization peculiar to one parent are repeated in the offspring; and it offers a reasonable explanation of the fact that children often inherit the defects of one parent, whilst in many other respects they resemble the other; and the inheritance in these cases, both natural and morbid, may

* Bastardzeugung, S. 452, 507.

† Op. cit. p. 173, July, 1863.

‡ Animals and Plants under Domestication, vol. ii., p. 29.

* Sedgwick, Op. cit., July, 1863, p. 186. †

† De la Génération, Paris, 1828.

‡ Op. cit., July, 1863, p. 190.

sometimes be conveyed to them by atavic descent." (Sedgwick.)

Mr. Westwood observed in a specimen of the scare egger moth at Berlin, that the front part of the body and front wings were half male and half female, and the hind part and hind wings half female and half male; the characters of the male and female insect being exhibited on opposite quarters of this specimen.

Indeed the exhibition of secondary sexual characters or peculiarities belonging to the opposite sex to that of their possessor, in animals naturally diœcious, is not without example even in the human race. We see women with beard, and men without; so also there are masculine women, possessing other peculiarities of the male, and effeminate men possessing characteristics of the female. Even where there is no apparent mixture of physical characters of one sex in an individual of the opposite sex, the mind of some men is effeminate, while that of some women is masculine.

Hence the following epigram of Martial:

But white thy limbs we rough and bristly find,
Effeminate and wanton is thy mind.

—Lib. ii., Epigr. 36.

Also:

Dum dabitur natura gravis puerum faceretne puellam,
Factus es O pulcher pene puella puer.

Ausonius.—Epigram 107.

Cases are not wanting in which one half of the body resembled one parent and the other half the other parent. Sibley relates the case of a young girl in Somersetshire, with hair on her head of two remarkably distinct colors; the right side from an exact parallel line which divided the skull into two equal parts was almost black; but the left side, from the same line, was of a reddish yellow. As she grew up the dark hair became jet black, exactly like that of her father; while the other side became of a strong caroty red, precisely like that of her mother. The hair on all other parts of her body was diversified in the same manner. She lived to be 28 years of age, and was resorted to as a great curiosity.

Another case is recorded by the same author where the son of a white father and a negro-mother had the whole of the right side white like the father, and that of the left black like the mother. Half the hair on the head was long and brown like the father, and the other half black and woolly like the mother.

A third case is given, where a negro-man married a white woman. By her he had two sons and three daughters, who were mulattos, except the eldest son, who was the first-born. From the head to the navel, all around his body he was remarkably fair, had a fine skin, handsome round features, light-brown hair, and sanguine complexion, like his mother; but below this he was completely black, with short woolly hair, exactly like the father.*

Buffon declares that the offspring of a black man and a white woman are often pied or spotted. I remember having seen a black woman having large white patches on different parts of the body. Though I have several times seen the offspring of a white woman and colored man, and less frequently the reverse, they presented nothing unusual.

Prof. Asa Gray † described an apple half russet and half Spitzenberg, the line of demarcation being quite distinct. Apples have also been found with one half sweet and the other half sour. This is the more remarkable from the fact that apples have five carpels, from which we would expect the divisions to be in fifths rather than halves.

Sedgwick says: "It appears to be the rule in reproduction, that the lower the position of the organized beings the more constant is the occurrence of the principle of atavic or uninterrupted inheritance, this associated principle of sexual limitation being gradually merged into that of alternation of form. So that whilst in the higher invertebrate there are alternations between the sexual and the virgin forms of reproduction, and in many of the lower invertebrate between the hermaphrodite and the gemmiparous, in the corresponding alternations which occur in some of the lowest conditions of animal life, the sexual element, if not altogether lost, exists in too rudimentary a form for us to recognize its presence.

"It may also be remarked, that although the occurrence of atavism in disease is usually effected through the female, yet it occurs also, though less frequently, through the male sex. Illustrations of this are given in many cases of disease already cited, and among the lower animals it may often be noticed as a natural phenomenon. It is well known, for example, that the supply of milk by cows is hereditarily influenced by the bulls rather than by the cows from which they are directly descended, and that the character of the secretion, as regards both the quantity and the quality of the milk, is chiefly derived from the paternal grandmother by atavic descent,* and as we descend still lower in the scale, we find, for example, in the case of insects, evidence more or less decisive in favor of the transmission by either sex of the distinctive peculiarities of the other."

From all that has been brought forward concerning atavism or interrupted descent, it would appear as if it were quite as important, in getting the family history of an individual with a view of predicting his longevity, to inquire into the history of his grandparents, as well as that of his parents. Indeed, according to the showing of some authors cited, the facts concerning the grandparents would be much more important than those concerning the parents; yet in my experience I have not known such facts to be required by life companies, though I have often given them.

MALES RESEMBLE THEIR MOTHER, AND FEMALES THEIR FATHER.

Aristotle seems to have been the first to make mention of this fact, though such an observation may have been made long before his time, as many of the ancient philosophers were mere recorders of verbal traditions handed down through preceding ages. Most of the ancient authors treat of the subject of resemblance of children to their parents; many of them entered into a detail and degree of differentiation which leaves little scope, even to the imagination, to exceed them. Ludovicus Bonaciolus † considers the subject under eight different heads, four for the female and four for the male. Venette ‡ proposes five different inquiries concerning resemblance. Mercatus, Montanus, Ambrose Paré, Mercurialis, § Osiander, || and numerous others, have entered very fully into the subject, but none of them appear to have settled upon any definite prevailing law controlling such resemblance.

Niceus, whom Bonaciolus ¶ calls "the noble poet," seems to have been among the earliest authors who make a distinction of sex in the resemblance of chil-

* Burdach, *Traité de Physiologie*, tom. ii. p. 117. and Giron. *De la Génération*, p. 127. Out of Sedgwick, op. cit., p. 101-2: also Thierry.

† *Enneas Muliæbris*, cap. ix., Apud Spachius Harmon. *Gynæcorum*, pp. 145-6.

‡ *Génération de l'Homme*, etc., p. 198, part II.

§ All in Spachius.

|| *Handbuch d. Entbindg.*, etc. t. i., p. 624.

¶ *Loc. cit.*

* *Medical Mirror*, London, Svo. p. 95.

† *American Journal of Science and Arts*, Dec. 1822.

dren to their parents. He says: *Mas avo materno similis*.

Aristotle * has it: "For the most part girls resemble their mother, and boys their father; though the contrary is often the case, and the females resemble their father, and the males their mother, and the different parts of the body resemble either parents."

Pliny † says: "In some cases the female children resemble the father and the males the mother."

According to Buffon, in general the males resemble their mother and the females their father.

Lucretius ‡ has the same:

Thus oft the father's likeness does prevail
In females, and the mother's in the male.

"We know, moreover," says Velpeau, § "since Aristotle, that the boys, as a general rule, resemble their mother, while the girls rather incline to the features of the father, etc., but there is such variation in this respect, that it is impossible to come to anything definite in regard to the mechanism of generation."

Many other authors might be cited fully confirming the same view, but they are principally statements handed down from one author to another.

Pre-eminent among those who have maintained this law, is M. Ch. Girou de Buzareignes, || who has done more to prove the truth of his position than any other person. His entire life was spent in experimenting on the generation of animals and plants, and his deductions are drawn from the observations and experiments of his friends as well as his own. He was probably the first to contend that this differentiation in resemblance was a law, and his deductions and observations from repeated experiments conducted during a series of years fully confirm his position. None of these authors have given a very definite explanation of the reason or cause of this law; most of them attribute it to atavism, others leave it unexplained. Further on the author will enter into the cause of this phenomenon.

Mr. Sedgwick ¶ calls attention to the frequency with which consumption has been observed to be restricted in its appearance to one sex. He cites a case occurring in his own practice, in which "it is to be noticed that the disease was transmitted by atavic descent from the paternal grandmother to three granddaughters, and that although there were five grandsons in the family, none of them inherited the disease." He relates another case in which the disease was limited, with one exception, to the males for three generations, being transmitted by atavic descent.

Dr. Greenhow ** relates the case of an old couple who both survived their eightieth year, who lost all their sons by phthisis, while all their daughters escaped. In a second case, in which both parents survived to an advanced age, the five daughters all died of phthisis, while the sons were exempt. In a third case, six out seven daughters died of phthisis under thirty years of age, the seventh went to India, where she also died at about the same age; but the only two sons are alive and well. † "In none of these cases was either parent phthisical; but it is worthy of note that all three mothers were asthmatical, the fathers being in each case healthy."

The writer knows of a case in which a daughter inherited phthisis from her father, her two brothers being

free from it. In another case a son inherited phthisis from his mother, while a daughter and five other sons were free from it.

One drunkard begets another (*ebrii gignunt ebrios*), says Plutarch, also Aristotle, Gellius, Macrobius, and numerous others. Atavic descent is very frequently noticeable in this connection, for we often see the daughters of drunkards have drunken sons, though they may be perfectly temperate themselves. The moral of this in a matrimonial point of view is evident.

The writer's father has a mare that had in her tenth pregnancy a horse colt resembling the mother in color, though taller; and in her eleventh pregnancy, a mare colt (by same father), resembling the stallion in color and size.

Sedgwick, in his elaborate articles,* mentions the case of a man who had ichthyosis from the time he was eight years of age. "This man had three sons and three daughters. One son died at the age of five years, and another at the age of seven, both of whom were free from the disease. The other son is living and past middle age, but has shown no tendency to the disease. The three daughters have all lived to grow up and marry, and in them likewise the skin is unaffected. Two only of the three daughters have had children. The eldest daughter has had four, of whom the first-born, a girl, has had no appearance of the disease; the three other children are boys, of whom the eldest, aged fourteen years, and the youngest, aged nine years, suffer from the disease, whilst the other son, aged eleven years, is free from it. The family of the other daughter consists of three children, the eldest of whom, aged six years, is, as in the former case, a girl, and free from the disease, whilst the two other children, who are boys, aged respectively three years and one year, have the skin very decidedly affected. It is to be noted that the disease in these grandchildren has in each case appeared within a few months after birth. There are two other important facts to which I would call attention before passing on; one is the non-development of the disease in the second generation, and its reappearance in the third, which is an instance of *atavism* for which no satisfactory reason can (?) be assigned; the other is the sexual limitation of the disease, which in this case is complete in a double sense; for whilst the females in the family have alone transmitted the disease, its appearance has been restricted to the males." Dr. Elliotson † reports a case of the same disease, coming under his observation, by which two brothers were affected, and one brother and sister were free from it.

In the well-known Lambert or porcupine family, ‡ this same disease was transmitted to four successive generations, and always limited to the male sex. Two brothers, descended from the original porcupine man, had seven sisters, who were all free from the disease.

Mr. Sedgwick calls attention to the fact of the limitation of the disease in the above cases to the males alone, and says, "it is not to be supposed that there is any peculiar inaptitude in the fair sex to this unsightly affection of the skin, for at one of the meetings of the Med.-Chir. Soc. in 1818, the case of Mrs. Holden § was brought forward, in which the disease was limited to the female sex, in the person of her daughter, aged three years, in whom the disease had appeared when about three months old, the same age as at which it had occurred in her mother; and this case is the more

* Hist. Anim., B. vii., c. vi. 5.

† Hist. Nat., B. vii., c. x. (10).

‡ De Rerum Natura, B. iv., ver. 1215 et seq. Good's translation.

§ Midwifery, Philadelphia, 1862, p. 133.

|| De la Génération, etc. Paris, 1828, and several papers in *Annales des Sciences Naturelles*, 1825 to 1833.

¶ Op. cit. July, 1869, p. 160.

** *Medico-Chir. Rev.*, March 25, 1862; out of Sedgwick.

* William Sedgwick, *British and Foreign Med.-Chirur. Review*, vol. xxvii., Apr., 1861, pp. 477-89. "On Sexual Limitation in Hereditary Diseases." Art. ii.

† *London Med. Gazette*, vol. vii., p. 633. 1831.

‡ *Philosophical Transactions*, 1731, p. 299; and 1753, p. 21.

§ *Transactions*, vol. ix., pp. 62-3.

remarkable from the fact that whilst the child inherited the disease of her mother, she inherited the features of her father.*

The same gentleman cites from various authorities several cases of individuals having the rose-colored eyes of albinos, as having "been observed to be often hereditary connected with one sex." M. de Saussure* mentions two well-known albinos who were brothers, whose sisters did not possess this abnormality. Dr. Trail† reports the case of three albino brothers, who had two sisters (the first and fifth children) who were not albinos, and two twin brothers, one of whom was an albino. Thomas Jefferson‡ mentions the case of two albino sisters, who gave birth, the one to an infant who was an albino like herself, the other to a very black infant like the father. Sedgwick cites the following two cases from Cornaz. § The two grandsons of a family residing at the village of Ferlens, near Oppens (Switzerland), married, and had each of them two daughters, one affected with albinism, and one exempt. These two albinos, who are the great-granddaughters of the family referred to, and from whom the inheritance is derived, married: the one had no children; the other became the wife of an agriculturist with black hair and brown eyes, is mother of an infant who is an imperfect albino.

The other case is that of a Swiss girl whose parentage unites her with seven other albinos. Her great-grandfather had two children, a son and a daughter. This girl, first mentioned, is the only one of the descendants of the son affected with albinism. Among the descendants of the second child (daughter), there have been seven albinos. This daughter, last named, had two sons who married two sisters. The eldest had, among other children, three albinos—namely, one son and two daughters. The other brother had seven sons, none of whom were albinos. Five of these seven sons married, but only one of these five had albino children, and he had four albino daughters out of a family of three sons and nine daughters. Mr. Sedgwick suggests in explanation of the fact of the appearance of albinism in the fourth generation in the one case, and in the fifth generation in the other, that, in the latter, albinism did not appear till the fifth generation, owing, it would seem, to the fact that Charles Rey had seven sons, but no daughters; the defect being transmitted to daughters only. In these cases we see fathers transmitting their abnormalities to their daughters in six instances out of seven.

"Mr. Wardour has recorded a case in which five brothers, afflicted with the hemorrhagic diathesis, had three sisters free from it; but each of the sisters had, besides other children, two sons similarly affected, whilst no female in the family shared in the disease." (Sedgwick.)

Mr. Sedgwick mentions a case of hereditary pityriasis versicolor which was limited to the males for several generations, "whilst the females of the family, although not suffering from it themselves, have transmitted it to their male children." ¶

Dr. Henry Stewart records the two following cases of sebaceous tumors of the scalp, which were hereditarily limited to the female sex, in one case for ten, and in the second case for five generations. He observes that "some of the females derived the inheritance from their paternal grandmother by atavic descent, which affords additional proof of the influence of sex,

for except when a male thus intervened to arrest the appearance of the disease, the inheritance was direct from parent to child." *

Alibert† states that *plica polonica*, a disease of the hair in Poland, "is observed not unfrequently to attack the father and the grandson, whilst the son is spared, a character which is common to it with other maladies, particularly with gout."

"Girou relates the case of a man, descended from a family in which the special use of the left hand was hereditary; although not himself left-handed, he has a daughter who is so, and all of whose children are left-handed; he has, moreover, a son married, who is not left-handed, but who is the father of a daughter so completely left-handed from her cradle, that it has been necessary to tie up the left hand, so as to force her to serve herself with the right hand." ‡

Sedgwick saw a case of supernumerary finger on the left hand of a girl whose two brothers were not so deformed, but whose father, paternal grandmother, and paternal aunt, all had precisely the same defect.

Girou § relates a case in which a rarer form of atavism is exhibited, of a defect transmitted through a male to a female. "A woman who was club-footed, had three male children all well formed; the eldest of these married, and had, at first, six sons well formed, and afterwards four daughters, one of whom was club-footed like her paternal grandmother." ¶

Maisonneuve ¶¶ relates a case of epilepsy in a man inherited from his mother's father. Insanity and other peculiarities in the case of George III. were transmitted to the males through the females by atavic descent for eight generations. **

Esquirol †† states that insanity is more often transmitted by the mothers than by the fathers." M. Baillarger †† is of the same opinion, and declares that "it is more to be feared when it is on the mother's than on the father's side, not only because it is more often hereditary, but also because it is transmitted to a greater number of children." He gives the following statistics with regard to sex:

"Of 346 children who had inherited the disease from the mother, I have found—197 girls and 149 boys. The difference is 48 or a fourth,

"Of 215 children to whom the disease had been transmitted by the father, I have found—128 boys and 87 girls. The difference is 41 or a third.

"The madness of the mother is transmitted, then, more often to the daughters than to the sons, in the proportion of a fourth: the madness of the father, on the contrary, more often to the sons than to the daughters, in the proportion of a third."

"The transmission of the mother's insanity is scarcely more to be feared, as regards the boys, than that of the father; the mother's insanity, on the contrary, is twice as dangerous to the daughters."

Dr. James Webster §§ says of the hereditary predisposition to mental disease, as it appeared in the 1,798 insane persons comprised in his observations—31.10 per cent. of the males were hereditarily predisposed, whereas

* Sedgwick, op. cit., p. 451.

† Description des maladies de la Peau, p. 40, Paris, 1814.

‡ Sedgwick, op. cit., p. 459, out of Girou, De la Génération, 1828, p. 278-9.

§ Op. cit., p. 270.

¶ Dr. Albert H. Buck, of New York, in a recent letter, relates the case of a girl, six months of age, whose little fingers have a peculiar crook in them, while exactly the same defect is noticeable in the little fingers of her father's mother. The parents of the child, however, are free from any such deformity.

¶ Recherches et obs. sur l'Épilepsie, p. 68.

** Sedgwick, op. cit., 467.

†† Des Malad. Mentales, p. 65, 1828.

‡‡ Archiv. Gén. de Méd., Paris, 1844, 4 série, t. v., pp. 116-117.

§§ Medico-Chir. Trans., vol. xxxii., 1840, p. 118.

* Voyage dans les Alpes.

† Nicholson's Journal, vol. xix., p. 1866.

‡ Notes on the State of Virginia.

§ Annales d'Oculistiques, 1850.

¶ Op. cit., Apr., 1863, p. 449.

of the 1,094 females, 37.47 per cent. were of that description. "This feature becomes more interesting," he observes, "when it is remembered that insanity is a disease more frequently transmitted to offspring by the mother than by the father; whilst mothers also transmit this disease oftener to their female than to their male children."

Sexual preference is not without its influence here, as I have shown in my previous article* that insanity is much more frequently met with in females than in males.

Dr. Moreau † has carried the investigation of this matter still further, and in a direction calculated to assist our inquiries. He was of the opinion "that personal resemblance and cerebral disorder may be transmitted by either parent, but never by the same; that where children resemble the parent of the opposite sex, the following results were obtained: of 22 females suffering from insanity, 17 had inherited it from the mother and five from the father; while of 142 insane males, 95 had inherited it from the father and 47 from the mother; when, on the contrary, the analogy of resemblance was inverted, 47 sons who resembled their father derived their insanity from their mother, and 8 girls, who resembled their mother, derived theirs from the father." Sedgwick, from whom we quote the above, ascribes the peculiarity to atavic descent. He observes that "in the most strongly-marked forms of hereditary disease, uninterrupted descent for several successive generations is the exception rather than the rule."

"In phthisis, for example, the late Dr. Theophilus Thompson, ‡ in a paper read before the Medical Society of London, remarked, 'it is worthy of observation, that the influence (of phthisis) tends peculiarly to extend in the direction of the sex in which it first appeared.' And in 'the first annual report of the Hospital for Consumption and Diseases of the Chest,' it is stated, that of 669 male and 341 female patients suffering from phthisis, and which was ascertained to be hereditary in 18.2 per cent. of the former, and in 36.3 per cent. of the latter (showing that females are twice as liable as males are to inherit the disease from their parents), it is found that whilst the father transmits the disease to his sons in 59.4 per cent., and to his daughters in only 43.5 per cent., the mother transmits it to her sons in 40.6 per cent., but to her daughters in 56.5 per cent." §

Cancer seems to be hereditary in many instances, and, as I have already shown || it to be nearly two and a half times as fatal among females as among males, it is probably due to arrested or defective development, as women have relatively a larger proportion of glandular structure, and are withal less highly developed in their organization than males. The developmental theory of cancer, once established, will corroborate the view here taken of the relative evolutionary developmental condition of the sexes.

In a case of hereditary deformity, consisting of crooked fingers and enlarged joints transmitted five generations, "it was observed by the family that those children who inherited the deformity from the father

had it in the more marked degree; those who inherited it from the mother had it in a less marked degree." And what is most curious, two first cousins of the fourth and fifth generations married, one having the deformity in a marked degree, and the other in a less marked degree, yet their two children had perfect hands.*

From this it would appear that "family proclivities to disease are more strikingly manifested in brothers and sisters than between parents and children. The intermingling of opposite tendencies begets, so to speak, in the children a neutralization of the peculiar aptitudes to disease existing in the parents respectively."

"Physiological likeness of the parents induces imperfect progeny, *pro tanto*, just as certainly as intermarriage within forbidden degrees of consanguinity." †

In certain animals the young resemble most the parent of the same sex; the young male resembles more the father, and the young female the mother. This phenomenon takes place in the majority of birds, and, following Hausmann, in the equine species. Girou pretends that it is above all true in our domestic animals, in that which concerns the height, the length of hair, the amplitude of the pelvis, in a word, the circumstances of the plastic life, and that this analogy becomes more pronounced by the progress of age than it was in the commencement. The black bulls often produce with red cows heifer-calves which are red at the epoch of their birth, but become black with time; in the inverse circumstance, the young males are from the first black, and red in the adult state. ‡

"It appears to be more common, however, that the parents act upon the sex of the product of generation which is opposed to their own. § One of the Colburns || brought into the world three boys and two girls, and propagated her infirmity, (supernumerary fingers and toes), to all the boys, but to only one of the girls; the second son of Gratio Kallja ¶ had one son only who was not deformed, but his three daughters all had supernumerary fingers and toes like himself; the daughter only propagated the anomaly to one of her sons, and not at all to her daughters. A man who had the palate malformed, engendered four sons well formed, and three daughters affected with hare-lip and fissure of the soft palate; in like manner the sister of his mother had five daughters well formed, and five sons with hare-lips. ** A woman related to a family in which there were several hypospadiacs, brought into the world two sons affected with that deformity. Another woman of weak mind, and of a family several members of which were hard of hearing and idiotic, gave birth to two boys, deaf-mutes, of which one was besides an imbecile; to two daughters well constituted; and finally to a boy who equally enjoyed good health." ††

A negro in Berlin produced with a white woman seven mulatto daughters and four white sons. †† Analogous observations have been made on bastard animals. Among the colts of the mare which had previously been fecundated by a Quagga, the females resembled more than the males their mother for the color of their hair. Bastard pups of a dog and female wolf exhibit the same difference of resemblance as regards sex, as the two males resembled the wolf (female) in form,

* New York Medical Record, June 16 and July 16, 1873, pp. 297-302, 333-4-5. "The Relative Viability of the Sexes."

† "On the Signs indicative of Hereditary Predisposition to Insanity," L'Union Médicale, No. 48.

‡ Hints on Some Relations of Morals and Medicine, with special reference to pulmonary consumption: Lond. Journal of Medicine, p. 402, 1851.

§ Sedgwick, op. cit., p. 208.

|| "Deaths from cancer, occurring in Philadelphia from Jan., 1801, to Dec. 30, 1870, showing the relative proportion of males and females dying from this disease, and the percentage of women dying of cancer of the uterus." Jour. of Gynecological Society of Doston, Sept., 1872, p. 201-1.

* Horace Dobell, M.D. Med. Chir.-Trans., vol. xxviii., p. 25. 1863.
† J. Adams Allen, M.D., LL.D., Medical Examinations for Life Insurance, Chicago, 1867, p. 47.

‡ De la Génération, p. 124.

§ Haller, loc. cit. t. viii. p. 90. Hoffacker, loc. cit. p. 98.

|| Carstole, Philos. Trans., 1844, p. 94.

¶ Gletchen, Abhandlung ueber die Saamenthierchen, p. 52.

** Nov. Act. Nat. Cur., t. 1, p. 445.

†† Meckel, Handb. d. Patholog. Anat., t. 1, p. 20.

‡‡ Meckel, Archiv f. Anat., 1828, p. 180.

§§ Steboia, Jour. fuer Geburtshulfe, t. vii., p. 2.

movements, the aversion for men, the defiance of and aversion for dogs; while the female had the head of a dog, did not trot as a wolf, was pleased with dogs, and exhibited less aversion for men.*

Girou assures us that the same phenomena take place in ordinary generation in relation to conformation of the head and other members, to the color and the constitution, as a consequence, in general, to the sensibility and irritability; he makes the remark that mules (females) have a longer mane, the pelvis larger, that they are more headstrong and vicious, that they have more resemblance, as a consequence, to their father than the male mule, and that the latter have much more frequently the same colored hair as their mother.† He adds that the male dog resembles more his mother, and the female her father; that a smooth mare gave birth to three females provided with hair, and one male smooth like herself; that a cow having white hair with patches of red produced four males that resembled her in color and distribution of spots, and a female similar to the bull; and finally, that the same thing happened in the ewe and in cats. †

The same writer says,§ that when in that relation at birth the young resemble their ancestors of the same sex; that, as a consequence, a young male will resemble his mother and his maternal grandfather, as indicated in the accompanying table:

1st GENERATION.			
Gt. Grandfather	Gt. Grandmother	Gt. Grandfather	Gt. Grandmother
2d GENERATION.			
Grandmother	Grandfather	Grandmother	Grandfather
3d GENERATION.			
Father	Mother	Father	Mother
4th GENERATION.			
Daughter	Son	Daughter	Son.

This table is founded on the same law as that of males resembling their mothers, and females their fathers, but extended one generation further. It reads, therefore: 1, the daughter resembles the father; 2, she resembles her father's mother; 3, she resembles her father's mother's father, etc.; or, more properly, her ancestral resemblance has descended in this line more than from a corresponding line in her mother's ancestry.

Osiander had already remarked something analogous. || So therefore, in general, it is that which differs, notwithstanding the affinity, which exercises a stronger influence, and we find in this traces of the law, difference in identity: the daughter resembles her father, because it is to him that she approaches the most in her origin, but she is remote from him by her sexuality; the son resembles his grandfather (maternal) because he approaches to him by his sexuality, and is more remote from him in his origin. If the manner in which we have before explained the discovery made by Chamisso is exact, this relationship is removed beyond possibility in the *Biphores*, in which the mode of generation varies following the generations, and in which the young are never procreated as their parents, but as their grandparents. ¶

M. Girou de Buzareignes ** cites the case of a girl who inherited from her father the habit of sleeping on her back, with her right leg crossed over her left.

Darwin †† mentions the case of a boy who had the

habit of rapidly moving his fingers parallel to each other and raising both hands to a level with the eyes, when excited by any pleasurable emotion. This habit continued with him even when an old man. "He had eight children. Of these, a girl, when pleased, (at the age of four and a half years), moved her fingers in exactly the same way," and when much excited raised her hands, all in exact imitation of the habit in her father.

Prof. Boek * reports the case of a father transmitting a congenital absence of the iris to three sons, in a family of eight children; one of the sons transmitted the defect to his two daughters.

Mr. Streatfield † has published the case of a family of ten children, in which the five boys squint, while the five girls do not. Neither the father nor the mother squint, but the mother has a sister, whose two children also squint, showing the inheritance from the mother's side. In these cases where but one eye was affected, it was always the left.

Concerning color-blindness, Mr. Sedgwick mentions the case of a boy, aged eleven years, who suffered from this defect, while his four sisters were free from it. The peculiarity of sight was derived from the maternal grandfather, who had a brother similarly affected, while another brother and three sisters were free from it. The second generation consisted of only two daughters, the mother and the aunt of the boy referred to, both of whom were free from this defect of vision. "The essential facts in this case closely correspond with those related in the case of ichthyosis, the hereditary disease being in each case limited to the males of the first and third generations, and transmitted by the females of the second generation, who were themselves unaffected by it." ‡

Dr. Pliny Earle § states that he inherited this defect of vision from his maternal grandfather, two of whose brothers were similarly affected. The defect prevailed in eight of the families related to this gentleman, being limited to the male sex in all except one family. The total number of persons in the eight families affected was 61 (32 males and 29 females); of the former nine-sixteenths were affected, and of the latter only one-fifteenth. An analysis of upwards of two hundred cases of color-blindness shows that the proportion of males affected is nine-tenths of the whole. ||

Mr. Milne inherited his color-blindness from his maternal grandfather, who had two brothers and a second cousin similarly affected. ¶

Dr. Bronner ** records the case of a German having this defect, who had two daughters not so affected. The eldest daughter had three sons, of whom only the second was color-blind; the youngest daughter had three sons, all of whom were color-blind.

M. Cornaz †† cites the case of a woman who had two sons, among other children of both sexes, by two different husbands, both of whom were color-blind.

Dr. Osborne †† reports the case of a family of fifteen brothers and five sisters who had eyes resembling in miniature the markings of the back of a tortoise-shell cat. The inheritance was derived from the mother, who, with three sisters and a brother, inherited it from their mother. This peculiarity was transmitted

* Annales d'Oculistiques, tom. xxxiii., p. 93-4, 1855, out of Sedgwick, op. cit., p. 483.

† Ophthalm. Hosp. Repts., p. 153-4, 1858, out of Sedgwick, o. c.

‡ Sedgwick, op. cit., p. 487.

§ American Jour. Med. Sci., 1845, p. 346-354.

|| Cyclopaedia of Anat. and Physiol., Art. Vision (White, Cooper), p. 1454, cited in Sedgwick, op. cit., p. 488.

** Dr. Combe, Trans. of Phrenol. Soc., p. 222, Sedgwick, o. c.

¶ Med. Times and Gazette, p. 259-61, April 12th, 185-, Sedgwick, o. c.

†† Annales d'Oculist. t. xxxiii., p. 43, 1850.

‡‡ Dublin Medical Journal, 1855.

* Masch, in Der Naturforscher, t. xv., p. 25.

† De la Génération, p. 119.

‡ Ibid., p. 120, 121.

§ Ibid., p. 123.

|| Loc. cit. t. i., p. 634.

¶ Burdach's Physiologie, t. ii., p. 269-70.

** De la Génération, p. 282.

†† Animals and Plants under Domestication, vol. ii., p. 7.

to three successive generations by the females exclusively, though their children, both male and female, inherited the defect.

Mr. Streatfield,* in his account of the congenital defect known as cleft iris (coloboma iridis), cites the case of three brothers having this deformity, whose mother's father is said to have had the same defect, and, indeed, it had exhibited itself in four successive generations, being limited to the males, though transmitted by the females. Sedgwick, in reviewing the case, says, the chief points of interest are—1st. The transmission of the defect without its being shared in by the mother. 2dly. That whilst two of her three sons had the defect, her three daughters were free from it; and lastly. That the maternal grandfather, the maternal granduncle, the maternal uncle, and the son of the last named, all shared the defect, which shows that the inheritance in this case extended to at least four generations.

Inherited peculiarities show themselves earlier in life in a daughter than in a son, and earlier in the daughter than in her father. The hairy family described by Mr. Crawford,† produced children during three generations with hairy ears. The hair began to grow on the father at six years of age, and on his daughter at one year.

The famous men of history owe their excellence to their mothers, and the women who have attained celebrity reflect the genius of their fathers. St. Paul wrote to Timothy, saying: "When I call to remembrance the unfeigned faith that is in thee, which dwelt first in thy grandmother Lois, and in thy mother Eunice; and I am persuaded that in thee also." (II. Timothy, c. i., 5.) Sarah Castor the mother of John Milton, [Magnum et Venerabile Nomen], was a woman of incomparable virtue and goodness. Letitia Romilini, mother of Napoleon the Great, was noted for the qualities which she imparted to her son. Lord Byron's mother was noted for her spleen, as she was termed the "Unhappy tempered mother." The mother of Gengis Khan, the famous Asiatic conqueror, was noted for her warlike courage and daring. Tamerlane, the greatest warrior of the fourteenth century, was descended from Gengis Khan in the female line. "Arete, the most celebrated woman of her time, on account of the extent of her knowledge, was the daughter of the distinguished philosopher Aristippus, disciple of Socrates. The daughter of the Roman Emperor Caligula was as cruel as her father. Marcus Aurelius inherited the virtues of his mother, and Commodus the vices of his. Charlemagne shut his eyes upon the faults of his daughters, because they recalled his own. Cornelia, the mother of the Gracchi, was a daughter of Scipio. Catherine de Medicis was as crafty and deceitful as her father, and more superstitious and cruel. She had two sons worthy of herself, Charles IX., who shot the Protestants, and Henry III., who assassinated the Guises. Her daughter, Margaret of Valois, recalled her father by her gentle manners. Henry VIII., who put two of his wives to death on the scaffold, had two sons [but one legitimate] distinguished for their meekness of character, and two daughters as cruel as himself. Arete, Hypatia, Madame de Staël, and 'George Sand,' all four had philosophers for their fathers. The mother of Tasso had the gift of poetry. Buffon often speaks of the fine imagination of his mother. The poets Burns, 'Rare Ben Jonson,' Goethe, Walter Scott, Byron, and Lamartine, all were born of women remarkable for their vivacity and

brilliance of language." Shakespeare* is not unmindful of this when he makes Cato's daughter say—

Think you I am no stronger than my sex,
Being so father'd and so husbanded?

Herodotus,‡ in speaking of the Lycians, says: "They have a distinction from which they never deviate, which is peculiar to themselves; they take their names from their mothers and not from their fathers. If any one is asked concerning his family, he proceeds immediately to give an account of his descent, numbering the female branches only." Plutarch† tells us that "a law was instituted among the Xanthians (Xanthia being a part of Lycia), that they should derive their names from their mothers and not from their fathers." Another authority§ says, that amongst these people the inheritance descends to daughters and not to sons. And to complete the reversion of the usual ordering of things, according to Beloe,|| in some parts of the kingdom, youngest sons inherited the parental estate in preference to their elder brothers.

Viewing this peculiarity in a purely physical light, aside from social and political bias and the accepted usage, there is a very philosophical reason, from what we have shown, why sons should take the names of their mothers, and daughters those of their fathers. In Spain, even at the present time, sons retain their mother's name as a sort of suffix to that of their father's, to indicate their descent in the female line. It is possible that the following complex provision may owe its origin to the same cause, viz.:

"If a man purchase land in fee simple and die without issue; in the first degree the law respects the dignity of sex and not proximity. * * *

"The nearer heir by the grandmother on the part of the father [paternal grandmother] shall have it before the remote heir of the grandfather on the part of the father [paternal grandfather]."¶

Darwin** states "that transmission and development though generally acting conjointly, are distinct powers.

. . . . We plainly see this distinction in the many cases in which a grandfather transmits to his grandson, through his daughter, characters which she does not, or cannot possess. Why the development of certain characters, not necessarily in any way connected with the reproductive organs, should be confined to one sex alone—that is, why certain cells in one sex should unite with and cause the development of certain granules, we do not in the least know; but it is the common attribute of most organic beings in which the sexes are separate."

The fact of the frequent resemblance of grandson to grandfather, alluded to by Darwin, and attributed to reversion, we would explain by the resemblance of the daughter to her father, and the son to his mother, for the reasons already given.

The development of secondary sexual characters and others not necessarily in any way connected with the reproductive organs, we would attribute to the difference in the degree of maturation of the ova at the time of fecundation.

"The principle of sexual limitation may be traced in family statistics of mortality from diseases not in themselves hereditary. In a case of measles, affecting the only son of a respectable mechanic, I ascertained that the disease was peculiarly fatal to the females on

* Julius Cæsar, act ii., sc. 1.

† Beloe's Herodotus, vol. i., Philada., 1814, p. 218-19.

‡ On the Virtues of Women.

§ Larcher, note in Beloe's Herodotus, p. 218.

|| Loc. cit., note. p. 219.

¶ Lord Bacon's Works, v. xiv., p. 191: compare Blackstone's Commentaries, B. 2, c. 14.

** Animals and Plants under Domest., vol. ii., p. 398.

* Ophthalmic Hospital Reports, p. 153, 1858.

† Embassy to the Court of Ava, vol. i. p. 329.

the father's side, but that the males, when attacked, recovered. The father and his only brother had both recovered from the disease without any unfavorable symptoms, whilst all the five sisters had died from it. The little boy referred to recovered quickly, but his only sister had died the previous year from the disease, which at its commencement was apparently destined, in her case, to prove fatal.*

The adherence to the female line in this case cannot be due to greater mortality among females than males, for we find (1845-53) 102 males died of this disease to every 100 females, while in *whooping-cough* † there were only 83 males to every 100 females, which is the only one of the children's diseases in which the proportion of females is in excess. And it is, moreover, one of the most fatal of the diseases peculiar to children, at least a great number die of it. A much larger proportion of females die of whooping-cough than any other disease incident to children.

According to Sedgwick ‡ sexual limitation of hereditary affections and defects is not owing to sexual preference, as the disease or condition is not more easily transmitted to one sex than to the other, but follows a certain law which limits its appearance to that sex in which it first originates.

"On the whole," says Darwin, § "as far as I can judge, new characters are more apt to appear in the males of our domesticated animals than in the females, and afterwards to be either exclusively or more strongly inherited by the males."

Both the above statements are notably in harmony with the deductions concerning malformations or defects brought out in my last paper, || wherein I showed that a much larger proportion of males than females (161 m. to 100 f.) perish from defective organization or development, and that there are more malformations by defect among males and more malformations by excess among females.

Dr. Smith ¶ says that when the mother and father are equally healthy, and have the same hereditary longevity, the daughters will be longer-lived than the sons; where the mother is as above, and the father is sickly or from short-lived stock, the sons will be longer-lived than the daughters.

"It is not true," says Braschet,** "that the male children who resemble their mother live longer than those who resemble their father, as Bacon would have it."

Sinclair †† contends that it is the mother principally who assures the longevity, and Dr. J. A. Allen is of the opinion that "Longevity of grandparents on the maternal side is to be preferred to that on the paternal side." ††

I am rather inclined to coincide with the views of Lord Bacon and Dr. Smith, as they are in harmony with the law on the subject; believing, as I do, that males who resemble their father most are effeminate, and females who resemble their mother more than their father are masculine, and being exceptional, and in a certain degree abnormal, entail upon their possessors a weaker constitution than they would have had, had they been properly constituted. Effeminacy and masculinity are too often looked upon as being caused

by the easy and affluent circumstances under which a child is reared, but this is only a concomitant, and not the proximate cause,—it is constitutional, arising from too early fecundation of the ovule in the first instance, and too late in the last. Individuals so constituted are consequently worthy of more sympathy than usually falls to their lot.

WHY MALES RESEMBLE THEIR MOTHERS AND FEMALES THEIR FATHERS.

The fact of males resembling their mothers and maternal grandfathers, and females their fathers and paternal grandmothers, was well known to most ancient philosophers and physicians, and many were the reasons given for this condition of resemblances, though none seem to have gone beyond atavism, until in the present day reversion has taken its place. All terms hitherto used as expressive of this condition are without meaning in regard to the proximate cause. The writer will give below what he considers to be the proximate cause, knowing of no other satisfactory explanation as having been given, and offering this as original.

Males are begotten from mature ovules (*eggs*), and females from immature ovules, hence the *ovule* from which a male is derived is (for a certain length of time, probably from three to seven days) *longer under the sole influence of the mother* than the ovule from which a female is derived, and as the period beginning with fecundation and ending with the extrusion of the ovum from the Graafian follicle, is claimed by some as that in which resemblance and hereditary predilection are impressed, we are led to believe that the sexual differentiation in the resemblance of sons and daughters to their parents is principally due to the difference in the time in which the ovule is under the sole influence of the mother, modified, perhaps, in some degree by the dynamic difference in the ability of the male element to fecundate a mature or an immature ovule, the latter being the more difficult. This, then, appears to be the cause of the law, subject, nevertheless, to differences in nutrition of the embryo, and variations in the condition of the mother during gestation.

CONCLUSIONS.

The author recapitulates the deductions and conclusions arrived at in this paper, at the risk of being tedious, for he believes that every person in writing a philosophical dissertation should state clearly in the beginning what he desires to prove, and finally, in as succinct a manner as possible, the conclusions arrived at. A neglect of this is as culpable as the lack of a complete index to a book. Authors do not deserve to be considered authority on the subject in which they have inflicted on the reader the necessity of perusing the entire text, and, moreover, merit the neglect which they so frequently get.

Recapitulation:—

1. In general, children of both sexes resemble their mother more than their father in physiognomy, habits,* constitution, and temperament.

2. Usually boys resemble their mother more than their father in physiognomy, habits, constitution, and temperament. In the same relationship girls resemble their father more than their mother.

3. As to whether there is any constant relationship between the physiognomical resemblance and a predis-

* Sedgwick, op. cit.

† Dr. Tripe, Br. and For. Med. Chir. Review, April, 1857.

‡ Op. cit., p. 486.

§ "Variations of Animals and Plants under Domestication," vol. ii., p. 74.

|| "The Relative Viability of the Sexes," etc., N. Y. MEDICAL RECORD, June 16, 1873, p. 302; also July 15, 1873.

¶ J. V. C. Smith, M.D. "Prize Essay on the Physical Indications of Longevity," N. Y., 1869.

** "Physiologie de l'Homme," vol. ii., p. 475.

†† "Principes d'Hygiène, Extraits du Code de Santé," Genève, 1823.

‡‡ Op. cit., p. 46.

* Dr. W. B. Carpenter, the distinguished physiologist, has recently written an able article "On the Hereditary Transmission of Acquired Physical Habits," in The Contemporary Review, April and May, 1878.

position to the diseases of the person resembled, it is very difficult to decide from the data at hand, but it would appear from the few facts in which any observations were made in this direction, that there was a larger percentage of cases in which inherited diseases were exhibited where there was no resemblance than where there was such physiognomical similitude. In other words, children have resembled one parent in general physiognomy, while they have inherited the constitutional peculiarities and diseases of the other, more frequently than where they have derived both these conditions from (one) the same parent.

This view of the matter is supported by the following cases already recited in this article:—

Mr. Sedgwick's case of ichthyosis, where a girl inherited "the disease from her mother," while "she inherited the features of her father."

Dr. Moreau asserts that personal resemblances and cerebral disorder may be transmitted by either parent, but never by the same.

Dr. James Webster assures us that insanity is more frequently transmitted by mothers to their female offspring than to their male children. And Dr. Theophilus Thompson has shown the same fact to be true of the transmission of pulmonary consumption.

The facts are far too few to warrant us in defining this as a law, yet I know of no facts or theories to the contrary. I am under the impression, however, that physicians have usually regarded a physiognomical resemblance as evidence of greater liability to the hereditary disease of the person resembled, yet it is quite possible I may be mistaken in this view of the matter.*

In general, then, hereditary and acquired diseases and defects are more likely to be transmitted to offspring of the sex in which they originated, and thereafter to be subject to the principle of sexual limitation, either directly from parent to child, or by interrupted or atavic descent, from grandparent to grandchild.

Though sons are usually best able to follow the avocation of their fathers, it is undoubtedly true that

men inherit the genius, talent, and intellectual excellence and morality of their mother or their mother's father, while daughters inherit the same qualities from their father or paternal grandmother.

4. *Females more frequently transmit* hereditary diseases and defects than males, though they *less frequently exhibit* them. Males less frequently transmit, and more frequently exhibit, inherited diseases and defects.

I have already, in my last paper,* called attention to, and offered an explanation of, the phenomena stated in the last conclusion (4), and may repeat it here:—

The ovule (egg) from which a male is derived being for a longer time under the sole influence of the mother (before fecundation, and longer in utero-gestation) than the egg from which a female is derived, acquires more of her physical constitution and peculiarities, resembles her more, or inherits more of her physical defects and tendencies, and this ovule is fecundated by a weaker element on the father's part than his female offspring; while the ovule (egg) from which a female is derived is a shorter time under the sole influence of the mother, being impregnated earlier in its course of development (being less mature), and besides this it requires the highest power of the male element to communicate the impregnating influence to it.† Hence we have less hereditary disease *exhibited* in the female, yet she may *transmit* with greater frequency and facility than the male, though it may not have developed in her.

The reason that females do not exhibit hereditary disease as frequently as males, is because of a *higher degree of vitality* in them, which gives them greater power to restrain the appearance of the predisposition, and an *inferior degree of developmental evolution*, retaining in their constitution as germs, what in men become fully developed diseases and defects.

2003 Walnut Street, Philadelphia, July 1873.

* "On the Relative Viability of the Sexes," &c. N.Y. MED. RECORD, June 16, and July 16, 1873, pp. 297-302, 353-4-5.

† This theory of a differential dynamic power of the male reproductive element was first maintained by the writer in "An Inaugural Dissertation, (presented to the Trustees and Faculty of the University of Pennsylvania, March 13, 1868, for the degree of Doctor of Medicine), entitled: Prepotency, Sexual Elective Affinity, Non-congeniality, or the dynamic differentiation of the Elements of Reproduction in the Human Species; the Cause of Relative Sterility. By John Stockton-Hough, A.M., M. Chem., of New Jersey."

This theory is further substantiated in the author's paper on "The Effect of the Nationality of Parents on Fecundity and the Proportion of Sexes in Births;" also in his article on "Statistics relating to Births, Marriages, and Deaths, occurring in Philadelphia for the eleven years ending 1871." Penn. Monthly, Philadelphia, September, 1873, pp. 599 to 620.

* Since the above has been in print, I have happened upon the following, which seems to confirm this opinion.

"When only one of the parents is the victim of constitutional disease, the tendency to similar constitutional diseases is most obviously expressed in those children who most resemble that parent in physical conformation and appearance, and it has been observed that, when both parents suffer, the tendency will sometimes be expressed more often in the daughters of the family than in the sons, or more often in the sons than in the daughters." (1) Prof. Gross appears to have given out much the same opinion, in his far-famed work on Surgery. (2)

(1) *J. Adams Allen*, M.D., LL.D., Medical Examinations for Life Insurance, Chicago, 1867, p. 46.

(2) Samuel D. Gross, M.D., LL.D., D.C.L., Oxon., A System of Surgery, &c., &c. 2 vols. 8vo, Philadelphia; H. C. Lea, 1859-1872.

