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PHYSICAL EDUCATION.

PHYSICAL EDUCATION;

OR,

THE NURTURE AND MANAGEMENT

OF

CHILDREN,

FOUNDED ON THE STUDY OF THEIR

NATURE AND CONSTITUTION.

BY SAMUEL SMILES,

SURGEON.

THE HEALTH AND VIRTUE OF A CHILD'S FUTURE LIFE ARE CONSIDERATIONS SO SUPERIOR TO ALL OTHERS, THAT WHATEVER IS LIKELY TO HAVE THE SMALLEST INFLUENCE UPON THESE, DESERVES THE PARENT'S FIRST ATTENTION.—PALEY.

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PREFACE.

THE Author of the following Essay considers little apology necessary for offering it to public notice. It treats of a branch of Education unquestionably of great importance to the well-being of our species, though one hitherto unaccountably neglected.

Notwithstanding the admirable Treatises of Drs Combe, Southwood Smith, and other individuals eminent in their profession in this country,—and of Drs Brigham and Caldwell in America,—the Author conceives that a Treatise, more especially confined to the Nurture and Management of Children, is yet, in some measure, a desideratum in Popular Educational Literature. It is in the hope that he may in so far contribute to supply this supposed want, that the following pages are now produced; and to his readers, without farther preface, he begs most respectfully to submit them.

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PHYSICAL EDUCATION.

INTRODUCTION.

THE IMPORTANCE OF THE PROPER MANAGEMENT OF CHILDREN TO THEIR HEALTH, HAPPINESS, AND MENTAL IMPROVEMENT.

It is a melancholy but an undoubted fact, that of the whole number of children born in this country, considerably more than one-third die under five years of age! This statement is appalling enough to excite the least reflecting to inquire into the cause of such excessive mortality among the young of our species; if there be any cause to which it may with justice be referred; or whether it be rather an unavoidable fatality of our race, that must patiently be submitted to as the will of Heaven without murmur or regret.

That it is not, however, the design of our Creator, we are justified in inferring, from the perfection of structure observed in the human frame—its admirable adaptation to external nature—and the efficiency of the laws provided for its healthy existence; and that it is not an unavoidable event is obvious from the greater mortality of children that occurs in one

locality than in others;* among the poor rather than the middling classes;† and from its great diminution even within the last century.‡ To what then can it be referred other than to causes in a great measure within man's own control, that are induced by him, and thus capable of being either avoided or removed? It *is* to a want of knowledge, a lamentable ignorance of the nature of the human frame, and the means of preserving its adaptation to external nature, that this sad fatality is mainly to be ascribed; and every year, every day, is adding to the force and certainty of this conviction. It is impossible to ascribe it to the want of affection and parental love of their children on the part of parents, for the tenderest feelings of human nature flow out instinctively towards a helpless offspring; and where parental affection is concentred, neither toil nor labour is spared to ensure their preservation. But without some system of management founded on a knowledge of their physical nature, this affection is often of as little avail as in some of the lower animals, that strangle their young by the caresses whose very object is intended to preserve them.

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* In Leeds, a manufacturing town, out of every 10,000 children born in it, 5286 on an average die under five years of age; while in Rutland county, which is almost entirely agricultural, out of the same number born, only 2865 die under five years.—*Factories Parliamentary Report* 1832.

† In London and Paris the mortality among the infants of the poor and labouring classes is proved to be nearly double of what occurs among the more wealthy inhabitants of those cities.

‡ The bills of mortality of the city of London prove that, while in the year 1770 (within the bills) 6144 children died of convulsions, only 2362 died by the same disease in 1832. Teething also destroyed at that time one-third more than now.

Out of 100 pauper children then received into the workhouses, not *four lived to be one year old*, while at this day not more than a fifth of the whole number die within their first year.

What success could we expect of a gardener, who was totally ignorant of the nature of plants and the relation that subsisted between them and the air around them or the soil in which they grew? or what but entire failure could be expected if, in ignorance of these, he planted his seeds in a dark closed up room, or among dry sand, where they could find neither moisture nor nourishment adapted to their growth and constitution? To rear successfully even the lower animals, it is requisite that a certain amount of knowledge of their nature, habits, and modes of living, should be previously acquired, so as to preserve their adaptation to nature, and thus rear up a healthy vigorous stock. But how different is it with the rearing of the infant man! To preserve him in health and cultivate his mind and feelings, no preparatory education is considered requisite—none is thought necessary; and the duties of a mother, on whom this training chiefly devolves, are reckoned so simple, so easy to be learnt, or so very unimportant, that a female who is fitted for no one station of trust is thought competent, and perhaps more than competent, for the care and management of children. Qualifications are needed for the garden or for the stable, but none are asked for the nursery; the most unqualified mother or most ignorant menial being esteemed fully sufficient for such a post.

How should this be the case? Is it because the former require the exercise of care founded on knowledge, for their preservation, while children can, of their superior nature, sufficiently preserve themselves from external influences? The fact is the reverse. For while the lower animals are guided

by an almost unerring instinct to their choice of food and shelter, and are born provided, for the most part, with natural coverings from the vicissitudes of season, the infant is introduced to the world helpless, naked, passive, and feeble. While the partridge chick as soon as it has broke its shell can run about and pick up its food, and the young of all animals can provide for themselves very soon after they are born, this state of utter helplessness in the child is protracted for many years, and but for the maternal solicitude so wisely appointed to care for its support, would inevitably cut short its otherwise painful existence.

So constituted, and so entirely dependent on a parent's care during so long a period of life, it were but natural to expect that some degree of attention would be paid to the nature and physical constitution of the child, and the means they point out for the preservation of his health and happiness, commensurate with his importance to his parents, and the place he is erelong to occupy in the great social scale of civilized life. And it were at least reasonable that the reflection with which man has been endowed, instead of the mere instinct that actuates the lower animals, should be exercised for the purpose of preserving the child from those noxious influences that are in constant operation around him.

On a certain degree of knowledge of his physical and mental nature, his relation to external objects, his gradual growth and development, the nutritive processes by which these are accomplished, ever going on within his frame; on these alone can a proper and healthy management of the child be founded. And the objects of this management, let

it be observed, chiefly consist in non-interference with the natural processes, or rather in aiding the powers of nature in their careful development of the infant man.

But when, instead of such a system, nature is thwarted and opposed at every stage of her progress, her plainest dictates are neglected, and her operations checked by an observance of fashions founded in ignorance or prejudice; what other result is to be looked for than a mortality amounting to nearly one-half of all that are introduced alive into the world. When we observe the child so much the mere sport of the prejudices and the fears of his parents, who have grown up to maturity under an erroneous system of management, and perpetuate its evils in their offspring because it has the sanction of ancient custom and habit,—are we not justified in assuming that in the premature decay and disease of their children, and the poignant moral suffering that thus ensues, they endure only the legitimate result of transgression of the natural laws which regulate the constitution?

But why, then, do not mothers as well as fathers make themselves acquainted in some measure with the physical and mental nature of their offspring, and so be enabled in a great measure to avoid the causes of such decay and consequent suffering? Alas! unfortunately for the young, this part of education is as yet *unfashionable*. While no showy accomplishment, no matter how trivial, is neglected, and no pains spared for acquiring it, the knowledge of living structure, of the laws of animated nature, though ever before their eyes, is almost studiously avoided; and young females as well as males grow

up to womanhood and manhood, in entire ignorance of all that relates to their future condition as parents, and the physical and mental development of the young, for whose welfare they may yet be so deeply responsible. This is more especially the case with the female part of the community, and inasmuch as it is so, it is the more deeply to be deplored, since the management of the young is their peculiar province, and they are influenced for good or evil through life by the mother's care of their early growth and development.* Is it, then, to be wondered at, when the young female finds herself a mother, with all this previous ignorance of her own and her infant's frame, from acquaintance with which she has, by prejudice perhaps, been so carefully guarded, that she is kept in a state of painful alarm and apprehension by the occurrence of the most trifling circumstance; or allows real danger to steal on, in a state of the most fatal because unguarded security?† Can we be surprised that, of the remaining half that

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* We may here be allowed to use the words of an accomplished female writer—one of the most shrewd and original thinkers of the day—Mrs Leman Grimstone: "It is the fate of the great majority of our species to fall from the hands of nature into those of an ignorant nurse and an ignorant mother: . . . In all the departments of life in which *men* are called to act, some preparatory discipline is deemed necessary and afforded; but where women are concerned, the presiding deity is chance. No provision is made to fit *them* for their allotments, though they are called to fill offices involving the most vital interests of society. Women extract knowledge from practice, they rarely bring knowledge to it: that, under such circumstances, they so often acquit themselves with ability, is pregnant with proof that mental power is the unalienable property of humanity; and since it thus bursts above the blight of neglect, and repels the effects of mistaken institutions, what, under better auspices, might not be hoped from it?"—*Character*, p. 35, vol. i.

† "The entire round of human existence presents not a greater contrast than that which a few months creates between the condition

survive their infancy, so many should carry with them through life the effects of their early maltreatment in a deformed frame and debilitated constitution, to propagate the evils they themselves have endured?

Parents are too generally in the habit of reposing all their confidence of safety in their medical attendant, who has been educated for no other purpose than the due regulation of the constitution and cure of disease; but how frequently is it the case that he is merely called in to witness the termination of a malady, the seeds of which have been planted in the nursery, or through ignorance of the natural laws whose observance is requisite to health; and too often does he bear the stigma of "improper treatment," where the unfortunate result was owing solely to an ignorance that had thwarted and opposed nature, and originated disease, which, when induced, no human power could remove.

We repeat: it is to a lamentable ignorance of the human constitution that the mortality and disease alluded to is mainly to be ascribed; and where the

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of the unmarried female and that of the young wife or mother; yet for this change no preparation is made, no training of instruction thought necessary. Accordingly, nothing can be conceived more helpless than the position of the great majority of females when first they find themselves suddenly encumbered with the care of a living child. Every ordinary occurrence is matter to them of doubt and apprehension; they are kept in a perpetual state of causeless alarm, or of a still more mischievous unfounded security. They hear the cries of their offspring; and while their newly awakened affections yearn for the sufferer, they can neither discover the cause of its uneasiness, nor suggest the remedy. Painful, indeed, is the condition of a woman of good natural sense and warm affections, when thrown, at such a moment, upon the experience (?) of hired menials, whose presumption she dreads, and whose sum of absurd prejudices she has already divined."—From an able article in No. 487 of the *Athenæum*, a journal that has long and ably advocated the cause of popular education.

neglect of its study is so universal, the transgression of nature's dictates so palpable, are we not compelled to admit that the result is but a natural and legitimate one? It is not enough that there are trustworthy medical men on whose skill and judgment reliance can be placed; it is required of parents to *know* enough of the infant frame to co-operate effectually with them in their attempts at the removal of disease; or, what is far more important, to enable them to *avoid* those causes which knowledge and experience inform them first give rise to it.

The present system of management of the young, though considerably improved with the growing intelligence of late years, is still radically bad. It is conducted on no rational principle, but after mere custom and fashion; and though it has been proved again and again by reason and from experience, that certain practices are bad, and ought therefore to be abandoned, yet they are adhered to with all the native inveteracy of prejudice in favour of what is old, and the clearest principles of organized nature continue to be most deliberately neglected and set at defiance. Gorging the young with food and drink of all kinds and qualities—bandaging up their tender bodies in tight-laced dresses, thus interfering with the performance of the most indispensable vital functions—immuring them in small, close, dark, and ill-ventilated cribs and rooms; these are adverse to the dictates of nature, and but for the power of resistance of the infants' constitution, called into exercise to resist their encroachments, would inevitably destroy, instead of one-third, more than three-fourths of the young of our species. Even were these powers of nature let alone

and uninterfered with by our absurd practices, their mortality would be very considerably diminished. The savage female is scarcely more ignorant of the nature of her child than the civilized lady; but not *interfering* with the processes of nature, she leaves the mere inherent powers of the child to preserve him. What is the consequence? In three or four months after he is born he can run about at large, and is of a constitution vigorous for a child, because in him the physical powers have become strengthened by being early called into their natural exercise; whereas in civilized life, the helplessness and feebleness of the child, from the absurd and unnatural management he receives, is prolonged indefinitely into boyhood, and often does not cease until mature age, with the existence of the being who is its victim. "Chance is thus more merciful than men's systems, and the eternal task of Nature is counteracting our efforts to deteriorate ourselves."

The only rational mode of management of the young, we assume, must be founded on a certain degree of knowledge of their nature and constitution. This is what might rationally be anticipated; yet how much, in all respects as well as this, is the study of Nature and her laws neglected, her institutions disobeyed! It is to his ignorance of this that man owes the greater part of the evils that afflict him from early mismanagement, or that he suffers disease in his body from the seeds of it inherent in him at his birth.

The laws that regulate and govern living beings or organized nature, are as invariable as those which regulate the physical or material world; the changes that are perpetually occurring in the body of the

human being take place only according to those certain laws of organization; and in the attainment of health, which is the regularity of human existence, and the physical wellbeing of his offspring, man deceives himself, and suffers the penalty of his ignorance, if he neglect to fall back on Nature, to consult her laws, and call experience to his aid. The practice of the physician is merely to regulate and assist her in repairing derangement—to remove obstructions to her peaceful and healthy action; but everyday experience proves how impotent his best efforts often are without man's own co-operation, and how much easier it is to *preserve* the healthy action of the system when sound, than to repair it after it has been allowed to become deranged and debilitated. To know and be guided by these certain laws, to this end, is the duty of all, and especially of parents, who have as such undertaken an office of the highest responsibility, inasmuch as the happiness or misery of the human beings they have introduced into the world depends so greatly upon their infant management and physical education. This responsibility, however, is so much underrated, that reason is scarcely ever allowed to operate in the matter; and children are born and permitted *to take their chance* of premature death, or debility and precarious health through life, without the idea ever occurring to their parents that they have any duties to perform to them, other than supplying their more immediate animal wants of food, and shelter, and clothing.

And here we may state what is the scope and object of a proper physical education. Its first great end is to promote the efforts of nature in preserv-

ing the soundness of the body, at the same time that each and every part of it is brought up to the highest state of perfection of which it is capable. Now, the main object of nature, in early youth, is to effect the growth and development of the body by means of the nutritive functions. Accordingly, this is one chief aim also of physical education; for though Nature herself performs much, she needs to be aided and enabled to effect her desired ends; while care is taken to steer clear of pernicious fashions and conventionalisms—those quicksands of civilized life. Development of the body is also in a great degree furthered by a proper *training* of its different organs, such as brings out the harmonious and healthy action of the whole system. Accordingly, this is another principal object of physical education. By thus aiding Nature through the means she herself points out to us, the proper exercise and operation of every part is attained, the nutrition and growth of the frame is promoted, while it is thus also fitted with the highest capacity for physical happiness and enjoyment.

Such being the first great object of physical education, it will be obvious that it must commence at an early age; for the body is chiefly formed in youth, and then acquires the germ of its vigour and strength in after-life. In fact, education, whether good, bad, or indifferent, begins with existence—the first and most important preceptor of man being his mother and nurse. She gives the first bend to the twig; by care nourishing and training it into health and strength, or by neglect allowing it to dwindle into disease or deformity.

But besides the importance of a knowledge of the

child's nature for the parent's due preservation of his health, it is also of immense consequence in the cultivation and training of his mind, as on the proper development of his physical frame greatly depends the healthfulness and vigour of his intellectual nature. In fact we can as little separate the mental from the physical part of education, as we can the action of the mind from that of the bodily organs. They are so created and expressly adapted for each other, and sympathize so intimately with each other's condition, that there is scarcely a possibility of separating the consideration of mind from that of physical structure, and viewing one or other of them single and apart from the one harmonious whole which together they form. The body and senses are the instruments of the mind's intelligence, necessary to its growth and enlargement. A sound mind therefore and a sound physical frame are equally necessary to the perfect constitution; a disregard of the conditions necessary for the attainment of health and physical soundness, inducing an equal amount of mental as of bodily debility.

The tender mind of the child is thus linked to his body by ties so intimate that we cannot affect the one, beneficially or otherwise, but we proportionally affect the other also. And when it is considered that the mind is ministered to, not only by all the bodily senses and relative functions, but operates through its own material organ, which is nourished, and renewed, and increases in growth like the other organs of the frame, this circumstance cannot excite surprise. The brain is the organ of mind, and the brain is a part of the bodily structure; hence it is materially influenced by the

physical development and general health, and wholly dependent on the bodily functions for its action and proper results. The mind, emphatically speaking, grows with the brain, improves with the brain, and is affected in all its phases by its action and condition. How necessary, then, is it that parents should have some idea of the relation that subsists between them, and the laws that regulate the healthy action of both! The blessings of a well-regulated mind, that so greatly influences the happiness of after-life, depend in no small degree upon an infant management founded on such a knowledge, and this for the best reasons ought to be chiefly under the mother's care; for the infant mind, when it first appears, is a thing of mere bias, and like the pliant sapling takes the direction her influence gives it. It inclines before every feeling—yields to every impulse; and as these more or less prevail, it becomes confirmed under their sway, till it gradually assumes its peculiar conformation—like the full-grown oak of the forest, to be abiding and almost unchangeable. It is in infancy, then, that the greatest care should be taken of the due education of the mind, as well as of the due development of the frame; and that the mother's influence over her children should be faithfully exerted for this purpose.

The importance of a mother's education of the feelings of her child it is scarcely possible to overrate; and the experience of all observers has proved that on this parent's care of her children very much depends their future health and virtue. And how can it be otherwise? The infant is part of herself; she hangs over it in its innocence—watches over its

growth—its awakening senses—its budding intellect; and her genial spirit enters into it, like the sun's rays into the opening flower, expanding it into full life and bloom. It unfolds itself before her tender love, which it drinks in at every breath. Her spirit becomes inwrought with the whole web of its nature, and is perpetuated in its future life and conduct. Of how great importance is it that the seeds of the impulses then planted in the young mind be good rather than evil—leading to virtue and happiness rather than to vice and misery,—as the physical constitution, on which it is so intimately dependent, is developed in health and strength rather than in weakness and deformity. For let it be kept in mind that the infants of the present generation will be the fathers and mothers of a future race, and happy or the reverse much in proportion to their present management and education.

Such are some of the conditions which parents have in their power considerably to regulate and influence in the early life of their children; and when their important bearing upon the comfort, welfare, and future usefulness of the human beings in question is for a moment considered, does it not force itself on the conviction of every father and mother, that to influence these for their good rather than their evil, is a duty of the most sacred nature, and an obligation which the high responsibility of their relation to their offspring emphatically imposes? One of the first considerations of parents ought certainly to be this:—"What is the nature and constitution of the child, that we may be so guided, in accordance with the dictates of reason, as to ensure his physical health, and thus prepare him

for the most effectual enjoyment of happiness and practice of virtue?" To assist them in the solution of this question, by familiarly describing the construction of the infant's frame, the functions of life, and the laws that regulate them, as well as the gradual development of the sound mind in the sound body by means of a proper education and management, and pointing out a few of the more general causes of derangement, such as a mother's or nurse's care may easily avoid, is the object of the following pages. And in doing so, we shall chiefly notice what has a practical bearing on their management, as founded on dictates that are clearly pointed out by the finger of Nature herself.

CHAPTER I.

PECULIARITIES OF THE INFANT CONSTITUTION; AND ORDER OF ITS DEVELOPMENT.

SECT. 1.—*Growth by Means of the Nutritive Functions.*

THERE can scarcely be a more interesting subject of contemplation to parents than the gentle and helpless infant, that owes to them its being, and is every moment dependent on them for its existence in health and comfort. Indeed, to persons even wholly unconnected with them by ties of this kind, children are objects of great interest. They are heirs of the same common lot with themselves—born to enjoy the same human hopes and pleasures—the same human sorrows and cares. They are the first-lings of a new race, fresh in vigour, endowed with as high energies to fulfil their destinies in existence as their parents, whom they are yet to outlive and thrust in their old age from the early scene of their exertions.

But however interesting they may be as thus contemplated, it is not in such a light we now propose to consider the youthful beings in question. It is more as individually than collectively, and chiefly

in regard to their healthy physical and mental development. And even in this examination of them they are still highly interesting,—the study of their nature and constitution laying open principles whose full observance is of the greatest importance to their future health, happiness, and virtue. The growth of the child, and the vital functions that preserve its existence; the peculiarities of its formation, and the varieties of its motions; the operations of sense, that with experience become so acute and embrace so extensive a range; and above all, the operations of mind, as displayed in the feelings, the passions, and at length all the habitudes of thought,—are to the inquiring mind subjects of surpassing interest, and especially to the practical student of them—the parent, nurse, teacher, or physician—are pregnant with valuable instruction, whose right application exerts over the future being a prodigious influence for good or evil, for health or disease, for happiness or for misery.

In viewing the infant, we are at first struck by its diminutive size when compared with man, as well as the imperfect action of its limbs and organs of sense. Its body abounds in fluids; it is soft in its texture, and yielding and relaxed in its construction. In this state, however, we only observe its progressive growth from a more early stage of existence. The first origin of the infant is the most minute point, and from this it increases in size, advancing through all the stages of development, from a fluid to the consistence of a jelly, and gradually arriving at the still more condensed form in which it appears at birth. The body indeed is constantly in this progress of consolidation, which commences at the first

moment of its existence, and continues without intermission till the last stage of life.

This progressive development is so rapid in youth that infancy has been emphatically styled the Period of Growth. Whenever growth takes place in living beings, the material composing them is undergoing constant change,—rapid in proportion to the rapid increase of size in the object. This is one of the wonderful and almost incredible things in physiology; yet if there be any one fact established in this science, this is one beyond the possibility of doubt. In the young of all animals especially, where we have said growth is the most rapid, the change of particles is most frequent. The ancients supposed that the whole material of the body became changed every seven years; but there can be little doubt that it is changed far more frequently than this,—some parts of it every week, perhaps every day. It is so constant and unceasing that not a moment can be said to pass without an exchange of particles taking place with surrounding objects; and at no one moment can we say with truth that the living body is the same in respect of the constitution of its particles that it was the very moment that preceded it, or that next moment it will be the same it is now that we speak. For every breath that is made adds new particles to it from the air, and discharges old ones that have performed their functions in the body; and every instant they are pressing through the thousand invisible pores of the skin in the form of perspired fluid, containing in solution old particles that have erewhile composed the frame.

The means by which this change of particles is effected, and the growth and development of the

child attained, are the Vegetative or Nutritive Functions. Even thought, sensation, and all the high attributes of humanity, can exist only by virtue of these functions, though they be of no higher a nature than those which effect the growth of the meanest vegetable, and are common to living objects of all kinds. They are as the groundwork on which are built up the animal and intellectual functions. These depend on the existence of the body, and the existence of the body can only be maintained by means of the organs of nutrition. Hence, also, they are as perfect at birth as at any future stage in the life of the human being,—with this distinction indeed, that they are then infinitely the most active in the performance of their functions.

Indeed the sole aim of nature in early age appears to be the growth and development of the child by means of these vegetative or nutritive functions so carefully provided for the purpose. They are Digestion and Respiration, [?] which add new material to the frame,—Circulation and Secretion, that circulate and deposit it in its various parts as it may be needed,—Absorption and Excretion, that throw off the old particles when they have performed their office, and when their further continuance in the body would be useless and deleterious.

In the organs that accomplish these several functions there is no imperfection to be observed at birth. They are all complete in their structure, ready for the performance of their several allotted duties, and perfectly adapted in every respect for effecting the growth and development of the infant. In the organs that perform digestion the utmost harmony is to be observed, and the nicest adaptation

of them to its wants and necessities. The only food the infant needs is its mother's milk; therefore the mouth is adapted for sucking alone, the stomach for digesting effectually milk alone, and the whole apparatus for acting efficiently on this fluid. The lungs also are fully formed for breathing in infancy, and at the moment of birth at once start into play with the utmost precision and regularity. The organs of circulation, which are the heart and blood vessels, are also from the commencement of existence in efficient operation.

With the exception perhaps of the lungs, all the organs concerned in nutrition are exceedingly ACTIVE in infancy. Thus the stomach is digesting almost without intermission, both by night and by day; the circulation is of nearly double the rapidity that it is in the adult; and the organs concerned in throwing off the old material are proportionally active. All this arises from the energy of growth, which, we have said, distinguishes this period, requiring a more frequent removal and succession of particles; and it is from these circumstances that physiologists have thus with justice emphatically styled infancy the period of growth.

Several of these functions are entirely involuntary in their performance, and for the most wise purposes altogether removed from our influence or control; while we can regulate others of them in a certain degree by the will or habit. The circulation of the blood, for example, goes on night and day, during sleep or stupor, while consciousness is not alive to one of the various motions connected with the function. And wisely is this so appointed; for were it to be regulated by the will, a minute's pause

or forgetfulness during the day would cause fainting and death, and its performance be altogether incompatible with the enjoyment of sleep or repose. So too with Secretion and other functions. But over other nutritive functions, such as breathing and digestion, though in a great measure involuntary also, a considerable influence can be exercised, inasmuch as we have it in our power to regulate the purity of the air inspired, or the quantity and properties of the food that is swallowed. And by means of this control, we can thus considerably influence the involuntary functions also, such as circulation and secretion.

It is chiefly by means of this influence we possess over the operations of nature in the nutrition of the body, that the proper early management of the young is of so much importance in the preservation of their health. While nature has provided a most perfectly organized apparatus to preserve the youthful frame, she has also as amply provided a suitable nourishment for supplying the materials of its growth and development. The object of parental management, therefore, most clearly ought to be to preserve the relations of these to the infant constitution, and thus aid nature to effect her desired ends. By doing so, health is in a great measure ensured; while by thwarting her in her operations, disease and premature decay are the inevitable consequences. Proper management is thus merely *an effectual co-operation with nature.* It is not a new road to health, but a mere falling back on first principles,—a walking hand in hand with this most sure guide, from which it is often the tendency and the fashion of civilisation to depart.

SECT. 2.—*Development of the Relative Functions.*

WE have seen, then, that in so far as regards the functions of nutrition, concerned in supplying the mere growth of the infant, there is no imperfection to be observed. It is when we ascend to the more important properties of the human being, that we find in them, as yet, so great a shortcoming; for while the functions that *preserve* the infant are perfect at birth, those which maintain the Relation of individuals to external objects, and with each other, can scarcely be then said to exist. These are Voluntary motion of the limbs, by which movement from place to place is effected; Sensation, whose organs are the eye, ear, &c., that take cognizance of surrounding objects; and the propensities and Mental faculties, that connect together individuals of our race into one enlightened society and brotherhood.

Every one knows how imperfect, in the infant, are all the apparatus of voluntary motion. The limbs are not capable of progression; the bones are soft and yielding in their consistence, and the muscles that clothe them and effect their movements are flabby, weak, and easily injured. They are sufficient for the fitful and buoyant motions of the lively child, but quite incapable of any thing like the sustained exertion they can afterwards endure. So unable are they to maintain the balance of the body, that even after the training of two years, they have scarcely acquired the full power of walking alone. The imperfect state of the hand, too, is not to be overlooked. This most important member is generally closed, and for a long period

the infant is quite incapable of opening and arranging its fingers so as to grasp the simplest object; and when at length able to do so, it is without energy or precision. From the comparatively large size of the head, and the extreme weakness of the muscles of the back, the infant remains long unable to sit erect in its nurse's arms, but lies passive, inert, and helpless.

But the imperfection in the organs of voluntary motion that is so distinctive of the child, also extends to the organs of sense. Indeed sensation can scarcely be said to exist in the new-born infant. The eyes, though well formed, cannot see, nor the ears hear; and the world of colour, odour, and sound, is a wilderness in which it exists unnoticing and incapable of perceiving or appreciating them. It is not long, however, ere sensation is fully awakened, and, rapidly expanding, becomes able to appreciate these several qualities. It is then that the education of the senses begins. The eye first becomes acquainted with light, which appears to be agreeable to it; next with bright objects; till at length it can appreciate shades and colours in all their variety. So too with the ear. Though the nurse's lullaby be at first superfluous, it by degrees learns to distinguish shrill sounds, as at first the eye did the brighter colours,—the hearing, like it, improving till perfect in adult age.

The mental faculties, like the senses, are perfectly awanting in the new-born infant, and still more protracted in making their appearance. Their special organ, the brain, is then less perfectly organized, when compared with its full development in man, than any other part of the system. It is extremely

soft—almost fluid in its consistence,—and altogether unable to perform those exalted intellectual functions so characteristic of the superiority of man. And it is only after the senses have been in so far cultivated, that the mind can at any time be said to exist, as it is through this avenue all its first ideas are acquired. They are as the windows through which light is poured in and illumines what before was dark and undistinguishable. All these pure and refined kind of feelings, then, with which fond parents have invested their tender and innocent offspring, have no existence in reality. The infant on its mother's knee has no feelings except what are instinctive. The smile that plays upon its lips is not the result of any mental process, but rather of satisfied animal instinct; nor do its cries arise from any *mental* feeling of which it is conscious. But with growing age the senses begin to act; and the brain becomes capable of perceiving impressions made through their agency. When by practice the ear, aided by the brain, has learnt to distinguish sounds, the eye shades and colours, and the hands in some degree the forms of objects, intelligence may then be said to begin; but as weak, when compared with the full blaze of manly intellect, as the feeble light of a taper is to the brilliancy of the noonday sun. It is at first merely the faculty of observation, not of reflection; the capacity for noticing and remembering the qualities of bodies,—not of reasoning on their effects or causes. In phrenological language the infant first exercises its *knowing* faculties, while its reflective are yet entirely dormant. At this stage of its existence the child becomes highly sensitive to the impressions of external objects; his attention

is awakened and excited, and he moves as among sunshine and gladness; for his senses are thirsting for satisfaction, and his infantile feelings are pleased with the impression of each object that is new and striking. His imitative powers become excited; he insensibly imitates the motions and gestures of those around him; and at length he gradually acquires the greatest of all the intellectual imitative arts—the art of speech.

The moral emotions or sentiments now come into operation; but are long ere they gain strength or acquire an influence over the conduct of the child. The influence of example and early habit accounts more for the behaviour of a child than intuitive principle;* and hence the acknowledged importance of early "training up a child in the way that he should go." In implanting early the seeds of good principles in the young mind, they take root the more deeply as the soil to receive them becomes more fully prepared; in other words, as the action and organization of the brain in which they reside becomes more complete.

The last part of the constitution of man that is developed is the intellectual,—that part of his nature which renders him the great being that he is, and so powerful for evil or good; that makes him toil up the steep of ambition, thread the rough and crooked paths of worldliness, or labour with untiring zeal in the great cause of humanity. To any portion of this high property the infant can lay no claim.

* At a very early age, however, does the natural temper and disposition of a child manifest itself. Almost from birth, some are observed to be obstinate or passionate; while others are, on the other hand, soft, gentle, and affectionate.

Even in the child and the more advanced youth it is weak and ineffective. It is only in advanced manhood that the reasoning faculties have become fairly developed, grow strong by practice, and full by application. But the first small beginning of the loftiest mind is in childhood; and though its progress be at first slow, if properly cultivated and well directed, it soon rapidly increases, until it reach its full stature in adult age. From the mere memory of the objects of sense, it learns to arrange and associate ideas regarding them; to understand the general laws they obey; and trace causes and sequences in all their relations; until at length it becomes competent to the mastery of the most profound speculations,—filled with the most sublime ideas,—so as to entitle its possessor to the appellation of Scholar, Philosopher, or Poet.

Such, then, is the order of development of the human being. Vitality or life is first conferred, and the action of the vegetative or nutritive functions preserves it; then the power of voluntary motion and sensation; and after these come thought and the manifestations of mind. They are progressively built up on each other, till the full corporeal and mental constitution of man is completed.

The management of the senses and intellect constitutes the important business of education, which, to be effectual, must needs be in accordance with the child's nature and constitution. While the nature and functions of the nutritive organs in infancy teach us that the chief object of management at that early period is to aid nature in the careful development of the body, its nourishment and preservation from disease; the consideration of the

nature of the senses and intellect clearly indicates that the chief part of education in childhood should consist in the cultivation of the senses, so as to make the child familiar with the appearance of things, and their form and structure; gradually awakening the mind, as it comes into operation, to a knowledge of their nature and properties. Above all things, good principles of action and conduct should then be inculcated, founded on sound moral and religious obligations, and the foundations thus laid of a good and virtuous character; for the habits of mind are then chiefly formed, and indelible impressions made for good or evil through life. Those emotions, particularly, which are connected with the temper or the disposition, ought carefully to be controlled,—strengthened where weak, and repressed where over active. But high cultivation of the mental powers in infancy or childhood is contra-indicated by nature, for they can scarcely be said to exist at those periods; and if too early called into exercise, it is at the expense of the physical health as well as of sound mind itself. Precocity or acuteness of intellect is thus in children an unnatural or diseased manifestation; and instead of being fostered and increased, should, by the proper management of parents, be retarded and checked ere it leads to premature exhaustion and disease.

CHAPTER II.

THE DIGESTION OF INFANTS AND CHILDREN.

All living beings undergo a change in the material composing them. The old is replaced by new, and this in its turn becoming old is discharged to give place to material still newer. The body is thus ever changing and ever new, as much so in the old man who totters under the weight of years, as in the infant of a day or an hour. This change of material is at the first stage of life accomplished through medium of the mother;—but at birth, when the infant acquires an independent existence of its own, the organs with which it is provided come into operation, and the supply and change are effected through their means.

Sect. 1.—*Organs and Phenomena of Digestion.*

The organs of digestion are the most important in the assimilation of new material to the body, and on this account, as well as from the priority of their development in organized beings, merit our first attention. They consist of the Mouth and its parts—the Gullet—the Stomach and its continuation in the alimentary canal. It would be impossible in the narrow limits we have prescribed to ourselves, to

give any correct description of the *mechanism* of these parts; suffice it to say, they are perfectly adapted to the ends to be accomplished, namely, the preparation of the food for swallowing—its digestion—and the absorption of the nutritive parts into the circulation. But we cannot avoid here remarking on the wonderful circumstance that all these parts are as able to perform their function at birth as at any future period of existence. The infant can suck as well at its first trial as after the longest training; and the whole organs are equally efficient then as after the most lengthened experience of their duty. Unlike the senses and intellect, that require a tedious course of training, the organs of nutrition are perfectly adapted to perform their functions at birth, and all at once start together into play. It cannot be the stimulus of necessity or the feeling of want that impels the infant to suck or swallow:—more likely that it is a powerful instinct provided for the purpose, more efficient than feeling or reflection, more potent in its calls, and much less fallible in its proposed ends. This is an instance of adaptation of the means to the effect required as striking as can be pointed out even in this abundant field of wonderful contrivances, the animal frame. Reason or feeling would have failed in warning the unconscious infant of its wants; or, if enough for this purpose, could never have suggested the effectual means of satisfying them. Indeed, it is to be observed that the results of vital actions are always the more admirable, and the more precisely adapted to the end in view, the farther they are removed from these influences, and the more entirely they are left to obey the organic laws of the constitution.

The food arrives at the stomach in the same state in which it is swallowed, and accumulates there in quantity after a meal has been taken. The stomach is an oblong bag lying obliquely across the lower part of the chest, in the infant capable of containing, when moderately filled, about half a pint. It is lined on its inner side by a membrane that has the property of secreting a liquid of a very peculiar and important nature in the performance of digestion. This is the Gastric Juice. Though to the taste and smell of the blandest and mildest possible nature, it possesses properties more powerful, in certain respects, than any chemical fluid that is known; and can dissolve all digestible substances, no matter how different they be in appearance, into one fluid of uniform consistence and property, capable of nourishing the body and supplying the constant waste of its material. An important property of the gastric fluid, one not to be overlooked here, is that of coagulating or curdling milk exposed to its influence. This is particularly the case in the young of all animals,* inasmuch as milk is their natural food, and to undergo digestion it is necessary this should first be coagulated. This circumstance is worthy of notice, the more especially as many are apt to attribute the curdling of milk in the stomach to some derangement of that organ, and unnecessarily resort to medicine under the idea of relieving it, when in reality it is but the effect of an indispensable provision appointed for the purpose.

When milk, then, is introduced into the stomach

* An infusion of the stomach of the calf, termed rennet, is in common use for curdling cow's milk, and this property it possesses in consequence of the gastric juice retained in it.

of an infant, it is first coagulated, and the watery part of it absorbed or taken up by the veins or absorbing vessels of the stomach. The same absorption of the fluid parts of a meal takes place, whatever be its nature, till it is reduced to the proper consistence fit to be acted on by the stomach. After less than half an hour the gastric juice, operating on the surface of the mass, has reduced it to a soft pulpy fluid, and this effect gradually extends to its centre as the parts first dissolved are carried onwards in the progress of digestion. This is effected by the gradual contraction of the stomach on its contents, that forces the fluid parts of it into the adjoining part of the canal, where it undergoes still farther changes before it is absorbed and carried into the blood.

In less than an hour the stomach has emptied itself and propelled the digested meal. This is much quicker than in an adult person, where digestion is slower, and the meals are taken much less frequently. But since the waste of material in the infant is so rapid, the whole of the nutritive functions are proportionally active, and the wants of nature are thus more frequent and urgent. For this reason the stomach of the infant requires much less rest to recover its tone than that of the adult: it has scarcely emptied itself of one meal ere it is prepared to recommence the same process with another, and this very many times in the twenty-four hours; almost the sole business of the infant being sucking, alternately with sleeping and crying.

Sect. 2.—*Food of Infants.*

Nature in her bountiful fulness has provided a nourishment for the infant, the most suitable to its

wants, the most perfectly adapted for supplying the waste of its system. This is the milk derived from the breast of the mother,—a fluid bland and easily digestible, at the same time that it yields abundant nourishment for the growth of the child. In the infant, the digestive organs are unsuited for the reception of any other food, and if early deprived of it, they with difficulty reach a more advanced period of life. In such a case, perhaps scarcely one in seven survives the first month, even though the greatest care of them be taken, and food as nearly as possible resembling the mother's milk be employed in its stead.

From the nature of the infant, and the adaptation of the milk to its growth and development, it is obvious that it ought to have that full and regular supply of this fluid which the full nourishment of the infant constitution requires. Hence the importance, in event of absolute incapacity of the mother, from debility or sickness, to suckle her child, of procuring a healthy nurse to supply her place. The natural relation, however, which subsists between the mother and her own child cannot be too cautiously interfered with; for sometimes a change to a strange nurse proves more injurious to a tender infant than the continuation of its support on even a much weakened mother. There is a certain adaptation of the mother to the constitution of her own child that renders her, generally speaking, its very best nurse; and unless there be sufficiently strong reasons for dissolving their connexion, this natural adaptation should be preserved unchanged.*

* We do not here insist on this topic, nor define the precise cases when nursing on the part of the mother ought to be discontinued, as this is the province of the medical attendant to determine and advise, according to circumstances that need not be here stated.

When it is reckoned absolutely necessary at length to make the change referred to (from the mother to a strange nurse), considerable attention requires to be paid to the relative age of the child, with the period of her nursing of the female that is to be selected; for there exists an important relation here also, not to be overlooked. The milk of the mother is at all times precisely adapted to the age of her infant, and its wants, and powers of digestion; and if this adaptation be not observed in changing the nurse, the result is derangement of the whole functions of nutrition. And for these reasons:—When the infant is newly born, digestion is weak in its first performance, and only gradually attains strength with the increasing physical development of the system. On this account the milk of the mother at its birth is weak and watery and easily digested. But as the infant becomes older, say four or five months, its body has grown considerably, its waste is greater, and its powers of digestion to supply it, much increased. On this account the milk of the mother becomes considerably stronger with the age of the infant, so as to yield a greater amount of nourishment in less bulk than formerly. Now, if this be not kept in view, painful and serious consequences may ensue. Should a new-born infant, for example, be put to be suckled by a nurse that has given milk for six months previously, the milk is too nutritive; it does not digest easily, and causes derangement of the stomach; or by its over-nourishing or stimulating nature induces diseases of excitement, to which the infant is constitutionally prone. On the other hand, should a child of six months be put to be nursed on a mother's first month's milk, the opposite conse-

quence ensues: the child is not sufficiently nourished; it becomes weak, and hence equally prone to disease. It is necessary therefore to preserve this important relation between the mother and the child, in so far as lies in our power, as such is in accordance with the clearest dictates of nature and common sense.

Although nature has provided this indispensable supply of nourishment for the infant, sufficient for a time to render it independent of all other kinds of food, she does not intend this should remain so. The period at length arrives at which this food cannot longer be furnished without serious injury to the mother, and when the objects intended in the first intimate connexion between her and the infant are fully accomplished. Teeth now make their appearance, and as these are quite superfluous to the infant in sucking, they are obviously intended for some other purpose. They are given for *use;* and it is a clear indication of nature, when they appear, that the food of the infant should now be changed from the mother's milk to what requires the use of the teeth that are given it. To prepare the infant for the change of diet, it should be commenced some considerable time before the period of weaning, that the change, when at length made, may not be so sudden as to prove hurtful.

The milk of the mother, when healthy and in abundance, ought to be the infant's almost only food until the fourth or fifth month, after which period some additional nourishment ought to be given,—at first once daily, afterwards increased to twice or three times a-day, and this only in small quantities at a time. The most proper food at this early period

is thin gruel of rice or oatmeal; panada of bread or rusk steeped in hot water, with the addition of a little fresh cow's milk, and sweetened with sugar. By this means the infant is gradually weaned from its mother's milk by food as nearly as possible resembling it in its nature and nutritive properties. And by degrees these may be alternated with some light animal broth free from fatty matters, and preparations of arrow-root, tapioca, and sago. These latter, however, ought to be well boiled and given very thin, in small quantities at a time, and chiefly at the more advanced stage of infancy. For arrow-root and such like, though highly nutritive, are for this very reason proportionally indigestible :—since it is ascertained that all kinds of diet which contain nutriment in a concentrated state are difficult of digestion, inasmuch as they do not afford the requisite stimulus to the action of the stomach; and when this organ is weak they remain there, until efforts are naturally excited to get rid of them by vomiting, or they pass through it unchanged.* This is especially the case too if any one aliment be too long persevered in without change or mixture. It soon ceases to give the due stimulus to the stomach to act

* This circumstance should be kept in view in the management of infants as well as invalids and persons of weak digestion—namely, that highly concentrated aliment is most difficult of digestion, inasmuch as it does not afford the requisite stimulus to the stomach to act on it; and that the digestibility of food is thus in an inverse ratio to its nourishing properties. "It is perfectly possible," says Dr Fletcher, "however paradoxical it may appear, to starve an animal by giving it continually too simple and too nutritious food." —*Rudiments of Physiology.* "Does not the capacity of the digestive organs," says Dr Paris, "sufficiently prove that nature never intended them for the reception of highly concentrated food?" —See article on Dietetics, *Cyclopedia of Practical Medicine*, where this is strongly stated.

on it, and it passes through without undergoing any change, or, if digested, without sufficiently nourishing the body. Nature would teach us this; for if the exclusive use of any one kind of food be continued for a length of time, the stomach soon becomes deranged, and a sense of loathing and disgust is excited at its very appearance. From this may be obtained some idea of the importance of occasionally changing the articles of the infant's diet; diversifying them from day to day, though in only a small degree, and not repeating the same article of diet several times successively without some intervening change.

There can be little doubt that some variety in the food is as absolutely necessary to the infant as it is found to be to the adult; and that the same injurious effects will be produced in them, if too exclusively confined to one kind, that take place as well in man as in most of the lower animals. Majendie, the French physiologist, fed dogs upon one article of diet alone; and no matter how much nutritive matter it contained, they invariably fell off in condition, and at length died if it was long persevered in. Some that were fed on sugar, gum, and olive oil, and confined to one or other of these, though they ate plentifully of them, became lean and scurvied, their eyes ulcerated and destroyed, and they generally died in about 30 days from the time they were commenced. Those fed on pure wheaten bread and water died with the common marks of imperfect nutrition in about 50 days. When fed on cheese or hard-boiled eggs, they lived considerably longer, but died at length, scurvied and weak; and what is most singular, and here worthy of notice, is, that

when fed on two or more of any of the aliments mentioned, together, or successively at short intervals, they throve well enough.

The reason of the falling off in condition that takes place when fed on one article of diet, is this: all food that is taken acts as a stimulus to the digestive organs; but all stimuli lose their effect if unceasingly continued; hence the stomach refuses to digest it; or, if digested, the absorbing vessels that draw the nourishing parts of the food into the general circulation become insensible to its presence, and it passes through the system without nourishing it. The body thus receives little or no addition of new particles, while the old parts composing it are in constant progress of removal by means of absorption, which, we have already stated, is constant and unceasing. Hence the leanness,—the absorption of the fat and muscle, and, by and by, of the skin, causing scurvy and ulceration; and of the coats of the eye, causing loss of sight; until at length life is exhausted and becomes extinguished, like a fire that goes out for want of fuel to support it.

These experiments of Majendie have a most important reference to the subject of nutrition of children as well as of adult persons, particularly the weak and invalid. There can be little doubt that inattention to the change of food that nature indicates, is one of the main causes of the scurvied and scabbed skin of children of the poorer classes, as well as of worms, rickets, scrofula, and other diseases of debility and defective nourishment that are observed to be so prevalent among them. And even among children of the better ranks the same effects are often produced by confining them too closely to one kind of

diet; for no matter how nourishing it is, or how easily digested, if not occasionally changed for other kinds of aliment, the same effects as from starvation from want are certain to be produced, besides disagreeing with the stomach, and causing flatulence and derangement of the bowels. Children may get as much as they can eat of them; but, if only of one article, from the cause above stated, it ceases to afford them the proper amount of nourishment, such as the rapidly growing frame of the child always requires. Though the taste of parents dictates to them a change of their own food, they often fail to appreciate the indication of nature in regard to their children; and these being unable to resist hunger, or make their taste understood, take what is set before them often with little or no relish, and consequently with little or no nutritive effect on their system.*

For a mother to nurse well, it is also necessary she should pay proper attention to this change in her diet, else she will neither be nourished herself, nor communicate a sufficient amount of nourishment to

* This subject might be enlarged on at much greater length; but as the general principles only are required to be laid down to be at once understood, there is little occasion for doing so here. The experiments of Dr Stark of Vienna are very interesting, and bear strongly upon this point. He persevered in taking only one kind of food for a long period together, for the purpose of making observations on their relative digestibility; but the result was, that he soon fell a victim to his zeal, destroyed by the debility and disease induced by want of due nourishment. In the same manner, sailors on long voyages, persons in besieged towns, and prisoners in jails, get diseased and scurvied from want of nourishment. They may get abundant food, but if it be of the same kind, day after day, it soon becomes almost as unequal to supporting life as no food at all, since it ceases to give the least stimulus to the stomach to digest it; and they at length as certainly perish, unless a change to new food be made.

her child. It may at first sight appear that the circumstance of the infant subsisting for the first months of its existence solely upon its mother's milk, militates against the peculiarity of the constitution we have just noticed; but this is not the case: it more fully confirms it. For the nature of the milk depends on the nature of the food the nurse subsists upon; and the changes in her diet thus affect the infant nursed by her milk as beneficially as they do herself. Thus it is more or less of a vegetable or animal nature after different meals; its changes being just in proportion to the changes in the mother's diet.

We may here notice that nurses are apt to run into errors in their diet that sometimes prove not a little injurious in their consequences. They often overfeed themselves with rich and highly nutritious food, to which, perhaps, they had not been previously accustomed, under the impression that by this means they will produce an overflowing supply of milk to their infant. Now this is a complete mistake (one, moreover, pregnant with mischief), for diet of this nature will have no such effect. On the other hand, it is almost certain to destroy in time the very best qualities of an excellent nurse. For the stomach is loaded with far more nutritive food than it can properly digest, or than the constitution requires, and hence indigestion at once ensues; or, if properly digested and absorbed, the body is thrown into a fever of excitement by an excess of stimulus, that neutralizes the benefit of the nourishment; and the formation of milk, instead of increasing, then becomes very considerably diminished. The milk, besides, is not so healthy and nourishing to the

infant as it ought to be, and it immediately suffers the same pangs of indigestion with its nurse.

The same objections apply in a still stronger sense to nurses pampering themselves with malt and fermented liquors, having the same end in view. Nothing can be more injurious to them as well as their infant; for such a practice will invariably produce indigestion, by which the acutely sensitive frame of the latter far the most severely suffers. The nervous excitement produced by the liquor, too, is much the most injurious to the infant, and not unfrequently sows the seeds of serious nervous diseases, or even fatal affections of the brain.

A nurse requires nothing more than her ordinary nourishing food, prepared in her customary way; to be taken, perhaps, in a little greater quantity than usual; always keeping in view that occasional variation in mixed vegetable and animal diet which is natural and healthy. She needs neither stimulating food nor drink, but ought much rather carefully to avoid them. Let her take what food is necessary to her health and the satisfaction of her natural appetite, *but no more;* and she is then, if enjoying sound health, as good a nurse as any management can make her. Nature is here fully competent for her purpose; she has arranged the most suitable means of producing a secretion of milk sufficient for nourishing the infant without the employment of any extraordinary diet on the part of the mother. And here, as usual, what we have principally to do, is rather to prevent interference with her operations, than to direct the adoption of any new plan or system.

When the infant has got the first front teeth, and

been accustomed to the use of prepared food, weaning should begin; and from a partial he must now maintain a total independence of his mother's nourishment. This must be very gradually diminished, while the supply of the prepared food is, on the other hand, as gradually increased. The child's supply of suck must first be lessened, and by and by entirely withdrawn through the night, until, as he becomes more completely nourished by the use of the artificial food, and has no farther need of his mother's milk, it must be taken from him entirely through the day also.

Weaning should not take place earlier than the eighth or ninth month, or later than the fourteenth or fifteenth; the infant, generally speaking, ought to have the four first front teeth ere it be commenced. This, however, must be regulated very much by circumstances. Should the infant be naturally of a delicate constitution, and have suffered much from teething or any of the diseases of infancy, and the mother's milk continue plentiful and sufficiently nourishing, weaning may be deferred beyond the usual period. At the same time it ought to be accustomed to the use of farinaceous food, that the weaning may be effected as soon after as circumstances will permit. The appearance of the teeth is here a good index of nature to be guided by. When they are long of appearing, it denotes deficient vital power,—a want of energy in the nutritive functions; and hence the infant is longer dependent on the mother's milk. On the other hand, when they make their appearance soon, it indicates a sounder constitution, and hence a more early weaning.

SECT. 3.—*Teething.*

THE teething of children is a process that requires considerable attention, as it is very generally attended with more or less disorder of the infant system. In infants of a healthy constitution, where life has been as yet carried on energetically from birth, it causes little or none; but in those that are born weak, of a sickly constitution, and naturally prone to disease, or whose development has been hindered by improper nursing and management, teething is generally attended with great disturbance, that kindles up often the most dangerous disease. Teething generally commences before the end of the eighth month, when the two front cutting teeth, above and below, make their appearance;* and from this period till the end of the second year, the first set of teeth, called milk-teeth, gradually appear till they become completed,—then amounting to twenty in number.

The ordinary signs of teething in infants are increased flow of saliva, heat and fulness of the gums, fretfulness, and constant attempts to thrust things into the mouth, evidently to allay their itching and irritation. These are almost the necessary attendants of the process of formation going on within the gum, termed the "breeding" of the teeth; and in ordinary cases, after some days, when they are sufficiently advanced, the teeth penetrate the tender

* In some children teething takes place much earlier than above stated. Some children have even been *born* with teeth,—a circumstance that Shakspeare has called to his aid, to enhance the disgusting character of Richard III.:—

> "Marry, they say my uncle grew so fast,
> That he could gnaw a crust at two hours old."

Louis XIV. was also born with teeth; and many cases of this nature are recorded by Haller.

skin, and the pain and uneasiness of the infant from this cause soon subsides. The object of the nurse, on this as well as on all other occasions, ought to be, to aid Nature, and imitate her in her efforts at self-relief. Thus nature here clearly points out the propriety of pressing certain substances between the gums, in the almost ceaseless efforts of the child to carry every thing he can lay hold of to his mouth, and the pleasurable relief that he appears to experience from doing so. A coral, ivory, or gold ring, should be placed in his hands for this purpose; or, what is better than all and easier obtained, a crust of bread or piece of biscuit; its pressure by the gums lessens their itching and promotes the flow of saliva,—results of no mean importance in the prevention of subsequent disturbance.

It has been recommended to divide the surface of the gum by the sharp point of the nail, when well cleaned; and while this effectually delays the closing up of the divided part, it also offers this advantage, that it does not at all alarm the timorous child. At the same time, *the head should always be kept perfectly cool,* with no other covering than what nature has provided it,—at least when within doors: on no occasion should this part be muffled up in warm thick cloth or felt hats, which are often sufficient of themselves to cause the most serious disturbance. The head should also be regularly washed with cold water night and morning, and the bowels kept regular and open.

In children of a delicate constitution, teething is very frequently attended with much more alarming symptoms than those above mentioned, and requires a correspondingly vigorous treatment. The irritation of the gums extends to the salivary glands and

throughout the whole of the digestive organs; the nervous system becomes excited; the breathing is quick and oppressed; and if the constitutional irritation be not speedily allayed by judicious means, fever or inflammation is excited, and the tender infant may sink under their united attack. When the gums are observed to be swelled and painful when touched, the face flushed and the head hot, the child restless and sleepless, it is advisable to call in the medical attendant, have the gums well scarified, and means otherwise taken to allay the disorder; but when either too great drowsiness or restlessness, or both states alternately, frequent startings from sleep, screaming, or convulsions, are observed, to do this instantly is imperative; for to check disease in the infant, when every organ is in a state of activity and excitement, not a moment is to be lost.

The most natural remedy of all is to liberate the tooth by cutting the skin that confines it. This is what Nature points out, for it is what she is labouring to effect; and generally as soon as it is effected, the disturbance caused by the process of teething is at an end. An early attention to this circumstance is highly necessary; and when medical aid is not at hand, there is nothing to prevent the parent herself from early having recourse to it. The scarifying of the gum may be simply performed with the point of a clean sharp penknife, and while no possible danger can result from it, the most beneficial consequence is likely to ensue; constitutional irritation is prevented, and the child's life may be saved. Let not the parent delay with the hope that it may be soon enough to resort to these simple means after a stated interval. Delay is most dangerous with the infant; while they speak, perhaps the moment is

passed that could have saved it, and disease may be kindled up which no medical aid can quench.

In this, as in all cases, much more may be done to *prevent* the bad consequences of teething, than to get rid of them by medical treatment after they have been fairly induced. Parents, in this respect, have much more in their power than the medical man, who is only called in at the appearance of danger; and on this account it is highly proper that the mother especially should be acquainted with the causes that generally give rise to danger from teething, as by *knowing* she is much enabled to *avoid* or *prevent* them.

Sect. 4.—*Causes of Danger from Teething:*

a. DEFECT OF VIGOUR IN CONSTITUTION.

One chief source of danger from teething is a natural defect of vigour of the infant constitution. All infants are weak and feeble; but in some the powers of life are deficient to carry on existence in a healthy state, from an originally feeble and imperfect formation derived from their parents. It is beyond doubt true, that healthy parents have the most healthy children; and the converse is equally true,—diseased or debilitated parents will have feeble children, prone to disease, and apt to be overtaken and cut off by the casualties of infancy. Of a numerous family born of healthy parents, a large proportion of them will reach manhood and live to a good age; while of a numerous family born of delicate parents, most of them will die from the effects of teething, and the diseases of youth, or carry through life to a premature grave the miserable effects of their native imperfection. The formation of the teeth and their

irritation in the gums more easily excites, in such, a tendency of the circulation of blood to the head; its regular distribution throughout the body is thus checked, and the natural processes are interrupted; hence disease ensues, and the powers of life being naturally deficient, the feeble infant soon falls under its invasion. The loss thus occasioned, and the grief thus induced by early mortality, is beyond calculation, and all causes except the proper one are assigned to account for it. There is no need for having recourse to mysterious influence in explaining the fearful mortality of the young from this cause; and men are blind to nature that look beyond it for causes that, as in this case, stare them broadly in the face. The feeble child, born of delicate or diseased parents, as inevitably dies soon, as the early and imperfect blossom of the fruit-tree is nipt and withered by the chilly frosts of spring. They both perish alike long ere they reach maturity; they scarcely give evidence of existence till they cease to exist, or if they survive, are ever stunted, weak, and withered in their constitution.* And this naturally feeble frame

* The intimate connexion between the health of parents and that of their offspring is so natural and so much in accordance with every-day experience, as to be altogether undoubted. It is particularly to be remarked in so far as regards the mother, whose character and constitution are preserved often pure and almost unchanged in her children. Yet, how little is either parent in general influenced in the preservation of their health with any regard to that of their children, and how seldom are their first engagements formed with any thing like a consideration of their future happiness and virtue! It might be objected that any cold calculations of this nature, instigated by principles of utility, that take into account things of so little consequence as the health and happiness of children yet to be, are uncongenial to the warmth of love, and would interfere with the unsuspecting enjoyments of connubial bliss. They certainly *do* sometimes lay prostrate the airy-built schemes of romance-loving youth a little before their natural term of existence, but it is certain, after all, that an observance of the natural principles they suggest,

of the infant is the more especially to be feared, as it renders it so liable to be affected by the, to them dangerous, irritation produced by teething.

b. IMPROPER NOURISHMENT.

Besides the native weak formation of the child, there are other causes that give rise to, or increase, the dangers of this period. Those most worthy of remark are what arise from improper nourishment. From what has been already stated, some idea may be formed of the indispensable importance of regular nourishment, to supply the waste of matter composing the infant's frame, that is so unceasingly taking place. If this be too sparing, or of an impure kind, the infant pines and fades, just as a plant would do whose roots had been allowed to wither in a parched soil.

A very important source of nourishment of all living beings, besides food, is the air they breathe;

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will unquestionably render a speedier and more certain return of real comfort and enjoyment. A little of the "greatest happiness" principle, and some degree of reflection upon consequences introduced into the forming of such engagements, would benefit mankind collectively and individually. As it is, they are too often formed to gratify transient feelings founded perhaps on mere fancy;—hence little else than bitter disappointment in the majority of such cases is to be expected. Health and physical happiness are disregarded, and children are perhaps born merely to die soon, or drag out existence to propagate the ills they inherit as their chief birthright. Thus, the evils of disregard of the laws of healthy existence do not cease with the individuals who have originated them, but may be visited on other human beings descended from them for generations to come. By the exercise of a small degree of reflection, on the other hand, and a walking in accordance with the laws of nature, parents may preserve and improve their own health and that of their children, and thus more effectually secure some certain amount of human happiness, and attain nearer the enjoyment of virtuous existence.—For more full information on this subject, see *Caldwell's Thoughts on Physical Education—G. Combe's Constitution of Man—Dr A. Combe's Physiology applied to Health, &c.*

and this is explained more fully in its place under the Function of Respiration. If the full supply of pure air be denied to the infant, it becomes debilitated as certainly as if it were denied a regular supply of nourishing food, and the same dangers in teething are as unfailingly produced; for the body is imperfectly nourished, and, as has been above explained, it is thus rendered more liable to disease and disturbance of the vital functions, from whatever immediate cause induced. Thus, it is chiefly in the low, close, and ill-aired streets of large towns that the greatest infant mortality is observed to take place, and most particularly in the dark and ill-ventilated dwellings of the poor.

Sixty years ago, when the streets of London were much closer built and worse aired than now, the deaths from teething of children were nearly double of what takes place at this day; and, as appears from the bills of mortality of the metropolis, nearly three times as many then died of convulsions, which are chiefly caused by the constitutional irritation of teething. The impure air, together with unwholesome food, were sufficient to produce all this mortality; and it is always remarked that these influences most prevail in the large manufacturing towns, where the bulk of our population is to be found. In Leeds and Bolton, the number of children who die in infancy are nearly *double* those in healthy agricultural counties such as Rutland or Devon. The premature weaning, and insufficient nourishment by breathing impure air, as well as from the milk of the mother, who may be daily tasked with iron and steam, and becomes attenuated and exhausted of vitality by disease and perhaps dissipation, render

the infant all exposed to the dangers of teething; sufficiently accounting for such a fearful amount of mortality at that early period of life. The late Sir John Sinclair affirmed that one-half of the children born in London die before two years of age, in consequence of the impurity of the air of that city; and it also appears from Dr Granville's tables, that the mortality is chiefly among the *poor*,* so that the impure air and unnutritive diet conjointly act in debilitating their offspring, and rendering them the most susceptible of all the dangers of teething.

c. OVER-FEEDING.

But another circumstance, on which much stress has been very properly laid as increasing the dangers of teething, remains to be noticed. It is a cause the very opposite of that last stated—imperfect nourishment; it is that of nourishment in excess, more than is needed—over-feeding. Two opposite causes thus produce the same effects, a thing by no means unusual in both nature and physics. Imperfect nourishment weakens the infant, and renders it the more liable to diseased impressions; while excess of nourishment inordinately excites it. Considered in regard to the ordinary standard, life in the infant is in a highly active state,—it abounds in vitality; and, when over-fed, the slightest cause affects the nervous system, or quickens the circulation, already rapid and vehement, into a diseased activity that lightens up disease in some tender part, dangerous in pro-

* In London, out of 1000 children born of poor parents, only 542 survive their second year; and in France, it has been remarked by Villermé, that mortality among the infants of the poor classes is double of that which occurs among better and middling classes.

portion to the abundance of fuel to feed it. Teething is thus one of the most general causes of disease in over-fed infants, giving rise to quickened circulation and nervous excitement that often ends in convulsions, water in the brain, croup, or other acute diseases of the air-passages.

It is too frequently the custom for mothers to give the infant food whenever it cries, no matter from what cause. And if it do so from the irritation of the gums in teething, and food and suck be offered, and taken by the infant, not having sense and discrimination to refuse it, the stomach is apt to become overloaded and distended, digestion is interrupted, and thus an additional disturbance is raised that very much aggravates the original irritation from the formation of the teeth and their progress through the gums.*

From these reasons the nature of the danger of over-feeding children appears most obvious, and requires merely the slightest observation to force itself on the conviction of every individual that is disposed to be guided by reason or experience in their management.

All the dangers of teething are aggravated by the practice that is so common, of muffling up the heads of infants with the warmest kind of caps and flannels, and covering them with woollen or felt hats over all. The heat so retained favours the accumulation of blood in the head and about the gums, and farther increases the tendency to diseased

* Dr J. Clarke strongly insists on over-feeding being a most fruitful cause of diseases from teething, as well of the brain as of the organs of breathing; and in this opinion he is supported by Drs Copland, Combe, and many other eminent medical men.

irritation, to which feeble and tender infants more especially are prone.

Such are the chief causes of danger from teething that ought to be carefully avoided, to carry the infant with safety through this stormy period. To avoid them successfully, it is certainly necessary to know the mode in which they act, and from what has been stated, this can only be known by a consideration of the nature of the infant, and the organic laws that regulate its constitution. It is obvious, that the health of the infant can alone be surely attained and preserved, by maintaining the harmonious operation of these laws of nature, and that disease and premature decay are as surely the inevitable consequence of their transgression.

Sect. 5.—*Of Animal and Vegetable Diet.*

The first teething of the child is completed about the end of the second year, when the jaws have become quite filled up with teeth. The double teeth, or grinders, eight in number, are last of making their appearance, and complete the set. This completion of teething indicates that the period has arrived for the use of animal food; and nature evidently intends it should only be commenced when the apparatus is fully provided that prepares it for digestion. Animal food requires thorough mastication and mixture with the saliva, to render it capable of easily undergoing the process of digestion; so that its use by children is contra-indicated till nature has provided grinding teeth suited for this purpose.

Some philosophers have declaimed against the use of animal food either in infancy or in manhood, and attributed to its use all the moral evils that

beset us, as well as the weakness and imperfections of our nature. Several have even gone so far as to say, that in consequence of the use of the flesh of animals, there have appeared no *real* men yet, nor ever will be, until it is entirely abandoned, and men subsist on fruits and roots, and drink pure water alone. All this, to say the least of it, is mere twaddle. It is founded on an ignorance of the nature and constitution of man; and the *real* men that are yet to be sought for, are a kind of beings that exist beyond the limits of nature as at present constituted, and only in the imaginations of the dreamers who muse over it.

The slightest examination of the structure of man and his vital functions, will prove to any one that he is adapted for being nourished by animal as well as vegetable food; and that they are both necessary to his healthy existence over this globe. The form of the teeth and of the articulation of the jaw,—the length and shape of the alimentary canal, occupying a medium, as they do, between animals that live on vegetables and those that live on animal food,—clearly indicate the use of both; and the circumstance that man is best nourished by animal food, and that his taste naturally leads him to its use in all regions, shows that it is but natural and proper he should indulge in it when necessary. This, however, should be within certain limits, prescribed by a due consideration of the wants of nature, and by the circumstances that influence them, such as exercise and temperature. And while reflection and reason should guide man in rationally supplying his own wants, they should also influence the parent in regulating the supply of food to the infant.

The natural index to guide them as to the proper period at which to administer animal food, is the appearance of the grinding teeth for the purpose of its mastication. And when the child has reached two or three years, and begun to run about and exert himself in infant romps, calling into active exercise his limbs and body,—something more nourishing than mere vegetable aliment is called for; and then it becomes proper to administer it accordingly. In active exercise there is a quicker expenditure of vitality, and a more active secretion and change of particles going on; hence, after healthy exercise, nature has provided that the appetite should be more keen, and the relish of food more pleasurable; thus indicating the propriety of supplying the place of this expenditure by a sufficiency of nourishing food. About the age of two years, then, animal food may be given in small quantities, and only two or three times a-week; gradually increasing the quantity and frequency of giving it with the increasing age and strength, and exercise of the muscular system.

The chief part of children's diet, however, should unquestionably be vegetable, as this is most consistent with their own desires, and most agreeable to the appetite implanted in them by nature. They digest easily all kinds of ordinary vegetable diet; and it seems to afford them the requisite amount of nourishment. The different kinds of corn, prepared in its ordinary forms of bread, cake, or porridge, ought to be the staple articles in their bill of fare, given with sweet milk, or light animal soup, at proper alternate intervals during the day. But they should be denied all kinds of heavy puff-paste

and confectionary stuff, especially such as have fatty matters baked up with them in any quantity. The kind of cake called "shortbread" is peculiarly indigestible, and very often, in this country, produces serious derangement of their digestive organs.

Children should likewise have a regular supply of the ordinary esculent vegetables, such as cabbage, turnip, and cauliflower, which ought always to be carefully dressed and boiled before being presented to them. Potatoes form a most valuable article of their diet; and, fortunately, this vegetable root is within reach of all classes of the community. When good and well boiled, potatoes are surpassed in good properties by scarcely another article in the child's dietary; being light, easy of digestion, and highly nutritious to the system.

No one article of diet, however, should be persevered in without that change and occasional interval, which has been already stated as so necessary to the uninterrupted nutrition of the child's body. The same diet, for instance, should not be given two or three times successively in the same day; or continued, at least at this rate, two or more days together. A regulated system of giving varied food at stated intervals, preserves the relish for it, and produces the most beneficial effects on the system; it continues to give the greatest amount of nourishment, and the proper appetite for eating, such as too constant repetition of one article is almost certain to efface.

Children should also be allowed a regular supply of fruit in its season; for, when ripe, it is highly wholesome and nutritious to their system. It appears as natural that man should regularly enjoy

the abundance of the earth in its fruits, as it is that the herbivorous animals should enjoy the luxuriant pasture of the green fields; indeed, the change from the dried and sapless vegetable diet of winter is equally beneficial to both. Dr Paris states, "that artisans and labourers, in the confined manufactories of large towns, suffer prodigiously in their health whenever a failure occurs in the crops of common fruits. This fact was remarkably striking in the years 1804 and 1805."* The instinct of children to eat fruit is so powerful, that though they be strictly denied it, they will furtively possess themselves of a supply by some means or other; and, no matter what description of green trash it be, they will devour it with great zest and relish. It is highly proper, therefore, to supply children with a wholesome share of ripe fruit, to satiate the cravings of this healthy natural instinct, rather than leave it to themselves to forage about for what, when thus obtained and eaten, will often produce the most pernicious consequences.

Another instinctive relish, common to man with the lower animals, is that for common or sea salt. It is a singular fact, that the salt springs of North America and other countries, are frequented by the native animals in immense crowds at certain seasons,—resorting thither from the greatest distances; and they appear to be impelled to the waters by an instinct as powerful as that for food or drink. Salt is used by man in every quarter of the globe, and has ever been considered an indispensable article of diet; it is not only grateful to

* Cyclopedia of Practical Medicine.—Art. Dietetics.

the palate when taken along with the food, but also necessary to his comfort and health. Children have generally a great fondness for salt, which should accordingly be indulged to a reasonable extent. Sufficient should be dissolved in their soups, and given with their vegetable and animal food, as suited to their peculiar tastes. It considerably favours the process of digestion, and tends to strengthen rickety constitutions; besides being a powerful preventive of worms, as well as children's other diseases of debility.

Such are the ordinary kinds of diet employed in the nutrition of the child. Many varieties of them might be farther enumerated; but, as the aim of this short treatise is chiefly to lay down general principles, the management of children, as founded on them, must be modified in detail, according to the varying circumstances of the case. And this is one of the advantages of a physical education founded on a knowledge of the nature of the child's constitution, that this training and nurture can be properly modified as may be required, under the guidance and control of the intelligent parent.

Sect. 6.—*Regulation of the Meals of Children.*

As the waste of the child's system is great, and the discharge of the old particles unceasing, the necessity is obvious of giving the child food more frequently than the adult, in whom, through age, this is in a great measure retarded and diminished. The stomach of the infant is small, and capable of receiving but little at a time; but it is very active, and has scarcely emptied itself of one meal, ere it is ready to act upon and digest another. And this it

does repeatedly both day and night; sucking and sleeping being its almost sole occupations in early infancy, when the existence is wholly vegetative, and the desire for food almost unceasing. This, however, becomes less frequent in childhood and boyhood; until, in adult age, when the frame has attained its proper growth, and the system is fairly developed, only three, or at most four meals are needed in the day. When the supply of food is interrupted beyond its usual time, or is less nourishing than nature requires, the consequences, as might naturally be expected, are more injurious to the susceptible infant or child, than to the full-grown adult. Debility, difficult teething, and all the diseases that attend or arise from these states, ensue, and, as already explained, cause great mortality among the children of the poor.

The wants of the youngest infant, when it cries for food, cannot be misunderstood; the mother apprehends them at once by a powerful instinct, and the satisfaction of its appetite is wisely appointed to be a source of pleasure to both. When satisfied, the infant ceases to suck, until its quickly succeeding wants call for the same supply and satisfaction as before.

Infants require a fresh supply of food at intervals of three or four hours during the day, and of longer duration in the night, when sleep considerably delays the action of the stomach. It is proper to adhere as closely as possible to a system of giving food or suck at certain stated intervals, as the return of appetite is periodic; and digestion is more effectually performed during its accession than either before or after it has been periodically so excited.

Regularity of meals, therefore, is of much consequence in the nutrition of the young; indeed, nearly of as much consequence as the quality of the food itself.

But, though it be thus necessary to give the child suck often in proportion to its youth, from the reasons above assigned, and to satisfy the frequent calls it makes, there is a possibility of over-suckling, and thus doing much injury, by forcing on the child's stomach more nutriment than the system requires, and rendering it more liable to the infantile inflammatory diseases to which over-fed children, as we have seen, are naturally prone.

Nurses in general offer the breast to the child on all occasions when he cries, no matter whether it be from hunger or the pain of an already over-gorged stomach; and though nature has taught the infant at first to refuse it, it is often repeatedly offered and insisted on, till the stomach revolts at the unnatural gorging which it is compelled to undergo. This is more especially the case when the infant is suffering from irritation of any kind, as from teething, when the incessant feeding the nurse gives to stop its cries, adds to the so-caused irritation, and much increases the danger of the process. Surely there ought to be a regulation for administering food to the child, as well as to the adult; and the same reason should be allowed to act in regulating the nursing of infancy, as the preservation of health and strength by the nourishment of the full grown frame of manhood. There can be no doubt, that the stomach, as well as any other organ, is exhausted by too constant exertion; and that there are certain laws regulating its function, whose observance are the

most conducive to health and proper nutrition. Experience informs us, that digestion is much more effectually accomplished when performed at regular intervals, and after the stomach has been allowed some time to regain the tone or strength that constant exercise of its function exhausts; and that the nutrition of the body is thus more regular and equal, and its healthy growth most safely effected. Like the other parts of the body, the stomach may be even strengthened by proper training. Suitable exercise and proper aliment, taken to a certain extent at proper intervals, strengthen it, by calling its powers regularly into activity; while excessive action, on the one hand, by exhausting it,—or defective exercise on the other, by weakening it,—unfits this organ for performing its functions aright.

The above remarks upon the over-feeding of children while nursing, apply to the same practice, with equal propriety, after they have arrived at a more advanced age. Active growing children require food at shorter intervals than adults, and a liberal supply of it, of the most simple, nutritious, and easily digested kind.* They may be allowed to eat

* The following plan, laid down by Dr Maunsell, will best illustrate the working of the above principle regarding the feeding of the young after they have reached the period of childhood:—"A healthy child, of two or three years old, commonly awakes, hungry and thirsty, at five or six in the morning; sometimes even earlier. Immediately after awaking, a little bread and sweet milk should be given to it, or (when the child is too young to eat bread), a little bread pap. The latter should be warm; but in the former case, the bread may be eaten from the hand, and the milk allowed to be drunk cold, as it is as well, at this meal, to furnish no inducement for eating, beyond that of hunger. After eating, the child will generally sleep again for an hour or two; and about nine o'clock, it should get its second meal, of bread softened in hot water, which latter is to be drained off, and fresh milk and a little sugar added to the bread. Between one and two, the child may have dinner, consisting, at the younger ages, of beef, mutton, or chicken broth

heartily, and early made to practise thorough mastication, as this is requisite to prepare the food for undergoing the process of digestion in the stomach. But they should not be encouraged to gorge themselves, or eat till the appetite be completely cloyed; neither should they be permitted to eat at all times in the interval between meals, as by this the stomach will get distended, become weakened, and digestion be injured, so as to induce debility, or ultimate serious stomachic derangement.

It is certainly a wise and most beneficial arrangement by which, at the same time that the satisfaction of the appetite is made indispensable to animal existence, a high sense of pleasure is associated with it; the performance of a natural duty being thus rendered at the same time a source of exquisite enjoyment. It is, no doubt, an *animal* pleasure, but

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(deprived of all fat) and bread. When a sufficient number of teeth are developed to admit of chewing being performed, a little animal food, as chicken, roast or boiled mutton or beef, not too much dressed, should be allowed, with a potato or bread, and some fresh well-dressed vegetable, as turnip or cauliflower. After dinner, some drink will be requisite; and a healthy child requires, and indeed wishes for, nothing but water. Light fresh table-beer would not be injurious to a child of four or five years old; but it is unnecessary, and no advantage would in this instance result from the creation of a new want. Between six and seven o'clock, the child may have its last meal, of bread steeped in water, &c. as at nine o'clock in the morning. A healthy child, who has been in the open air during the greater part of the day, will be ready for bed shortly after the last-mentioned supply, and will require nothing farther until morning. Similar regimen and hours may be adopted through the whole period of childhood; only, as the fourth or fifth year approaches, giving for breakfast and supper bread and milk without water, and either warm or cold, according to the weather or the child's inclination. The supply of food, upon first awaking in the morning, may also be gradually discontinued, and breakfast given somewhat earlier."—*Maunsell and Evanson on the Management and Diseases of Children*, pp. 51, 52.

Of course it is not intended that the above plan should be strictly adhered to in all cases, but modified so as to adapt it to the various peculiar constitutions of children.

not the less to be despised on that account; though, as the higher properties of the human being become developed, he is chiefly diverted from it by the enjoyment of pleasures of a nobler—even an intellectual nature. It is probably, however, the first sense of enjoyment of which an infant is capable, and only yields to others as their sources become enlarged in the development of the constitution. We ought, therefore, to consider the keen desire of children for food, and the exquisite relish for it which they so early display, as a wise and benevolent provision of nature, always careful for their preservation. And it need be no subject of regret with parents, but rather the reverse, that children at first display more fondness for their food than their books, and appear careless for every thing but the satisfaction of their appetite; for as the other bodily and mental organs become developed in their ordinary course, higher desires will occupy its place to its almost entire exclusion. Parents, however, should be careful of the growth of the higher and nobler powers, and to present to their children higher motives than the sensual one of appetite, as inducements to exertion and good behaviour; else they may frustrate the intentions of nature, and render the pleasure of appetite, which in manhood ought to be one altogether subordinate, as supreme as it is at first in infancy and childhood.

The prevailing system of rewarding children for good behaviour by sweetmeats or eatable stuffs, is a pernicious one, calculated to promote this bad result. It proves hurtful, not only to their bodily health, but to their moral disposition. For, as the first impressions which children receive are generally the most abiding, when they have become accustomed to

have set before them, as the prospect of reward of their good behaviour, some kind of eatable stuff, the impression is forced on them, and becomes ineffaceable, that the satisfaction of *sense* is the highest reward; and hence they learn to regard "doing good" only as the means of enabling them to get something good to regale themselves with. In short, they are thus taught to do good and practise virtue, not for their own sake, but for the trash it is to gain admission to their stomach. It would be curious to speculate on the influence which this has upon the adult practice of eating and drinking on all occasions where people meet together for enjoyment; and to trace the analogy between the feeling of the child who is taught to set the highest value on lollypop and sugarcandy, and that of the full-grown children whose opinions can be readily changed, and whose minds are rendered most open to all kinds of conviction under the influence of a good dinner, or even the distant prospect of its enjoyment.

The equally absurd practice of giving children food indiscriminately at all times, and stuffing it into their mouth sometimes to stop their cries, whether they require or wish it or not, is so happily satirized by Dr A. Combe, that without comment we conclude this section by citing his own remarks on the subject:—"It is astonishing," says he, "with what exclusiveness of understanding eating is regarded even by intelligent parents as the grand *solatium* or *panacea* for all the pains and troubles which afflict the young. If a child falls over a stone and bruises its leg, its cries are immediately arrested by a sugar biscuit stuffed into its open mouth. If its temper is discomposed with the

loss of a toy, it is forthwith soothed by an offer of sweetmeats, the ultimate effects of which are to excite cholicky pains in its bowels, which are worse than the original evil, and for which, in their turn, it is presented with "nice peppermint drops," or some equally pleasant antidote. Because the mouth is open when the child is crying, and the mouth leads to the stomach, parents jump to the conclusion that it is open for the purpose of being filled, and proceed to cram it accordingly; forgetting all the while that the mouth leads also to the windpipe, and may be open for the admission of air to the lungs as well as of food to the stomach,—and that if they stuff it with cake or pudding, when it is open only for the reception of air, they run the risk of suffocating the little innocent when their only wish is to sooth him. Every body must have seen fits of convulsive cough induced by fragments of food being drawn into the windpipe in such circumstances."*

Sect. 7.—*Propriety of giving Medicine to Children?*

Before concluding this cursory account of digestion and the essentials of its performance in children, it is necessary we should consider for a moment the propriety of administering medicine to them; pointing out where it is needed, or, on the other hand, when it may be useless or hurtful.

The use of medicine is *unnatural,* for it is used to occupy the place of nature, to act in her stead. It is not for one moment to be supposed that the Creator has formed the constitution of man imper-

* Physiology of Digestion, p. 222.

fect, and its modes of action inefficient, so as to need our substitution of artificial means for its existence. Its constitution merely requires our co-operation in preserving its relation to nature, and maintaining the integrity of the vital action, by an observance of their regulating laws. When this is effected, the natural result is health. But if these relations be overlooked, and the animal body be kept in a state at variance with nature, then disease is induced, an artificial substitute for her is to be found, and medicine is called in to her aid. Medicine is therefore *unnatural,* and the necessity for its use indicates a state of the body not in accordance with nature; some of her laws have been infringed or transgressed, and the artificial means are had recourse to for the cure of the mischief this has occasioned. But though medicine be thus useful in even artificially restoring the soundness of the system, far too little attention is in general paid to the real necessity there is for administering it; and nurses are often in the practice of indiscriminately giving it to children in all cases of disorder, whether its employment be indicated or not. Even medical men often run into this error, and where they find it their interest, from the prevailing ignorance of their employers on this point to do so, it is not much to be wondered at that such a practice prevails to so considerable an extent.*

* Owing to the absurdity of the regulations as regards practitioners in England, it has become the interest of the greater part of the medical men there, however honestly inclined they may otherwise be, to fill their patients with drugs, whether they actually require them or not, in order to obtain any thing like a fair remuneration for their advice and attendance. The notion has thus become ingrained in the minds of most people, that to remove derangement of the system, by whatever causes induced, medicine is

The habitual use of strong medicine, of whatever kind, acts as an artificial stimulus to some part or other, and, if it be persevered with, the natural stimulus of the part at length ceases to be supplied, since this would be useless over and above that excited by the use of the medicine. The parts so excited become exhausted and weakened, and if the medicine be discontinued, then torpor and debility, causing often a high degree of constitutional disturbance, is the sure result. Thus, costiveness very generally follows the exhibition of an aperient medicine, which, in its ultimate effects, may be productive of much mischief to the system.

On the whole, far more harm than benefit results from the *indiscriminate* use of purgative medicine with children for the remedy of their disorders, which arise, most probably, from errors in their diet, or non-observance of some of the laws regulating their

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the only means; and accordingly the stomach is deluged with drugs of all kinds and properties. Sometimes, indeed, it is made even a question of "Rule of Three" thus:—If one dose does good, two will do double the good, and so on; and double or more is accordingly given than is at all necessary, with infinite mischief to the constitution.

Now, children are chiefly the victims of this absurd mania for medicine; and are not unfrequently, we feel convinced, destroyed by its too constant exhibition. They cannot resist its exhibition, for it is forced *nolens volens* down their crying throats; and when it is so generally given under mistaken notions founded in ignorance or prejudice, need we wonder that mischief should often ensue?

It would prove most useful and profitable to the public, we have no doubt, could they make the important discovery, that the most effectual way to ensure health is to adopt the natural means to *preserve* it,—such as by pure air, exercise, and healthy supply of food,—instead of wantonly neglecting these means, and afterwards resorting to physic, that, instead of alleviating, often infixes the mischief more deeply on the constitution. Such a discovery of the public would besides improve the medical profession itself. It would render physicians, who are at present comparatively useless in *curing* disease, of the greatest importance to the public weal, as *Preservators* of the health of the community.

constitution.* The animal system has no need of medicine if those laws of nature regulating it be observed. The Creator has provided it so, but he has not provided against their habitual transgression with impunity. The lower animals have no need of medicine, excepting those which are domesticated or servants of man; and even then their diseases can generally be accounted for by mismanagement or infringement of the laws preserving their soundness. Their instinct is generally sufficient preservation from disease, but the instinct of man is merged in his reason: the exercise of this latter is therefore clearly indicated to preserve man in accordance with nature from the infliction of pain and disease.

It has also been provided that the infant should be able to live and thrive, like the lower animals, by its own innate powers of existence, providing it be preserved in that harmony with nature we have just pointed out. Yet he is scarcely born ere the medicine-shelf is ransacked, and carminative drops, elixirs, and draughts, often indiscriminately, are forced into his tender stomach. The only medicine that a healthy infant requires is its mother's milk, the truest panacea for its wants and weaknesses; and the utmost caution ought to be exercised in administering any thing else, either of the druggist's prescriptions or quackvender's nostrums. The bowels

* "The frequency with which medical aid is required for infants under gastric and intestinal disturbance, and the numerous infantile maladies which spring from this source, are sufficient proof that their ordinary diet is not as rational as it might be rendered. From errors of diet are the digestive functions of infants chiefly, if not solely, liable to be impaired, and when these become so, correction of diet, rather than the exhibition of drugs, should be relied on for remedying the evil."—*Dr Barlow in Cyclopedia of Prac. Med.*—Art. *Physical Education.*

require to be emptied immediately after birth, but nature as usual has fully provided means to effect this object; the mother's milk at first acts as a laxative to the infant, thus answering the purpose both of natural food and a medicine at the same time. Should this evacuation, however, not fully take place, the exhibition of some gentle laxative is proper, of the mildest and least irritating kind, such as manna, syrup of senna, or cold-drawn castor oil. Medicine of an acrid nature causes great irritation of the membrane that lines the alimentary canal, and thus is apt, by the sympathy with it conveyed to other parts of the system, to give rise to serious disease. This membrane is naturally very irritable in infants, and is powerfully affected by medicine or even the slightest change in the food, when not easy of digestion, or of too stimulating a nature. The copious secretion of mucus, however, that takes place on such irritation, prevents the immediate contact of the offending matters, besides obviating much of the mischief that would otherwise ensue, as well as securing their speedy evacuation.

A remarkable sympathy is to be observed between the mucous membrane of the alimentary canal and the skin,—the state of the one generally indicating a corresponding state of the other. The frequency of eruptions of the skin in infancy thus arises primarily from irritation of the bowels, and they point out the propriety of remedying this by internal means, instead of attempting to cure the mere eruption of the outer covering. This susceptibility of the skin may be termed the safety-valve of the infant; for, by abstracting the chief part of the irritation from within, it removes the chief source of

danger. It is therefore highly improper to attempt to heal eruptions without first removing their cause; for not unfrequently it is to be observed that the recession of such is attended with most dangerous consequences. The irritation of the skin diverts, as it were, the danger from the more vital parts; and when this is suddenly checked, it immediately lights on some internal organ that is probably far less able to bear up under it. The best mode of treatment, we may here remark, is to keep the skin clean by daily ablution, and to improve the diet, so as to be more in accordance with nature; at the same time administering gentle laxatives to carry off more quickly the old matters from the system. The perseverance for a short time in these natural means will not fail to remove the cause and the disease together.—(See farther, chap. iv. sec. 6.)

Above all things, Stimulants should be denied to children, for, to their tender frame, the use of these is peculiarly obnoxious. Nurses are often in the practice of adding a spoonful or two of spirits or wine to their food, or of giving negus or punch for the purpose of composing the child to rest. This practice is a very deleterious one, and should always be most severely reprobated; for the spirit acts as a narcotic drug, chiefly upon the nervous system and brain; first exciting and irritating them, especially the latter, and increasing its vascular action; then favouring congestion of venous blood by the collapse that follows, which produces the sleep that is intended. This greater quietness and sounder sleep of the child is certainly a thing much to be desired by a nurse, as a saving of trouble, and as better securing the enjoyment of her rest; and it is there-

fore not surprising that on this account their use is resorted to so frequently. But, though they secure this object, and procure rest and ease to the child for the time their effects last, no lull can be more deceptive; for experience proves the danger of such kind of sleep, and that when thus artificially produced, it is almost certainly, in susceptible infants, the forerunner of disease in their nervous system. All kinds of narcotics,—spirits, opium, and poppy, and quack-medicines that contain these, are thus dangerous, and their use should therefore invariably be renounced. The physician is often able to trace the origin of convulsions, or diseases terminating in water on the brain, to their use, and every day observes the nervous mischief they produce. Medical men themselves have been led astray by idle notions regarding the effects of stimulants on the child's system. A physician in Vienna, who admired the recklessly theoretical notions of Brown, allowed his children wine and diluted spirits from their birth; but the consequence of this infringement on nature was, that they rapidly became emaciated, and all died of chronic water in the brain.*

In concluding this subject, we may urge what cannot be too often repeated, that the proper management of the young in respect of their nutrition, as well as in all other respects, can be effected only by an observance of the laws of nature regarding them, with which a small amount of study and experience may make every individual sufficiently acquainted; and the more the attention of parents is directed to this subject, the more interested will

* Copland's Med. Dictionary, p. 677.

they feel in the harmoniousness of nature it reveals, as well as impressed with the importance of attending to the careful rearing of their children, in the sound health of a well-nourished constitution.

CHAPTER III.

RESPIRATION OR BREATHING.

THE nutritive parts of the food are absorbed by a series of vessels appointed for the purpose, and added to the mass of blood circulating through the heart and blood-vessels. Digestion is thus the main source of supplying the waste in the system; the stomach being in that relation to the body which the root of a tree bears to its leaves, and branches, and trunk, both alike indispensable to their existence. But, as before noticed, other functions besides digestion are concerned in supplying the waste of life. One of the most important of these is Respiration or breathing, performed by the lungs and organs belonging to them. By their means, the new particles that have been absorbed from the food after the process of digestion, and added to the blood, are rendered fit for nourishing the body; the impurities this fluid has contracted in the course of its circulation are removed; and the vital properties restored that it has lost.

SECT. 1.—*Organs and Phenomena of Breathing.* THE lungs are situated within the chest, which is composed of the ribs on each side, closed up from

below by a fleshy flat muscle* called the Diaphragm or midriff. They are open to the admission of the external air by the mouth, through the trachea or windpipe, which is formed of elastic rings of cartilage that are thus constantly permeable by the air in breathing. The trachea, before it enters the lungs, divides into two branches,—one to each side; these again divide and subdivide into smaller and smaller branches, until they become so minute as to be totally invisible to the naked eye, presenting a surface nearly twenty times greater than that of the whole outer surface of the body. With each of these minute branches of air-tube there is an accompanying blood-vessel equally minute; and of this tissue of air and blood vessel does the substance of the lungs consist. The object of this arrangement is to expose the largest quantity of blood to the largest surface of exposure in the smallest possible compass; and from the arrangements we have thus cursorily alluded to, it will be observed how admirably this object is effected.

The lungs are in contact with the inner side of the ribs; not connected with them, however, but moving with the motions of breathing, by means of a serous membrane that lines both the lungs and the inner aspect of the chest. They have no motion of their own, but are emptied or filled by the depression or elevation of the ribs in breathing. They are quite passive; but it is easy to perceive how they can be filled or emptied in this way as well as if they possessed an active motion of their own. Suppose, for instance, the diaphragm descends, and

* For an idea of the properties of a muscle, see chap. v. sect. 1.

the ribs are raised as in drawing in a breath, it will be perceived that the space within the chest is increased both in length and diameter, and that, if the cavity communicate with the atmosphere, the air will rush in to fill it: just as this takes place when the two boards of a pair of bellows are suddenly separated. And it is as easy to perceive how the reverse action,—the compressing the ribs and raising the diaphragm,—by lessening the capacity of the chest, will force *out* air equal to the amount of diminution of space effected.

The necessary motions of the ribs are made by means of muscles that have their fixed points either above or below them, as they are required to be raised or depressed in breathing. For instance, in drawing in a breath, when the ribs require to be raised, the fixed point of the muscle is about the shoulder; so that when it shortens itself or contracts, it draws upwards the moveable point the ribs to which it is attached, thus enlarging the capacity of the chest, during which the air is drawn into it. On the other hand, in expiring or forcing out air from the chest, the muscles of the abdomen, that have their fixed point *below* the ribs, are called into action, and by drawing them downwards, and thus diminishing the capacity of the chest, effect the object required.

All this apparatus of lungs, and trachea, and ribs, with their proper muscles, is perfect at birth. The lungs are prepared to be filled with air; the windpipe to give admission to it; and the ribs and their muscles, so intricate and complicate in their insertions and connexions, ready for action. The moment the living child is born, they begin to act in

the most harmonious possible manner. It is wonderful, if we may be allowed to reflect but for a moment on the circumstance, that the unconscious little being is before birth in a progress of gradual development; slowly attaining a consistence of parts; the bones disposing themselves after the most unvarying regularity; the muscles attaching themselves with the best advantage for action; the air-tube and lungs forming themselves on the most exquisite plan of arrangement; all ready to start into action together, without the slightest previous notion of their duty, and all unconscious to the infant they contribute to form. We are insensibly led to speak of these parts "disposing" themselves, and "forming" themselves, from the resemblance their operations have to those of reason or reflection; but we must not allow ourselves to forget, that in all this the human frame, from the first moment it is called into being till that which terminates it, is acting merely in conformity to the preconcerted plan of its constitution; and is moulded, and altogether formed, and comes into the world ready to breathe, not from any influence it then has over its own development, but in obedience to the contriving, and preserving, and executing power of its Creator.

Sect. 2.—*Objects effected by Breathing.*

Before describing the objects effected by breathing, we must first notice the peculiar property of atmospheric air that fits it for this purpose. The ordinary air we breathe consists of two kinds of air or gas, called Oxygen and Nitrogen. The latter constitutes nearly $\frac{3}{4}$ parts of the atmosphere, and appears to perform merely the part of a diluent to the oxygen,

which is the life-giving part of the air. Oxygen is absolutely indispensable to life; and wherever we find living beings, whether in the waters of the rivers or seas, or on the surface of the earth, there we find it an ingredient of the medium in which they exist. Water contains a great quantity of free oxygen, and if it be deprived of this by boiling or any other method, it is unfit to support the life of fishes inhabiting it, and they are suffocated just as certainly as other animals are if placed in an atmosphere deprived of *its* oxygen. Now, this ingredient of air, let it be especially remarked, *is consumed in breathing.* As much as 1400 cubic inches of oxygen are required in the hour to support the healthy respiration of a full-grown adult; considerably less than this, however, being needed for a healthy infant. And while the oxygen, or vital part of the air inspired, disappears, its place is supplied by another gas or air of different,—of almost diametrically opposite properties,—that is thrown off in expiration. This is Carbonic Acid gas. It is most noxious to life, and if breathed without mixture of oxygen is almost instantly fatal. *During breathing, then, we are regularly consuming oxygen and giving off carbonic acid; thus deteriorating the air by withdrawing its most vital constituent.* Let this circumstance be especially noted and kept in view; we shall apply the important fact to practice as we proceed.

But what, let us inquire, becomes of the oxygen that disappears? What are the effects it produces in being breathed? In answering this, we may first remark that the blood in circulating through the body gives off its nutritive properties, and takes up

the old particles that have served their part in the system and are now to be got rid of. Before the blood has parted with its nutritive properties it is of a rich scarlet colour, and on its progress outwards from the heart, in the series of vessels termed *Arteries*. It is hence called *arterial* blood. After it has parted with its nutritive properties, and taken up the old particles in their stead, it becomes of a dark purple hue, and is taken back to the heart in the series of vessels termed *Veins*. Hence it is now termed *venous* blood. It is carried back, let it be observed, for the purpose of having the old particles separated, that have been absorbed by it in its progress, and to have those nutritive properties restored which it has lost. This is in some measure effected by various glands, as the liver, &c., but the chief organs for this purpose are the Lungs, through which the blood is propelled by the action of the heart. Suppose, then, that we observe the impure venous blood arrive at the lungs, and the changes effected there, subjected as it is to the influence of respiration. It permeates through the minute capillary vessels of the lungs; they secrete or separate and throw off its old and useless parts in the form of carbonic acid and halitus or vapour; at the same time that it most probably absorbs the oxygen of the air drawn into the lungs in breathing, which again converts the venous into arterial blood, restores its nutritive properties, and renders it fit for again performing its circulation through the system. Such, we conceive, are the objects effected by respiration; and although the mode in which this extraordinary change from venous to arterial blood is accomplished be extremely obscure, there can be no doubt that the

changes alluded to do take place, as by experiment and induction has been sufficiently ascertained.

SECT. 3.—*Animal Heat produced by Breathing.*

BESIDES purifying the blood, the function of respiration is subservient to the production of animal heat. Every one must have remarked that the temperature of the living body is preserved equal at all times, in all climates and seasons, as well at the Pole as at the Equator, and almost irrespective of the temperature of the air around it. This is in opposition to that law of nature regarding inanimate objects, that maintains them in an equality of temperature, warmer or colder as they may be exposed to the agency of a warmer or colder medium. In this country the air we breathe is almost always colder than the temperature of our bodies; sometimes indeed it is nearly 100 degrees of Fahrenheit *below* that of the blood circulating in us; and although we are constantly, in obedience to the law of radiation of caloric, giving off heat to the colder air around us, the temperature in the adult is preserved in an almost equal degree at all times, in the coldest day, and throughout the coldest season. This heat, which is developed in the body and so preserves it, is produced by respiration; and this is certainly not the least of the important objects effected by this function.

The production of animal heat is always observed to be great in proportion to the completeness of the breathing apparatus and the quantity of air inspired. Cold-blooded animals, for instance, have a breathing apparatus of a most imperfect kind: while in warm-blooded animals it is always the most fully developed. In fact, the degree of development of the lungs is

an invariable index of their temperature, as their temperature is of the development of their breathing organs: and, for the same reason, the development of the chest and lungs of adults is generally a correct index of the integrity of their physical constitution and muscular energy.

Now, let it be remarked that in infancy the lungs are comparatively small and but very imperfectly developed, and the well-known fact is explained that the production of heat in infants is extremely weak; requiring the most regular and constant supply of warmth to preserve them from the dangerous influences of cold in this country. So feeble are their powers of producing heat to supply its quick abstraction by cold air, and so injuriously does its deprivation affect them, that it is calculated more than one-half of the deaths that occur in infancy are caused by rash exposure to its influence.*

Sect. 4.—*The Importance of a Proper Management of the Functions of Respiration.*

Such are the chief phenomena of respiration, and the more important effects produced by it. These might be enlarged on at greater length, and rendered more interesting in detail; but we rather proceed to make a practical application of the knowledge of respiration we have communicated in the few preceding pages, to the preservation or improvement of the health of infants, by enforcing that observance

* Sir G. Blane and J. P. Frank have proved that cold is the exciting cause of the greater number of the diseases of infancy; and Dr Copland affirms that more than two-thirds of the diseases of the children of the poor are caused by this agent. See chap. iv, sect. 3.

of the natural laws regarding it which our simple explanation we think plainly points out.

It is a well-known fact that no diseases are so fatal in this country as those of the organs of breathing; nearly 50,000, it is computed, annually falling victims to consumption in the British Islands alone. These, too, are for the most part taken from the young, the beautiful, and the talented of both sexes.

> Death falls on them, like an untimely frost
> Upon the sweetest flowers of all the field.

The misery and sorrow their loss thus occasions is incalculable. Tears cannot number the victims, nor sighs the sufferers that mourn for them; for there is scarcely a family that has not cause to deplore this universal calamity, and grieve o'er the dissipated hopes of early promise—the memory of departed worth and virtue. Are there no means of staying this blight,—of dispelling it or checking its progress? If there be, it is as a voice from the dead that warns us to adopt them, and stay the fell destroyer of so much human worth. It is above all the incumbent duty of *parents* to make themselves in some manner acquainted with the means of avoiding in their children such a fruitful source of disease and misery; for there can be no doubt that the health of the child's future life is chiefly owing to his careful management and education when under the mother's care in the nursery and domestic circle; and that the seeds of those diseases which so prematurely make prey of him are there planted and fostered, and gain strength with his growth.

It is too much the case to consider these diseases of the lungs, like many others, as constitutional and hereditary, which no human power can avert, no skill

can cure; and it has therefore generally been regarded as divine philosophy to submit to the will of Heaven without a murmur. But in this assumption we do impious injustice to our Creator, inasmuch as we implicate his providence as arranging what is alone caused by man's *own* improvidence and short-sightedness. It is manifestly the duty of man to regulate his existence, and act always in accordance with nature and his organization, and preserve that harmony in their adaptation which reason has been granted us to discover and appreciate. If we transgress their laws, the disease so induced is but the result of this violation of nature; as legitimate a consequence as the breaking of glass by falling, or the injury of a delicate piece of mechanism by violently straining its springs, or rudely breaking it by a blow. We can easily enough perceive this, and feel its force in the case of an external injury: for instance, to have a hand burnt by thrusting it into the fire, or any part of the body cut by forcing a pointed instrument against it. These are tangible sources of injury, and the feeling of pain that nature has situated in the skin to warn us of the injury sufficiently informs us of the danger, and we take care always to avoid it. But we are careless of what is slow in its operation, though infinitely more dangerous to our safety; and because it causes no immediate pain we carelessly submit to its operation, and allow the danger to steal on by degrees and destroy us, which, when more sensible in its approach, we would have taken the utmost pains and made the greatest sacrifices to avoid. Causes of disease may be slow in their operation, but are they the less to be feared and avoided on that account? Are

not rather the more dangerous, and worthy of our watchfulness to prevent them stealing on us unperceived; as the secret whirlpool, that slowly draws every thing into its destructive vortex, is more dangerous than the surf-beaten rocks that sufficiently warn of the danger ere it be approached? Though the debility and diseases that result from early mismanagement do not all at once become apparent, they not the less slowly and surely steal on and destroy their thousands of victims. The operation of their causes may be but slow, and their effects corresponding; but in as far as management of children is at variance with nature, just in the same proportion will be their consequent pain and suffering. How entirely are unconscious children thus dependent on their parents for future health and happiness; and how necessary is it, then, that they should possess adequate qualifications for their duty as parents,—a duty of so surpassing importance and high responsibility!

From what has been stated regarding the functions of the lungs, and the objects effected by respiration, it appears evident that there must be certain conditions necessary to be observed by us in order that these objects may be fairly attained.

The most important are, a Free supply of pure Air; Free Expansion of the Chest and Lungs in breathing; and the proper Exercise of the Lungs. We proceed to consider these in their order.

a. FREE SUPPLY OF PURE AIR.

This is the most essential of the conditions for healthy respiration. Its absolute necessity will be

at once recognised, if it be kept in view that the impure or venous blood is sent into the lungs to be nourished by breathing, and also divested of its impurities, for which purposes the absorption of a certain quantity of oxygen from the air is necessary; this ingredient of the air being so important, that, if deficient, the creature that breathes it languishes from insufficient nourishment; and if entirely awanting, its life is at once extinguished. If it be also kept in view, that by breathing, the oxygen or vital part of the air is speedily consumed, and another air—carbonic acid—of noxious qualities, substituted in its place, the necessity of often renewing the air of apartments where breathing goes on will be at once clearly apparent. Should this not be effected either by accident or arrangement, the oxygen is gradually consumed; the air becoming so much deteriorated as to be totally unfit for supporting life, and at length, if not renewed, inducing inevitable suffocation.

This necessary change of the air of apartments by efficient ventilation is very generally neglected, and hence the source of much disease and fatality among our race. It is more especially fatal to children, in whom the nutritive functions are most active, and the change of material composing them is the most frequent; and if the old matters be not readily thrown off, and the blood regularly purified, their tender frame suffers from defective nutrition, becomes debilitated and prone to disease, not only of the lungs, but of the whole body. The constitution of the young, though buoyant, is easily injured,—pliant, but feeble,—and though natively sound, the want of nutritive food, or nutritive air, soon impairs its vigour, and paves the way for worms, scurvy,

rickets, and all kinds of diseases of defective nutrition.

A single fact, however, which we here adduce, will, more than any argument, enforce the importance of attention to this requisite to health,—pure air. Out of 7650 children born in the Lying-in-Institution of Dublin in the space of four years, ending 1784, no less a number than 2944 died within the first fortnight after their birth. It was fortunately discovered, however, that this fearful mortality arose from want of pure air; for when, in consequence, the hospital was thoroughly ventilated, the proportion of deaths was reduced to 279. There was every reason to suppose, then, that out of the 2944 who had died in the four years specified, no less a number than 2655 had perished solely from want of a due supply of fresh air! This is certainly an extreme case, though a true one, yet there is every reason to believe that the same evil prevails most extensively among all classes, and that the want of pure air annually destroys thousands of our population. Though less speedy in its results than in the above case, it still as surely undermines health and induces lingering and fatal diseases; and though existing only in a modified degree to any great extent, the operation of the poison is not the less noxious in its ultimate effects. For if impure air be fatal when in excess, it may likewise be expected (from the reasons referred to) to be deleterious, as it is present in greater or less abundance.

In nurseries and sleeping-apartments of children, and in the confined cribs where they are often put to sleep, the air soon becomes stagnated and vitiated by being breathed perhaps a hundred times over in the

course of one night; and still more so if it be allowed to remain unchanged by ventilation or airing, before they are again placed there for the same purpose on the succeeding night. How seldom are sleeping-places and bedrooms in general constructed with a view to efficient ventilation! and, should this be actually attained, is it not often by the merest chance or accident that they are so? When such is the case, then, how can the nutrition that is needed for the child in breathing be obtained? When the laws of nature regarding respiration are so flagrantly transgressed, what other results can be expected than a debilitated or diseased frame? But parents in general will scarcely be prevailed on to attend to the simple and natural means of avoiding this fruitful cause of the debility of their children, till something, as striking by its horrid fatality, occurs as in the case of the Dublin Hospital; preferring to arraign the will of the Almighty or other agency, instead of at once assigning, as its true cause, their own inveterate blindness to natural laws, and obstinate adherence to noxious and antiquated custom and prejudice.

The sleeping-apartments of children should be large and well aired; their sleeping-places, whether beds or cribs, without curtains, or these always drawn aside. During the day, they should be kept open to the free admission of air and light, and all the bedclothes freely exposed to their influence. All this is quite consistent with the proper degree of temperature that children require for health; and by due regulation of its admission, the highest degree of comfort may be attained.

In schools where many children are assembled

together, free ventilation is highly proper and necessary, though as yet very much neglected. It is fortunate, however, that impure and confined air is detrimental to the personal comfort of teachers themselves, else it might be much more deleterious in this case than it really is. But scarcely are any means adopted farther than those suggested by mere offended sensation, or with any regard to their own health or that of the children submitted to their care; and even after the importance of efficient ventilation has been proved and enforced, schools are still generally constructed without their directors entertaining the smallest view to its accomplishment.

Should schools have no express provision for securing regular ventilation, as ought always to be the case, they should be emptied at intervals, and the windows thrown open between school-hours, to secure the admission of pure air, ere they be again filled with the children.

Besides the neglect of means for their efficient ventilation, school-rooms are in general much too crowded for their size; and the pupils are kept at their seats for too long a period without interval of relaxation. It is unnatural to confine a young person to a seat in a constrained position for many minutes at a time; much more so for hours successively. The unvaried position of sitting, together with the closeness of the air so rapidly consumed, and so repeatedly breathed even *after* it is consumed, by perhaps a hundred pairs of lungs, is a source, if not of disease, at least of great weakness, languor, and listlessness. All who preserve any recollection of their early school-life, must well remember with what alacrity they were prepared

to commence the morning's labours, and how zealously they were disposed for the mastery of their respective tasks in the early part of the day. They will remember, too, how gradually a feeling of listlessness, increasing often to sleepiness and stupor, stole on, and rendered them incompetent for mental exertion, after they had been confined for a time in the closed and heated school-room; and how suddenly their original vigour and alacrity were restored on their return to the pure air without, or even by its casual admission on the entrance of a chance visiter.* Now, this feeling of languor, and its removal by breathing pure air, is most easy of explanation on the principles already laid down. By breathing, the oxygen, the vitalizing part of the air, is consumed, and carbonic acid gas substituted in its place. But, since the admission of pure air is not provided for, the chinks of windows and keyholes of doors not being sufficient for the purpose, the air first contained becomes so much deteriorated as to be unfit for breathing; hence the body is not properly nourished, and hence the consequent feeling of languor and exhaustion that invariably occurs when this is the case. But farther: the brain, the organ

* In Dr Combe's excellent Work on *Physiology, applied to the Preservation of Health*, &c. occur many most judicious remarks on the importance of ventilation in schools and assembly-rooms. He says, "On referring to the symptoms induced by breathing carbonic acid gas or fixed air, it is impossible not to perceive that the headach, languor, and debility consequent on confinement in an ill-ventilated apartment, or in air vitiated by many people, are nothing but minor degrees of the same process of poisoning which ensues on immersion in fixed air. Of this latter state '*great heaviness in the head, tingling in the ears, troubled sight, a great inclination to sleep, diminution of strength, and falling down*,' are stated by Orfila as the chief symptoms, and every one knows how closely these resemble what is felt in crowded halls."—P. 225.

of thought, like every other organ, requires a regular supply of well-vitalized blood to fit it for performing its functions properly; and if deprived of this, thought becomes languid, and at length ceases altogether in sleep or stupor.*

The ill health of factory children is chiefly owing to the want of pure air; and no matter how carefully they are reared and fed in other respects, it cannot compensate for want of this agent, which is no less requisite for their health and development than food and clothing. In the examination before the Factory Commission, it was stated by Sir A. Cooper, that the result of confinement in the impure air of factories was to stunt the growth and produce deformity; and Mr Owen of New Lanark stated, of the children employed in his factory, that though extremely well fed, clothed, and lodged, and healthy in appearance, their limbs were gene-

* "For the preservation of health and vigour when possessed, and their restoration when lost, a supply of salubrious air is as necessary to the lungs as a supply of sound and nutritious food is to the stomach. The one is not more essential to the production of healthy chyle, than the other is to the formation of healthy blood. And without such blood not a single function belonging to man, whether it be physical, intellectual, or moral, can be in unimpaired health and perfection; for, heterodox as the sentiment may probably appear to some persons, it is, notwithstanding, true, that florid, well-vitalized arterial blood is as necessary to give full vigour to the intellectual and moral powers of the philosopher, statesman, and patriot, as it is to paint the roses on the virgin's cheek, and the coral on her lip. The reason is plain. That they may be in the best condition to perform their functions, the intellectual and moral organs, like other portions of the body, require a supply of well-prepared blood; and to form such is the province of the lungs, using as their principal means unadulterated atmospherical air. Other things being alike, the more perfect the blood the brighter is perception, and the more vigorous every mental operation."—From an admirable treatise by Dr Caldwell of Transylvania University, U. S., entitled *Thoughts on Physical Education*. Edinburgh edition, p. 46.

rally deformed, their growth stunted, and *they were incapable of making much progress in the first rudiments of education.* The effects of confinement were always observed to be more deleterious to children and young people than to adults, whose frame and constitution had become fairly formed and consolidated.

Various modes of ventilation have been proposed to obviate these deplorable effects of confinement in the impure air of factories. The late Mr Thackrah of Leeds proposed numerous openings in the highest parts of the rooms; and these to be built much higher than at present, and less crowded. But probably the most effectual plan of ventilating large rooms is by means of "ventilating fans" kept rapidly revolving, which thus maintain a constant current of air through the largest factory; extracting what has been consumed and become impure by breathing, to be replaced by pure and fresh air in its stead.*

Pure air, then, is the first requisite for healthy respiration; and this is so clearly indispensable, and so plainly indicated when the nature of breathing is understood, that our illustration may to many

* The effect of a plan of this kind in a weaving-mill in Manchester, as noticed by Dr Ure, was very remarkable. After the ventilating fan had been kept in operation for some short time, the workmen, instead of thanking their master for his humane attention to their health and comfort, made a complaint to him that the ventilating fan had increased their appetites, and therefore entitled them to a corresponding increase of wages!!! This the master was not prepared to give, but he made an ingenious compromise with the workmen; by stopping the fan during half the day, he adjusted the ventilation and the voracity of his establishment to a medium standard, after which he heard no complaint either on the score of health or appetite.—See *Ure's Philosophy of Manufactures*, p. 381.

appear superfluous on the subject. But so often do people in general, as well as parents, transgress this law of nature, that we feel it proper to insist on it at greater length than, from its obvious necessity, it may be supposed to require.

b. FREE EXPANSION OF THE CHEST AND LUNGS IN BREATHING.

This is the next requisite for healthy breathing, and must also be self-evident; yet, so generally is it neglected, that we require to insist at length upon the necessity of its observance.

The chest is formed for being raised and depressed in breathing. In all its construction this is kept in view, and most effectually provided for in the strong muscles, joints, and elastic cartilages that effect and permit all the motions of breathing. The object of the expansion of the chest is to dilate the air-tubes of the lungs within it, which, as has already been explained, are passive, and follow its motions. It can easily be perceived that if the expansion of the chest be limited, that of the lungs will be limited also,—an insufficient volume of air admitted, and thus respiration be imperfectly performed. And if this be the case,—if respiration be deficient, the function of the lungs, by which it effects the nutrition of the blood, cannot thus be accomplished; hence its necessary consequence, debility or defective nutrition. For the free exposure of the blood in the lungs to a full volume of pure air is necessary to life and sound health; and whatever checks or limits this must therefore be prejudicial to health. The case may be summarily stated in these terms: *Whatever*

limits respiration, limits nutrition, and whatever does so, induces debility and disease.

Every thing, then, that tends to limit respiration, from the reasons adduced, must be prejudicial to health. Of this nature are stays, and all kinds of bandages that confine the chest within an unnaturally small space, preventing the natural development of the chest and expansion of the lungs; limiting nutrition and strength, and thus inducing serious, often prematurely fatal, diseases of these organs. The practice of swaddling up the tender infant at birth in tight rollers, that restrain the motion of the chest in breathing, and of increasing the compression in girls in proportion to their increasing age, there can be no doubt is fraught with the most serious consequences, and is a chief cause, in the female sex, of the nervous and dyspeptic complaints, and organic diseases of the lungs, which are so prevalent in this country.

The use of stays and such like had its origin in the ignorance of our ancestors of the nature and constitution of the human frame, and in their vain attempts to improve its symmetry and form. A fatal experience, however, has proved the utter folly of attempting to improve upon nature, or mould the human shape after a new form and fashion; and further, how actively the use of artificial supports and bandages defeats the very end in view, by producing distortion in figure and stunting the growth of the body. But instead of returning to nature, and abandoning what has been proved over and over again to be injurious to health and the fine symmetry of the human form, the fashion is adhered to with the most inveterate

tenacity, and promises to maintain its usurpation in spite of reason and common sense. As a late able reviewer facetiously remarks, "there is no such thing as an ascendency of whalebone, no 'glorious and immortal memory' of buckram: yet does the usage prevail with a tyrannous exaction; and not a mother is to be found possessing sufficient independence to break through its trammels and rescue her offspring from disease and deformity."*

There can be no question that this practice, in so far as regards new-born infants, has been much on the decline of late years, indeed is almost entirely abandoned; but with growing girls it prevails with all its former inveteracy; and as soon as possible, long ere the peculiarities of the female form should appear, the stay-bandages are applied, and the little chest of the tender girl is forced within the smallest dimensions that bare existence without suffocation will admit of. The aristocracy of wasp-waists is all-prevailing; and so long as these are preferred to health and soundness, and the monster Fashion prevails over Nature, so long, there is every reason to believe, will this dangerous practice continue in existence.

From what has been above stated, the noxious effects of stays and bandages upon breathing will be sufficiently apparent. The chest is confined within smaller bounds than Nature has intended; natural respiration therefore cannot be accomplished; the nourishment of the body is imperfect; and hence debility, with its motely train of diseases of the lungs as well as of the whole system, finally ensues. This is the shortest statement of the case, and from the

* Athenæum, No. 460, p. 582.

rationale given above, it will be equally satisfactory as if we had detailed (what it were easy to do) a long train of facts on the subject.

But the injury inflicted on the youthful frame by the use of tight rollers or stays on the chest, does not rest with the organs of breathing alone; it extends to other vital organs. The stomach also materially suffers, for its free contraction on the food during digestion is much prevented, as well as the proper supply of the fluids necessary for the performance of this function. The heart and organs of circulation suffer, because they have not the free room to act that their healthy action requires; hence probably arise many of the palpitations and symptoms of disordered circulation that so much prevail among the female sex. *The symmetry of the body is materially injured;* for, besides the more immediate bad effects of compression, and the defective nourishment of the frame, insufficient for its wants and development, it presses down the lower ribs, and favours—often produces—lateral curvature, in other words, crookedness of the spine, which, in its turn, still farther diminishes the capacity of the chest.*

Here the indications of nature most distinctly are, to allow the chest to become fairly developed, without our interference by artificial means; and to clothe the body, not with the view of altering or amending (if we could) its shape, but of preserving its natural temperature, and allowing, at the same time, the fullest and freest motion of all the parts concerned in breathing.

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* See chap. v. sect. 6.

c. EXERCISE OF THE ORGANS OF BREATHING.

Proper Exercise of the organs of breathing is another requisite for the healthy performance of their function. Every part of the body is formed for use and exercise: the limbs, the organs of sense, the brain, and all the vital organs. They must all be used and exercised; for this is necessary to their proper growth and development, and the right performance of their functions. Such is the case too with the lungs. Exercise is necessary to develop and strengthen them as well as any other part of the animal frame. Nature has ensured to the organs of breathing a certain degree of exercise, by making the action of the muscles by means of which respiration is carried on in a great measure *involuntary;* and farther, by rendering the voluntary suspension of breathing exceedingly difficult, and impossible to be borne beyond a certain point, when it must again be resumed and continued as before. Its regularity is thus provided for by night and by day, during sleep and while awake, and almost unconsciously to the being it serves.

But the infant is scarcely born ere other exercise is given the lungs over and above their mere motion in ordinary breathing. This consists in the early efforts of children with their arms and legs—the grasping and plunging they instinctively make even before they are able to perceive and appreciate objects near them. It is farther afforded in the incessant attempts they make to seize all objects when their senses become awakened to them; in their perpetual restlessness and early efforts to jump and spring in the arms of their nurse. Now, in all this

action there is exercise to the lungs as well as to the limbs and body; for it will be observed that during this their breathing becomes fuller and quicker; and as during muscular exertion of any kind the chest must be firmly fixed as a fulcrum for the limbs, while this continues to be made, its gradual compression upon the lungs is forcing the blood in an equable flow through them to the body, and thus promoting healthy circulation, and consequently the regular nutrition of the system. It is evident that the child feels the benefit of this, from the pleasure expressed in his countenance while in action, and the fondness he has for its continuance. A healthy child cannot be still for a moment. He will romp, and frisk, and leap about to his heart's delight, and welcome as his best friend whoever gives him the roughest dandle. This propensity to muscular activity is so powerful that it is impossible to restrain it; it is highly improper indeed to attempt to do so, since it is wisely implanted in the young by nature for the purpose of calling into action their limbs and the healthy play of their lungs, so that in romping they only obey the powerful natural instinct given them for the very purpose.

When the child is checked in these muscular actions, or is unable to engage in them, he is compelled, by an instinct equally powerful, to cry. It may to many appear heterodox when we state, as we confidently do, that the infant much seldomer cries from pain than from an instinct to do so when the lungs become loaded and their action too languid; and that, instead of being feared, the practice of crying in children in want of muscular exercise is most beneficial in its effects. If we observe the

occasions on which a child cries, and reflect on the physical effects it produces on its system, we shall undoubtedly be led to this conclusion. Sickly and weak children cry a great deal, and but for this it is almost certain they could not live long. It is their only exercise, often in fact their only nourishment, for when they cease to cry they soon sink and expire. The very first act which the infant performs at its birth is to cry; and many of them continue to do so at the average rate of four or five hours in the day during the first years of their existence. It cannot for a moment be imagined that all their cries arise from the feeling of pain. It would be an anomaly in the benevolence-working plan of creation, and an unmerited infliction of pain on the little innocents, were this the case. Not at all. They cry in default of exercise, or rather *for exercise;* and we shall immediately explain satisfactorily enough, we think, the benefit they derive from it. Medical men have generally the best anticipations of the favourable termination of a case when the child cries long, often, and lustily; and nurses ought to think no less favourably of a child from its loud crying.* To endeavour to repress the instinct (for it is one) is useless and improper: to lull them asleep, as many do by spirits, poppy, and other narcotics, is most pernicious to health; and, for reasons already

* "You must not," says Mrs Bakewell, "be distressed at every little cry of your babe; for crying is often an effect of nature to exercise the lungs, which certainly require exercise as much as the other organs of the body; it is, too, very frequently the best remedy that can be found for the disorders that cause it. For instance, if an infant be troubled with flatulence, the exertion of crying will remove it and give relief; if it be cold, crying will cause a rush of blood to the surface of the body that will restore a warm and healthy action to the skin."—*Mother's Practical Guide.*

given, renders them most liable to dangerous disease.

It is generally easy to distinguish between cries arising from pain, or disease, or anger, and the natural cry of children referred to;* and while it is proper, in the case of the first, to endeavour to remove its cause by medical or soothing means, if necessary, in the latter this is often useless and hurtful; for if we check it by narcotics we struggle against this wise provision of nature, apparently indispensable to the existence of delicate children. To be angry with children for crying in such cases is no less improper than to be angry with them for *breathing;* since a certain degree of exercise in particular states, or, in want of it, crying, appears to be highly necessary to their health. Every one must have observed how almost instantly a child is pacified when a quick motion by dandling is commenced with him, and how soon he is apt to become fretful when the agitation has ceased.

Akin to the physical effects of crying are those of shouting and roaring, that children so love to in-

* Besides the natural cry above alluded to, children often cry from various other causes, which need only be cursorily alluded to (though they are not incidental to our subject), lest it be presumed that we attribute all or even the greater part of their crying to this natural exercise of their lungs. Tears and crying are the only signs and language of children whereby to express their wants; thus they generally cry when some want requires to be supplied, some appetite to be satisfied, or uneasy position to be changed. If the cause of their crying be not promptly discovered by the nurse, and removed, fretfulness is produced, and perhaps angry passions called thus early into being. It is best, therefore, to anticipate in so far as possible the child's wants ere he have occasion to cry, and thus obviate the bad consequences of fretfulness and ill humour upon his temper and habit of mind. An intelligent nurse will almost at once understand whether his want be of food or drink, sleep or amusement; and generally succeed in satisfying it accordingly.

dulge in, and from precisely the same reason. They exercise the lungs; and when muscular exercise and shouting are combined, the pleasure of children seems to reach its acmé. Observe a group of children at play, and hark to the noise that issues from their little throats! Every one struggles to be heard, and the confusion of tongues would rival that of Babel. It is in this shouting and bellowing, as well as in the muscular exercise, that a great source of the pleasure of their exercise lies. Stop the noise, and you stop the play; for there is no fun in silence, and as little physical enjoyment. Nothing can be more healthful than this conjunct exercise: it keeps the lungs in action, accelerates the flow of blood through them, gives a healthy stimulus to the nervous system, and by promoting nutrition favours the development of the whole body. For the same reason, speaking, laughing, singing, and all acts of *expiration* performed while the air is being forced out of the lungs, are healthy and favourable to their development. For during these acts of expiration, as speaking for instance, the chest is gradually contracting on the lungs to force the air out by the glottis, when the voice is produced in order to effect the sounds required; and as it contracts equally on all its contents, by the same means it regularly forces out the blood contained in the lungs also. It thus obviates the stagnation of blood in them, while it increases the circulation of the arterial or nutritive blood, and thus ensures more constant nourishment of the system.

Acts of *inspiration*, on the other hand, where the breath is mostly drawn inwards, such as sighing, sobbing, yawning, &c. increase the accumulation

of blood in the lungs, and diminish the circulation of arterial blood and the consumption of oxygen. They are hence depressing on the spirits, and detrimental to the healthy action of the lungs and development of the body. They all create a disposition to cry in children; and even in adults it is sometimes with difficulty the propensity to do so can be controlled. Indeed delicate females often instinctively give way to it, and find relief from the act of crying, as it unloads the lungs and promotes nutrition for the time being. So too with children that sob or yawn for a length of time; they are seldom thoroughly pleased till they get rid of its effects by a hearty cry, and then they can be pacified almost at once.

The indications of nature here, then, are to encourage rather than repress the noisy bawling of the young; not to confine them to restrained positions for any time, or to compel them to maintain constant silence either within doors or without; not to confine the exercise of their lungs in any respect either from strait-laced notions of decorum, or by strait-laced articles of dress; but to obey the dictates of Nature, and allow this bountiful mother, and most efficient of all physicians, the most free and unrestrained play.* Declamation should be

* Since writing the above we have met with a very useful little work by Mrs J. Bakewell, entitled "The Mother's Practical Guide," &c., wherein our ideas on this point are well corroborated. She says, "Habituate a child to the stillness and silence of strict decorum, and he will be indolent and stupid; always prohibit vigorous exertion of the limbs and voice, and he will soon evince the folly of such prohibitions by distressing manifestations of bodily and mental weakness. On the contrary, let him act as a child; let him jump, and run, and laugh, and shout, and sing, even within doors, and his muscular and nervous system will be strengthened, his spirits will be exhilarated, cheerfulness of temper will be promoted, and he will be the better prepared for meeting the difficulties of life with a manly courage." (Pp. 77, 78).

encouraged;* they should be made to read aloud for some time every day; and above all things, the exercise of singing should be regularly practised. The importance of this exercise it is scarcely possible to overrate as a preserver of health and the improver of physical soundness. It exercises the lungs, improves the action of the muscles and the development of the bones of the chest; and is most highly conducive to nutrition of these parts as well as of the whole body. It should therefore, on this account, as well as on other grounds, be introduced into all schools, and made a branch of education as general as reading or writing. It is a striking fact, and strongly corroborative of the doctrine above advanced, that in Germany—the country where, above all others, singing is made a regular branch of education in the schools, and where all are taught to use the voice and musical powers with which their Creator has endowed them—*consumption, the most*

* It is generally observed that teachers of all kinds who speak for many hours in the day enjoy, considering their confined occupation, very good health. Indeed schoolmasters are proverbially "long-lived."

Ministers of religion are in general longer lived than the members of any other profession or trade. Besides their temperate habits, this is in no small degree to be attributed to their regular practice of exercising the lungs in speaking. They have almost entire immunity from diseases of these organs.

Public lecturers are generally healthy and long-lived from the same reason. The great Cuvier was originally of a delicate constitution, and early threatened with symptoms of consumption in the lungs. But he was fortunately appointed to a lectureship, when he was required to speak some hours every day. His health soon began to improve, and at length became excellent, so that he lived to a great age. He himself attributed this result to the early exercise of his lungs in speaking. The same naturally weak frame was the lot of the late eminent Dr Thomas Brown, Professor of Moral Philosophy in Edinburgh University, and it is understood that his appointment to that chair was the means of improving his health and considerably prolonging his brilliant career.

fatal disease of the lungs in this country, is almost unknown. This is probably in no small degree attributable to the universal cultivation of the voice and practice of the lungs in singing. The cultivation of music, besides collaterally improving the mind itself, is highly beneficial to health and good spirits, as all must be able to testify who have practised the art of singing.* Unfortunately for the young it is nearly unknown, or at least very little practised by the youth in this country; and its general introduction into national schools would, in all probability, be viewed in the light of a most serious and dangerous innovation on the good practices of our forefathers. Custom or prejudice has thus proscribed a most healthy, innocent, and in every respect beneficial enjoyment; and the young have been deprived of all the advantage so clearly to be derived from it. It is much to be hoped that

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* It is well known that professional singers, if temperate, are in general healthy and long-lived. The celebrated Mr Braham, though nearly 70, looks much younger, and very healthy, and bids fair to attain very old age. Cecilia Davies attained the age of 79, Madame Mara 82, Palestrina 81, Signor Tesi 84, &c. &c.—(See *Supplement to No. 26 of Musical World*).

For the same reason that singing is healthy, as above stated, so is laughing. The old saying "Laugh and grow fat" is a true one, "for a merry heart," saith Solomon, "doeth good like a medicine." Whether laughing and fatness stand in the relation to each other of cause and effect, may not be certain; but it is so that the heartiest laughers are fat, and very likely by this exercise *grow* fat. A good hearty laugh at a comic representation is a most healthy relaxation, and does one at times much real benefit. This is an old remedy well known to the ancient writers; for Celsus, an old Roman physician, recommends these kinds of representations to excite laughter *as a cure for indigestion;* and he was perfectly right. One invariably feels refreshed after a good hearty laugh. It unloads the lungs of blood, accelerates ist flow when impeded by relaxation of the vessels, excites the nervous energies, exercises the muscles, promotes nutrition, and favours the healthy development of the lungs and body.

all prejudices against improvements in physical as well as mental education are in the progress of being smoothed down, to be erelong entirely removed; and that in time to come practices will not be valued for their age and the constancy with which they have heretofore been observed, but only according to their real utility, and with regard to the prospect of benefit to be derived from them.

The practice of singing in infant schools is most excellent, and worthy of general imitation in other seminaries for the young. Mr Wilderspin early introduced it, and from the benefit that resulted, it was perseveringly continued. He has stated that he scarcely ever found a child that could not be taught to sing if it came under training sufficiently early, and who did not erelong become fond of the exercise. Accordingly singing has been zealously encouraged in these institutions, both in the hymns and ordinary lessons of the day. And it needs little discernment to predict that, as education makes progress, the practice referred to will be generally adopted.

CHAPTER IV.

OF THE SKIN.

THE infant frame is composed of a number of differently constructed organs, variously situated, and having great variety in the functions they perform. These organs are chiefly hid from our view by an outer covering or envelope, which, at the same time that it performs its own peculiar and important functions, affords protection from accident, and binds firmly together all parts of the frame. This covering is the Skin. It is contrived to fit closely over every part, so as without tension to produce smoothness, and, without being thick and rugged, to be sufficient security from ordinary injury.

We enter on the consideration of the skin in this order after the lungs, because, like these organs, it is one of the chief means of removing the old particles from the system after they have circulated and served their purpose in the body. Indeed the functions of these organs appear to be nearly analogous, or, as physiologists would say, *vicarious;* aiding and influencing each other in the accomplishment of their allotted duties. Thus, when the lungs,

influenced by certain circumstances, are languid, or obstructed in the performance of their functions, the skin acts with the greater activity, and thus compensates for their defective action. And the converse takes place also; when the skin is obstructed, the lungs chiefly do its duty.* This is the more probable, since in vegetables the skin or leaves perform the same function that the lungs do in the higher orders of animals; and even in the lower orders of these, the skin is the sole organ of respiration. But, as we ascend in the scale of being, we find the apparatus of lungs, &c. developed for the especial purpose, the function of the skin becoming less exclusively respiratory, though still very analogous in its results.

Sect. 1.—*Structure of the Skin.*

The Skin is not so simple an object as it is generally supposed to be. It is by no means complicated either in structure or function; but the parts com-

* Another most important organ, whose chief function in connexion with the lungs, skin, &c. is to remove old matters from the system, is the Liver. That constant change of material composing the organized frame which is necessary to its existence, goes on as regularly before the birth of the infant as after it, although not with the same activity; and as the lungs cannot then act, and the skin but very imperfectly, the liver has, at that period, the chief part of this duty to perform. Accordingly, it is of enormous size in the infant compared with the diminutive size of the lungs and other organs concerned in nutrition, but gradually decreases in proportional size towards adult age, when the lungs have become the most active and energetic in the performance of their function, and in removing the old material from the system.

The liver also sympathizes intimately with the skin, as well as the lungs; and when by cold the functions of the skin are interrupted, that of the liver becomes increased; in addition to its own duty performing that of the skin also. Hence, the bilious vomiting and bowel-complaints of infants produced by a check to the function of the skin by cold or other causes; as well as the increased action of the breathing organs, then so prone to disease from this cause,

posing it are various, and the functions it performs are highly important.

The popular notion is, that merely that portion of it which is raised by a blister is the real skin; but this is not the case. The true skin is situated beneath this thin coat, and is composed of a dense fibrous network of tissue varying in size and thickness in different parts of the body. In this true skin the property of life, particularly in children, resides in a high degree of perfection; enabling it to perform its important functions. Hence, it is most plentifully supplied with both nervous and vascular parts. Indeed it is permeated in every direction by such countless myriads of blood-vessels and nervous filaments as to defy calculation by their number and minuteness. The natural redness of an infant's skin shows the universal diffusion of the capillary vessels. Not a part of it can be penetrated with the point of the finest needle that we do not wound a vessel and draw blood, or prick a nerve and excite pain. This extreme vascularity considerably diminishes towards adult age, especially in cold countries, as the lowness of temperature is unfavourable to its progressive development. Besides, towards adult age, the lungs become more active and energetic in vitalizing the blood, and removing the old matters from the system; thus performing the chief part of what in the infant was almost the peculiar function of the skin.

This true skin is covered by the cuticle, or scarf-skin, which is the very outermost covering of the body. It is the part raised up in a blister when any powerful stimulant is applied to the skin, or which scales off after scarlet fever or measles. By aid of

the microscope, the cuticle is found to be composed of scales resembling those of a fish, but so minute that it has been said a single grain covers 250, and a single scale 500 pores; from thence issuing the insensible perspiration so necessary to health and comfort. This part of the skin is *quite dead;* having neither nerves nor blood-vessels, and being of itself quite insensible to touch. But while it is so, it permits through its fine layer the most delicate perceptions of this sense; at the same time limiting its intensity, and preventing the pain and tenderness to which this exquisite sensation would otherwise have constantly exposed us.

Between the cuticle and the true skin is situated the layer in which *colour* resides;—but as the consideration of this would be foreign to our purpose, we satisfy ourselves with merely noticing the fact.

Such, then, is a short notice of the structure of the skin, though perhaps sufficient to give a general notion of that important organ of depuration in the young. Let us give an equally brief statement of its functions.

Sect. 2.—*Functions of the Skin.*

These are sensation or Touch, Absorption and Excretion of the perspired fluids.

a. TOUCH.

Touch is the sensation produced by the contact of an object with the skin. It is thus one of the chief inlets of ideas to the mind, and the most important of the preservative agents that nature has appointed to maintain our existence in comfort and safety. Like an ever-wakeful sentinel placed at the outposts,

it informs us of what is near, and gives warning of the slightest approach of danger. For, the same extreme sensibility of the skin that transmits ideas to the brain of the minute impressions of objects on its surface, is also the seat of pain when a dangerous object is too rudely approached to it. Thus, if we take a pointed knife in our hand, and feel its edge, we excite the sense of touch; but if we violently thrust the knife against our skin, we give rise to a feeling of pain, as we destroy the texture of the skin. Now, it is well known that this thrusting of the pointed object into the body is dangerous to life, and often attended with fatal consequences; hence, nature has appointed that pain as well as touch should warn man of his danger, and by making it disagreeable to bear, force him to take every means to avoid it.* In the same manner, excessive heat or cold would often endanger and destroy life, were there not placed in the skin a sensation of these two different states that warns us to avoid them. Now, let it be kept in mind, that in the infant neither volition nor reflection are competent to take advantage of this warning of the skin, and that the feeble

* Some philosophers have argued that this liability to pain was an unnecessary infliction of misery on mankind, when it could have been so easy for omnipotence to have created them without it. But, not to notice the presumption of so arraigning the all-wise disposition of events in nature, it is sufficient if we keep in view this actual *usefulness* of pain in causing us to take care of our health, and exert ourselves in ceaseless efforts at self-preservation from the numerous accidents that would otherwise soon infallibly destroy us, to perceive at once the fallacy of this assumption. Indeed, the liability of man to pain and external injury, so far from implying an imperfection in his construction, proves the very reverse; for what is so likely to stimulate him to the due exertion and development of his intellectual faculties as the conviction that the preservation of his life is so much dependent on *himself*, and his enjoyment of it free from pain in so great a measure the result of his own care and watchfulness?

state of their muscular power renders them altogether passive under the influence of external agents, —such as adult experience and volition make us at once instinctively avoid,—and the necessity of great parental care and protection will sufficiently appear. The lower animals are protected from cold by their natural coverings of feathers, down, or wool, with which they are born covered; but the child is brought into the world naked, shivering and defenceless; and but for the artificial covering given it which its nature requires, would be nipt in the bud and perish; like a tender opening flower that has been unwittingly exposed to the keen frosts of winter or the early spring. Since, then, what our feelings do for our preservation, the feelings of infants cannot do for theirs, it becomes evidently the duty of parents to exercise the reason granted them in studying in so far the nature of their tender offspring, so as to supply that protection of which nature indicates them to stand so much in need. There appears, however, every reason to believe that what they give is often so insufficient for preserving their natural warmth, that thousands of children annually fall victims to the deliberate neglect of the means so clearly pointed out by nature for their preservation.

b. ABSORPTION.

The function of Absorption is so different in its nature from that of touch, that it could scarcely be expected the same skin could perform both. But the saving of means that always appears so prominently in the works of organized nature, in accomplishing any object, is here strikingly obvious.

Though amply *sufficient* for the purpose required, we never find any *prodigality* or waste of resources; and when one organ can accomplish two several functions, it is so admirably arranged that both are performed with the best possible effect, while at the same time simplicity is preserved, and the apparatus of life rendered harmonious and easy in its action.

Absorption is the property of drawing in, or imbibing, fluid matters placed in contact with the skin. It is by means of this function that many medicines are introduced into the system, and most probably that the poisonous effluvia of contagious diseases floating in the air first affect the persons subjected to its influence. For example, a moist tobacco leaf applied to the pit of the stomach will produce its sickening effects as surely as if directly swallowed; and the matter of smallpox, cowpox, and many other eruptive diseases, acts by being applied to the skin alone.

c. EXCRETION OF PERSPIRED FLUIDS.

But the most important function of the skin, as connected with our subject, is Excretion of old matter from the system in the form of fluid, ordinarily termed Perspiration or sweat. It will be remarked, that this function is exactly the reverse of the last-mentioned; for while, by absorption, new matter is drawn in and *added to* the fluids already circulating in the system, by this function old matters are thrown out from it, and this too in far the greatest abundance. The skin thus resembles the lungs both in absorbing new and removing old particles; and likewise in the preponderance of the latter or excretory function.

It is but seldom in a state of healthy repose that we are sensible to the giving off of the perspiration. It is only after active exercise, or when exposed to high temperature and other agencies, that it is produced in sufficient quantity to make us sensible of its presence. But though we may not perceive it unless on such occasions as these, it does not the less regularly take place. For, in a state of health, perspiration is thrown off by night and by day, at all times and seasons. It has been sufficiently ascertained, that the average perspiration of a full-grown adult amounts to more than thirty ounces in the twenty-four hours: that is, supposing the perspiration to have been condensed into a fluid state and weighed in scales. The perspiration of the infant, if we take into account its comparatively diminutive size and smaller surface of skin, is considerably more copious even than this, as, from the extreme vascularity of its skin, might rationally be expected. In the ordinary state this passes off from the body so insensibly, so regularly and quietly, without producing any moisture farther than what gives the skin the most agreeable softness and smoothness, that it has been termed the *insensible* perspiration. After exercise of the limbs it becomes more copious, because the circulation of the blood has been accelerated, the breathing hurried, and the animal heat considerably increased. And here we may incidentally remark, that besides serving the purpose of purifying the blood, like the halitus of breathing (see Respiration), so the perspiration is also appointed by nature as an avenue through which the body is relieved when exposed to a higher degree of temperature than its health requires. It does so on the

well-known principle of evaporation; the fluid, in assuming the form of vapour, absorbing the heat of the body which is necessary to enable it to take that form, and thus carrying it off from the system.

SECT. 3.—*Effects of Cold on the Infant System.* THE management of the skin is of much importance in the proper rearing of the young, though a part of it that is very considerably neglected.

The first indication of nature regarding its healthy action is, that it be properly covered by sufficient clothing, and thus protected from the vicissitudes of season and temperature. This will be the more clearly obvious if it be kept in view, that in the infant there is less power of evolving heat than in the adult, from the comparatively imperfect development of the lungs, and therefore the greater necessity for preserving carefully that heat which actually *is* evolved, and preventing the chilling pernicious effects of cold on the surface of the body.

Cold is the exciting cause of a great number of diseases in this country, where, from its insular situation, the vicissitudes of temperature are extremely sudden and often unexpected, and on this account the more dangerous. "I believe," says Dr Copland, "that more than one-half of the deaths, and two-thirds of the diseases, that occur among the children of the poor, are more or less caused by it."* Its influence, let it be remarked, is pernicious exactly in proportion to the youth of the child; for, since the least vital heat is generated in very early infancy, its abstraction then is far more injurious on its

* Copland's Medical Dictionary, p. 357.

tender frame, than after the vital functions have become fairly developed in advanced years, when heat can be produced more than equal to its loss on the exposed surfaces. When it is considered, too, what a sudden change of temperature the infant undergoes at birth,—from a state of constant and equable warmth to a cold and varying atmosphere,—there need be little cause for surprise that neglect and careless exposure of infants at this early age should be so pernicious,—so fearfully fatal. We select a case in point that strikingly illustrates the above statement. It is the custom throughout France to carry every new-born infant to the office of the mayor, for the purpose of being registered in the public books. On an inquiry being set on foot by Dr Edwards* regarding the consequences of this early exposure to the air, it was found that the proportion of deaths within a limited period after birth was *much greater in winter than in summer*, and in the northern and colder, greater than in the southern and warmer districts; besides, that it was much more considerable in parishes where the inhabitants were spread far asunder, and lived at a distance from the office of the mayor, than when they lived near him. It therefore appeared from all these circumstances, that the deaths of infants were very much influenced by the degree of cold to which they were exposed, and the length of time during which this exposure lasted.

These injurious effects of cold are easily explained. The skin of the infant, it has been remarked, con-

* See Dr Edwards on the Influence of Physical Agents on Life. Translated by Doctors Hodgkin and Fisher.

tains in it a very large proportion of the circulating fluids. It is also extremely sensitive to impressions of whatever kind, especially those of temperature. Cold immediately affects its nervous structure; and in so far as it does so, by sympathy it affects the vascular part of the skin in an equal degree. By its action, the blood-vessels of the skin, that contain so much blood, are caused to contract, and thus expel it from them; while the pores, through which the fluids of perspiration pass out, become shut up and impervious. The immediate consequence of this general constriction of the surface is thus twofold: First, The blood is driven inwards upon the vital organs, where, from want of its ordinary receptacle, the skin, it accumulates, and forms what are termed congestions of blood. Second, The function of perspiration performed by the skin is checked, and the old matters, that ought to pass by this means, are now either retained in the system and clog its operations, or got rid of by some other co-operative organ, whose functions are thus preternaturally increased.

It is easy to trace from this the origin of disorder and disease. The blood, it must be evident, after it is repelled from the skin by the constriction of its vessels, must be accommodated somewhere else; but as, in a state of health, every part has just that supply, and no more, which it requires, any additional quantity overloads it, and increased action or disordered function immediately ensues. Should the head be weak, as is often the case in the infant, congestion of the brain and consequent disease of that organ, indicated by convulsions, &c., may take place; or, should the lungs and air-passages be the weak

point, inflammation of these organs, in all the varieties of cold and croup, take place; or, what is very often the case, the congestion falls on the bowels, and then the old matters which should have been thrown off by perspiration are voided by vomitings and bowel complaints.

The danger of exposure to cold does not consist so much in the intense degree of it to which the child is subjected, when accustomed to its influence,—as in the suddenness of change from a warmer temperature, and while the vessels of the skin are relaxed and throwing off copious perspiration; its nervous power at the same time being weak and depressed. Thus it is not a clear and steadily cold winter that is so fatal to children, but a season that has many changes of temperature from frost to mildness, and from this to frost again; neither is it the constancy of their exposure to cold,—in a house, for instance, that is kept regularly cool at all seasons,—but in one where the vicissitudes from heat to cold are as frequent as the opening and shutting of the doors in it. It is the suddenness of the change, of which the nerves and vessels of the skin become instantly sensible, especially while relaxed, that does the mischief; and this, we say, is hurtful, not so much from the *amount of depression* of temperature, as in proportion to the relaxed state of the skin and nervous system, and the quantity of blood contained in the organ when the exposure takes place.* When, in consequence of exposure

* When the system is in a state of excitement, the most incredible changes of temperature can be borne with impunity. Thus glass-blowers, smiths, and foundrymen, can pass from their workshops to the cold air, literally in a pour of sweat; and so long as the excitement produced by their active muscular exertion lasts, they feel no bad effects from doing so. In the same manner, the Russians

to the influence of cold, the blood contained in the skin has been thus repelled inwards on the vital organs, and these are not impaired, the heart and internal blood-vessels come to react on the great quantity of blood thus forced on them, and propel it outwards again to the skin. It is during this interval between the repulsion of the blood and the period of reaction, that disorder or disease takes place; and it is always the more serious, the longer the period that elapses ere the reaction occurs. If the exposure to severe cold be long continued, and no interval be allowed for the reaction of the circulating powers, they become less and less active, the nervous system becomes torpid, volition sinks, till at length life goes out entirely,—the loss of temperature having been too great to permit existence to go on.

Sect. 4.—*Clothing.*

The indication of nature here, then, is, to avoid his being chilled by these sudden changes of temperature, by clothing the child in a proper dress, sufficient to permit the proper performance of the functions of the skin, and at the same time to protect it from the vicissitudes of the atmosphere.

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roll themselves among the snow immediately after emerging from the hot water or vapour bath; and so long as the excitement of the nervous and muscular system continues, they do so with impunity, —the check to perspiration giving rise to even healthy reaction. But with the infant, sudden change of temperature operates very differently, inasmuch as in it there is neither nervous nor vascular excitement to prevent the bad effects of the chill, under the influence of which he is entirely *passive*. The same is the case with all weak and feebly constituted persons, as there is not sufficient nervous or vascular excitement to prevent the deleterious operation of sudden depression of temperature on the skin. Hence, with such, the danger that is so apt to occur on sudden immersion in cold water; and the necessity for avoiding cold bathing with the infantile, the feeble, and the invalid.

Clothing ought not to be so heavy as to excite unnecessary perspiration, nor, on the other hand, so light as to allow the cold to repel it. Since the whole value of clothing consists in its *utility*, this should always be kept in view, and the ends for which it is employed be first fully subserved. Unfortunately, however, the utility of dress as a comfortable covering for the body is too often made merely a secondary object, and sacrificed to fashion and ornament; whereas these, if worth estimation at all, ought certainly to rank *after* the enjoyment of genial warmth, comfort, and sound health. Happy is it, however, in so far, that babies have no occasion to dress for rout or party, else there is not the smallest reason to doubt, they would be trumped up with tightly bound waists and naked necks, with as utter a disregard of nature and common sense as their seniors so often display upon the same occasions.

The object of clothing is to preserve the temperature of the body equally, and thus allow the functions of the skin, as well as of the whole system, to be fairly performed; and it is especially of consequence to preserve the natural heat of the chest, within which are contained the important organs of breathing, so easily injured in the youthful subject. There is a practice, most pernicious in this country, but so prevalent and customary as to have ceased to attract observation, of exposing on certain occasions the necks of children to the cold air; and this is carried to an excess with grown girls, that infringes at the same time both the laws of physiology and decorum. The breasts of dress-frocks must be made low, so that the skin of the neck may be exposed

as much as possible; and if it be covered at all, it is only with a piece of the thinnest transparent gauze. This practice is dangerous, chiefly because it is at certain intermitted periods resorted to; that is, it may be for only one or two hours in the day, and this one day in the week or the month. But inasmuch as the neck is in general covered, and accustomed with probably a natural enough degree of warmth, the departure from usual habit at these periods is just the more likely to be injurious to the constitution. For if the neck then be exposed to the slightest draught of cold air, or even air of ordinary temperature, the skin is at once influenced by the change, a chill takes place, the blood is repelled from the surface, and some internal mischief in the lungs, air-passages, or throat takes place. What reason, then, is there to wonder at the prevalence of colds and sore throats after a fashionable party, or the premature death of so many young persons from their ultimate effects?*

It was particularly remarked that, during the

* "If the errors of dress are less signal in the attire worn by day, they reach their acmé when the evening rout or midnight ball is to be attended. At these seasons the tightly-laced stays, exposed chest, and thin draperies, furnish a combination of influences, the continued effects of which no constitution could withstand; while to these is yet to be added that of respiring for hours a heated and vitiated atmosphere, and, after this, of passing, when relaxed or exhausted, into the cold currents of a frosty air. So far from wondering that many suffer from these egregious imprudences, our surprise should be that any escape; and instead of the inherent delicacy so often imputed to the constitution of females as explanatory of their peculiar ailments, we have ample proof, in their powers of resisting such noxious influences, that they possess conservative energies not inferior to those of the most robust male. Were men to be so laced, so imperfectly exercised, so inadequately clothed, so suffocated, so exposed, their superiority of bodily vigour would soon cease to have any existence."—*Dr Barlow, in Cyclopedia of Practical Medicine.* Article, *Physical Education.*

mania of the French Revolution, croup and other acute diseases of the lungs were uncommonly prevalent among children; and among the elder of them, consumption of the lungs, bowel complaints, and rheumatism. This arose from the then prevalent fashion of dressing *classically* in naked busts and thin clothing,—a mode of dressing well enough suited, it may be, for the milder regions of Athens and Rome, though by no means adapted for the cold and changeable climate of Britain or the north of France.

Parents entertain the notion that the exposure of their children's necks is manly and becoming, and tends to harden and invigorate their constitution. With regard to the first, it is quite possible to believe it is becoming, because this is entirely a matter of individual taste; but the latter, that it hardens the constitution, is exceedingly doubtful, indeed highly improbable. In such methods of hardening the constitution, perhaps the number that survives them bears but a small proportion to those who are destroyed in the experiment; and the health and strength of the former are not to be placed to the credit of the *hardening* system, but to their originally sturdy constitution having preserved them in spite of it. Peter the Great was eminently unfortunate in his similar attempts at creating a hardy race of seamen, by learning them to drink salt water alone; all that persevered with it died ere the experiment succeeded. Parents must not forget that a degree of cold which *they* can bear without uneasiness, may excite in the child dangerous disease; or that what perhaps merely invigorates *them*, may to the tender infant prove speedily fatal in its effects.

Children and young females are made to dress lightly precisely at the age at which the most com-

fortable clothing is required, particularly about the neck and chest; since, as already shown, vital heat is supplied in least quantity in early life, and the organs of breathing are then, from the rapidity of their growth, the most liable to become disordered and diseased. Fathers and mothers themselves know the comfort derived from warm clothing about the neck and breast, and accordingly we scarcely ever see them expose these parts to the vicissitudes of our changeable atmosphere; but they are often culpable in not enforcing the same observance on their tender, because more youthful, sons and daughters. But we fear that till the fiat of fashion has gone forth, that the young cover up the naked neck and bust, we may reason ourselves out of breath, and declaim against the present practice, to no purpose; comfort, convenience, and sound health remaining entirely in abeyance.

The proper rule for clothing is to apply merely sufficient to preserve the natural temperature of the skin, without overloading it so as inordinately to excite it. When perspiration is excessive, there is either too much clothing, or the air around is too close and heated, and one or both of them should accordingly be diminished.

The most ordinary kind of clothing worn nearest the skin is of cotton, linen, or wool. The two first are preferable in infancy and childhood, from their less irritating nature; and as the functions of the skin are particularly active in early youth, there is a propriety in restraining rather than quickening the action of this organ. It is for this reason we think the use of flannel objectionable in infants, as its woolly texture is too irritating to their tender and already irritable skin. It is not improbable, indeed,

that the constant use of flannel nearest their skin, by increasing its susceptibility, renders it more easily affected by the vicissitudes of season, and thus proves in many a source of the colds so prevalent in this country.

Flannel, applied to the skin of infants, has many advantages as a *medicinal* application; and it ought generally to be by advice of the medical attendant, therefore, that it should be resorted to in very early youth. The above objections to the use of flannel nearest the skin in early infancy, do not, however, apply to the whole body. The legs and feet are most exposed to cold; and in these parts the circulation is most languid, hence also their skin is less irritable. They should therefore be clad with stout worsted stockings in winter, and covered with woollen gaiters, when the child is about to be exposed to the cold air.

The first covering of the infant's body, then, should be of linen or cotton, which should be regularly changed and aired night and morning, as its dryness and cleanness, when worn, contributes to preserve the skin healthy and the constitution sound. Above the inner covering, a dress of flannel should be worn, thicker or thinner, and covering a greater or less surface, according to severity of climate and season. Flannel used in this manner, as a part of dress, presents many advantages. It is loose in its texture, and thus retains a considerable quantity of air; and as both this and the flannel itself are bad conductors of heat, they preserve, with little diminution, the animal warmth. By its looseness it affords also a greater surface for the gradual evaporation of the perspiration, which it readily takes

up through the inner dress, and thus conveys away without producing too sudden depression of temperature on the skin. On this account its use is resorted to with the greatest advantage in advanced years, when those circumstances which form objections to its being worn nearest the skin in infancy do not apply, but are rather recommendations in its favour.

There is considerable risk of children suffering from exposure to cold during the night, when this agent is most intense, from their tossing off in their restlessness the bedclothes that cover them, as well as from their greater susceptibility of cold during sleep, when the power of the constitution to resist it is considerably diminished. To obviate, therefore, as far as possible, the danger arising from this cause, a long flannel night-gown should be worn over the cotton shirt, sufficient to preserve the child's natural warmth.

We may here notice the management in regard to the covering of the head, as this forms rather an exception to the general rule regarding the careful preservation of warmth over the rest of the body. In the infant, this part should always be kept *perfectly cool.* In winter, of course, it must be covered with a comfortable cap, when out of doors, but not too heavy or close in its texture,—comfort, not warmth, being required of it. Heavy woollen or felt hats should be avoided, as these accumulate too much heat about the head, and thus favour tendency of blood to the brain,—an event much to be avoided as promoting derangement of that most delicate organ, as well as increasing the dangers of teething. Within doors, if covered at all, it should be only with a cap of the thinnest texture. It is better

indeed, after two months old, to leave the child's head altogether uncovered, unless by the covering which Nature has provided for it. Non-confinement of the hair greatly promotes its growth; and when well grown, it is of itself quite sufficient for the comfort and safety of the child's head. Even in sleep the same rules must be observed; the head must be kept quite cool. It has become much the custom to allow children, when well advanced, to sleep without any head covering; at all events only a very thin cap ought to be used.

All clothing, of whatever description, outer as well as inner, should fit loosely on the body, so as not to interfere, by pressure, with its development or functions. The insensible perspiration is thus allowed to pass off without giving any inconvenience, even when it becomes sensible and in excess. By the friction which its looseness permits between it and the skin during exercise, a healthy stimulus is given to this organ, which is highly beneficial in its effects. Besides, no muscular motion is interfered with, nor the circulation in the veins beneath the skin at all interrupted. Tight cravats or shirt-collars should be particularly avoided, as, by constricting the neck, they prevent the free descent of the blood from the brain, and thus favour congestion and disorder of that organ.

But while it is thus of the utmost consequence to preserve the proper heat of the body by the means referred to, we must take care, in securing it, that we do not run into the opposite extreme. Too much, as well as too little, clothing is to be avoided; since, by accumulating warmth and relaxing the vessels of the skin, debility is thus certain to be

produced. Some parents, in their excessive carefulness of their children, undirected by any knowledge of their real nature and constitution, load them with the warmest coverings by night as well as by day; and, in addition to this, scarcely ever allow them to see the open air unless through a glazed window; or are ever in a state of agony lest "the rude winds of heaven visit their face too roughly." By this close confinement to heated rooms and warm clothing, like hothouse plants they become more quickly developed; but, like them too, they are apt to be nipt, and wither when exposed to the open air with any thing like an ordinary share of clothing.

Unlike cold, that constricts the vessels of the skin, too much heat has precisely the opposite effect. It relaxes them, so that they oppose no resistance to the entrance of the blood; they likewise lose the requisite power of contracting and forcing onwards the blood thus propelled into them; hence it accumulates, and increased secretion of perspiration consequently takes place. Now, during this excessive accumulation of blood in the skin, some organs must have a diminished quantity, as it must have been withdrawn from internal parts to occasion it; from the stomach, the lungs, the larger blood-vessels, and the brain. From this circumstance we can satisfactorily account for the slow digestion, the languid breathing, the feeble pulse, the enervation of mind, and general prostration of bodily vigour, which occur on exposure to heat, at the same time with copious perspiration; and, on the other hand, the opposite appearances which occur on its suppression or gradual diminution.

The two extremes of sudden exposure to cold and too high temperature, whether produced by heated

air or warm clothing, are thus equally to be avoided, and safety and comfort to be sought in the medium that lies between them. Observation of nature will teach any one, that all that is required in the management of the skin, is the regular and unintermitting flow of the insensible perspiration; and to avoid the suppression of it on the one hand, or its excessive excretion on the other, as being both injurious to the healthy performance of the vital functions.

The reasons adduced in support of the general principles above stated, we consider better adapted to attract attention to the present defects in the clothing of children, and to point out the reformation of it so considerably needed, than more specific directions on all or any one of the branches of this subject. A clear understanding of the objects intended by nature in appointing the functions of the skin for the service of the human frame, is, we think, in this as in every other respect, the best guide to a sound and natural mode of management of the infant's physical constitution.

Sect. 5.—*Air and Light.*

As a supply of pure air, we found, was indispensable to the healthy performance of the function of respiration, so is it equally necessary for the healthy performance of the functions of the skin. Impure air, as we have shown, acts prejudicially through means of respiration on the growing frame of the infant, by diminishing its supply of vitality, and thus retarding its growth and nutrition. In the same manner does it act upon the skin; and, as we have stated the function of this organ and that of the

lungs to be somewhat analogous, this was but rationally to be expected.

In those who live chiefly in impure air the skin becomes pale and sallow—of a sickly, unhealthy hue, altogether unlike the clear ruddy skin that marks the denizen of an abode well ventilated with pure air. And while the skin is thus rendered unhealthy, all the other vital organs must of necessity partake in its suffering. The whole frame becomes enfeebled and prone to all the diseases of debility. Worms in a great measure arise from the bad effects of impure air upon the skin, as well as from the other debilitating causes already mentioned; and they are generally most effectually got rid of, when such is their cause, by a removal to a purer air. But the importance of a full and free supply of this agent has already been so fully insisted on (see Respiration, &c.), that we need not here farther enlarge on a topic so nearly exhausted.

Besides pure air, however, the light of the sun's rays appears to exercise a beneficial effect on infants, in their growth, and physical and mental development. It is well known that all vegetables grow sickly and pale if confined in a place from whence the sun's light is excluded, and soon die or cease from growing to maturity if they do not reach the open air. Can it be doubted that, besides from confined air, it is in a great measure from want of the same natural agent which has been, as it were, identified with life, that children confined to dark rooms, and all whose occupations are in the night or excluded from light, acquire the same pale, emaciated, and bloodless appearance? Factory children, miners, and the inhabitants of close-built cities,

especially those parts of them into whose recesses the light of day can scarcely penetrate, have this sickly appearance, by which they are easily distinguished from the lusty and ruddy dwellers in the open air, engaged in country and agricultural occupations. The light appears to be necessary to give colour to the blood, as well as to impart to it nourishing properties; for in miners who have died from diseases of debility induced by want of light, the blood has been found very deficient and nearly colourless; the vessels of the skin and mucous membrane of the mouth and alimentary canal being entirely empty.*

It is well known that the vital functions of all living objects, of vegetables, animals, and man—old and young—are performed with the greatest activity in spring; most probably excited by the genial influence of the sun's rays, combined with the greater dryness, purity, and electrical state of the atmosphere; while in winter, on the other hand, these decay and become languid from their deficiency. The familiar fact, so regular as scarcely to attract our attention, of the approach of day waking all the tribes of living creatures from their rest, and inspiring them with renewed life and activity, and the fall of eve causing their relapse into inactivity and sleep, sufficiently illustrates the same power. And where no light penetrates from day to day,—to the miner in his cave, or the prisoner in his lonely dungeon,—there is a gradual depression of the vital powers; the mind itself becoming languid and attenuated with the blood,† till at length

* Chomel, Dict. de Medecin, Art. Anémie.

† In the interesting account of Caspar Hauser, we have a good

the frame becomes dissolved,—the thread of life that bound its parts together becoming too slender to maintain them.

From this evidently beneficial influence of light upon life, we may observe the importance of rearing children in well-aired, well-lighted rooms, and, when weather permits, as much as possible in the open air; for it is evident that the whole construction of man is suited for the most open and unconstrained exposure to its influence, as well as to that of pure air.

Sect. 6.—*Cleanliness.*

The next and last essential we notice for the healthy performance of the functions of the skin is Cleanliness. That this is of much importance to health, and highly necessary to personal comfort,

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illustration of the above statement. This individual had been confined in a perfectly dark cage from early childhood to the age of about 17, where he never either saw, or heard the voice of, a single living creature, till in May 1828 he was found in the streets of Nuremberg. He was then as if newly come into the world; and as incapable of discerning objects or communicating his impressions, and nearly as unable to walk, as a new-born infant. When his attention became awakened,—after thus so suddenly coming into existence, as it were, —the variety of objects presented before him, the strong impression of light (which at first produced violent spasms) and free air, by the morbid acuteness of his senses, produced an excitement that had almost overpowered his feeble frame, and required his partial exclusion from them for a time, till this excitement had ceased.

(For an account of this most interesting individual, see a history of him, published by Simpkin and Marshall, London, entitled "Caspar Hauser.—An Account of an Individual kept in a Dungeon, separated from all Communication with the World from early Childhood to about the Age of Seventeen. Drawn up from legal Documents by Anselm Von Feuerbach. 1833.")

The Earl of Warwick, also, in the time of Henry VII. was imprisoned when an infant, and kept shut up in a lonely cell for about fifteen years; he was separated from man, from exercise, from light, almost from air, and thus reduced to a state of great physical weakness and the most abject idiocy.

there can be no doubt. Cleanliness has conventionally assumed the rank of a virtue, and hence its observance is more or less acknowledged by all who esteem a character in civilized society. In the East ablution and bathing are as regularly practised as eating and sleeping, for Mohammedans connect the idea of internal sanctity with that of external purification. Hence they are considered indispensable religious services, and as constantly observed. But in European countries, though its importance is fully recognised, it is but little practised. Cleanliness of the skin is chiefly confined to those parts of it which are seen; and people in general think they sufficiently preserve the character of cleanliness if the hands and face be kept free from stain or spot, though soap and water should not have visited the rest of the skin from one year's end to another.

If we were to appear in society with foul face or hands, we would be scouted and libelled as every thing that was impure. Accordingly these parts are kept scrupulously clean, while the body may be still carrying on its surface the remains of a former year's impurities, and the idea never obtrude on people that in allowing this they infringe the laws of both health and cleanliness together. This, however, is sufficiently in accordance with fashion, and as usual we have little expectation of seeing the evil remedied until this tyrant has decreed that a clean skin where unseen is equally imperative in society as a clean skin where exposed to view.

The chief importance of cleanliness consists in its beneficial influence upon health. It has been generally remarked that fevers and epidemics are always most fatal in dirty families; and that these too have

the most noxious and inveterate diseases of the skin. "In ordinary circumstances and seasons," says Dr Thackrah, "the greatest proportion of sickness and mortality I have often observed to occur in dirty families; and on the invasion of severe epidemics this remark is better established. In the year 1825, Gawthorpe, a village remarkable for its filth, was equally remarkable for the prevalence and fatality of cholera and dysentery." The reasons of such noxious effects of uncleanliness are these: The perspiration, which, as we have formerly stated, is given off in such abundance at all times, especially in children, consists chiefly of watery fluid, holding in solution, however, various kinds of saline and animal matters. These latter ingredients are condensed on the skin, and become collected there after the watery part of the perspiration has evaporated; being also partly rubbed off in the form of scurf by the clothes worn next the skin. If these be worn for some time, they become soiled and saturated with the remains of perspiration, and are rendered unfit for farther wearing until cleansed by washing. It is because flannel takes up the greatest quantity of this refuse of the skin, and thus keeps it cleanest, that, in those who perspire much from exercise or labour, this fabric is so much preferable to all others for wearing in contact with this part.

But no article of dress can of itself remove the whole of the impure matters perspired. A portion remains in immediate contact with the skin; and there, if not regularly removed by washing, accumulates, till, if on the face as it is on the body, it would actually be pronounced *dirty*. When it is so allowed to collect, it obstructs the exhaling pores,

and causes irritations of the skin, often terminating in disease. It is highly probable also that a portion of the old matter thus thrown out of the system is re-absorbed, and acts with noxious effect in the nutrition of the body.

The indications of nature and reason in this respect are, to wash the skin of the young regularly, at least once in the day; not being so anxious to preserve merely the cleanness of the face and hands alone as the cleanness of the whole body. For reasons already stated when noticing the effect of cold on the skin, it is improper to use cold water for this purpose with tender infants, the more especially as warm or tepid water answers the purpose of cleansing much better, and is not liable to any objection on account of its chilling effects. Cold water is very generally used in washing infants, under the impression that it *hardens their constitution;* but this is a dangerous mistake. It is neither reasonable nor natural that it should be so. Its application chills the skin; and in delicate children, whose vital powers are low, some internal organs become overloaded with blood, and their disorder is the consequence. It is both much safer and more effectual, besides being agreeable to the feelings of the child, to use tepid water, as nearly as possible about the temperature of the skin itself; gradually substituting colder water as the power of resistance of the young constitution becomes improved by age, and the reaction that follows the application of cold instead of being hurtful becomes then most beneficial in its effects.

Still farther to preserve the cleanness of the skin, the flannels and linens of the young should be

frequently changed; or, what is perhaps equally effectual and the most economical, two or three sets may be kept in use at the same time, and worn on alternate days.

Before concluding this short account of the nature and management of the skin, it is proper we should notice the Eruptions of this part that are so generally prevalent among the young.

All children are subject to eruptions of the skin, some of them very inveterate, others simple and easily removed. This arises from the high state of activity of this organ, and its susceptibility of external impression; as well as sympathy with inward irritation. The eruptions of very young infants mostly proceed from this latter cause—namely, some irritation created in the inner lining membrane of the stomach and bowels.

The first eruption that generally appears on the skin of the infant is ordinarily termed the *red gum*. It is usually confined to the face and neck, but sometimes extends over the whole body. This, as well as nettle-rash and other like eruptions, is apt to appear on the occurrence of the slightest irritation in the bowels; from the taking of improper food; from imperfect nourishment; or even from sudden change in the nurse's diet. When her milk,—or, it may be, the spoon-meat given to the child, proves indigestible in its stomach, irritation, giving rise to increased action of the whole alimentary canal, takes place,—and serious mischief must inevitably ensue, but for the rash that generally appears on the skin, which almost at once relieves the internal disorder.

This peculiar sympathy between the skin and the bowels is of immense importance to the healthy

preservation of the infant. Eruptions of the skin ought indeed to be considered as the result of Nature's exertions to relieve herself; and this organ may be thus described as a safety-valve, through which the constitution gets rid of a dangerous irritation. What might have proved highly injurious to the internal organs is thus diverted from them to the skin in the form of an eruption, which, of the various evils it might produce, is infinitely the least. By this means the dangers of cold, of teething, or of indigestion, are safely obviated, and the child's health preserved.

During the period of teething, these eruptions are especially to be observed. They present various forms and appearances, but their effects are always the same: they invariably relieve the irritation of teething; children that are most loaded with them continuing the healthiest, and cutting their teeth most easily. The rash, however extensive or severe, is by no means to be feared; it leaves no marks, and generally heals up as soon as the irritation of teething, or its other causes, have subsided.

The treatment of these eruptions is obvious. As Nature has established them for the purpose of relieving the more vital organs, we must therefore allow her to accomplish this object, without attempting to frustrate her by healing them up, or repelling them. All that is required of the nurse is to see them regularly washed with soap and warm water night and morning, and carefully dried with a soft towel. A warm bath daily is also advisable, followed by gentle friction of the skin, to increase, if possible, its activity, and keep up the eruption till the necessity for it has ceased. The bowels must also be kept open,—thus to alleviate the internal

disorder. No other medicine, however, than a little calcined magnesia or cold-drawn castor oil, should be given for this purpose; either of these being amply sufficient without resorting to the use of more active drugs. The diet also should be carefully regulated,—both that of the nurse (if the child be not yet weaned) and of the child itself; every thing in the least degree indigestible being especially eschewed. Particular care must also be taken to prevent the child, when covered with any such eruption, being rashly exposed to the influence of cold, which might at once repel it, and thus produce serious—likely fatal results.*

In all circumstances regarding the management of the skin, as we have stated with regard to other organs, its nature and functions must be kept steadily in view; and the means adopted for its healthy preservation, and maintaining the regularity of its action, founded alone on the sound and secure principles of physiology.

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* Eruptive diseases, such as measles, scarlet fever, ringworm, &c. &c., are so generally and properly intrusted to the direct management of the medical attendant, that any thing here added regarding them would be superfluous.

CHAPTER V.

VOLUNTARY MOTION.

SECT. 1.—*Of the Organs and Function of Voluntary Motion, and their Development.*

IN the preceding pages we have considered the organs, and their functions, concerned in supplying the waste of the system, and the preservation and growth, as we may express it, of the young animal. We have now to consider shortly the nature and management, in youth, of those organs which enable the human being to react on surrounding objects; to walk from place to place; to grasp and wield objects; in short, to effect all the movements so familiarly known as characteristic of our species.

The organs of Voluntary Motion (as their movement under the influence of the will is termed) are the body and limbs. In fact, every external part of the body is under the influence of the will in this respect; and, through means of the muscles so numerously connected with every part, is subservient to the performance of the different movements of the frame.

Every one knows that the scaffolding or framework of the human body consists of the Bones fixed

or jointed together in a manner that is singularly delicate and even beautiful. They are the basis of support for all the soft parts, which they both maintain and protect. One of their important uses is thus to enclose and defend from external injury the most delicate parts of the frame: but their most important office is unquestionably that of subserving the purposes of voluntary motion. While they possess in themselves no power of motion, they are passive under the action of the muscles connected with them, and are directed from place to place by means of their contractions, which, by merely altering their relative positions, thus perform all the complicated motions of the limbs and body.

To accomplish these objects, the bones possess the requisite mechanical properties of firmness and tenacity, at the same time with the greatest possible lightness of construction. Accordingly, in the state of their greatest perfection in adult age, they are chiefly composed of an earthy matter, intimately interwoven with tough fibres that bind the whole together, and confer on them the most extraordinary powers of resistance of external force. In infancy, however, they partake of the imperfection that marks the whole of the organs concerned in the relation of the human being to external things. As the earthy part of the bones, which gives them firmness, is deposited in but a small proportion, they are soft and gristly, and comparatively incomplete both in their form and development. Only those parts of them which protect the vital organs, so necessary to the preservation of life, thus nearly approach to completeness in this respect: for example, the ribs and those parts of the spine that afford them a firm

connexion. All the other bones are exceedingly imperfect, consisting, for many of the first years of the child's life, of several parts, that only become firmly connected together with their advancing age and constitutional vigour.

Like the other parts of the frame, the material composing the bones is undergoing constant change and renewal of its particles, and this even in adult age, when they have attained so hard and durable a consistence. They are plentifully supplied with absorbents and blood-vessels, that remove the old and replace them with new particles unceasingly. These are most numerous and most active in infancy; accordingly, the growth and development of the bones is most rapid at that period. M. Quetelet of Brussels ascertained that the infant increased during the first year about eight inches in stature, and proportionably in breadth; and that after that period growth still continues rapid during childhood, but gradually diminishes, until it ceases entirely in advanced adult age. It is thus more than probable that the comparative softness of the bones in infancy favours the rapidity of growth, by rendering the removal of old and the deposition of new particles more frequent; while it enables the bone more gradually to become adapted to the action and growth of the muscles conneeted with it.

Such is a brief notice of the peculiarities of the Bones of the frame. And of no less importance are the Muscles which we have mentioned as connected with them and effecting their various motions. A muscle is said to be fibrous; that is, composed of an immense number of minute threads bundled together, and generally running into strong cords or

tendons occupying much less space, that are firmly fixed to the bones, which they operate upon and move. The muscle possesses the peculiar property of *contracting*, whereby it shortens itself, and approximates its two fixed points, between which there is almost invariably a moveable joint, for the purpose of allowing motion to take place.

The muscles are more than 400 in number: they constitute the greater proportion of the outer parts of the body, and, together with the bones, almost the whole of the limbs. They form what is termed the fleshy parts of the frame, and are larger or smaller in different individuals, owing to circumstances to be hereafter noticed.

Like the bones, the muscles are very incomplete in infancy, as regards their physical characters; being weak, flabby, pale, and easily torn. And corresponding to their physical imperfection is the function they perform. They then want precision in their action, and are totally incapable of any thing like the prolonged exertion that distinguishes them in mature years. They are also easily excited to contract; and at first this is altogether involuntary, as may be observed in the fitful and unconscious motions of the newborn infant. It is only after the senses come into operation that they acquire precision or certainty in acting; their development exactly keeping pace with that of these organs, to which almost all muscular motion is in adult life subservient.

Almost the first voluntary motions are those of the hands, to grasp and hold objects presented to the infant; but every one knows how very imperfect is the development of its hand, and how incapable it

is for a long period of arranging its fingers and adjusting its thumb so as to grasp them firmly. By and by it attempts to use its legs and feet. The nurse's knee is abandoned for the floor, and it creeps long before it can maintain the erect position and walk alone without help. This it seldom has fully learnt till between the second and third years. But many are the mischances which befall it before these efforts are successful. Wanting certainty of action of its muscles, the feet are irregularly planted; the limbs are not maintained firmly; the body is thus ill-balanced; it topples over, and a luckless tumble is the consequence.

The very large proportionate size of the head to the body is besides a considerable obstacle to the child's first attempts at balancing itself: it is what we say of a vehicle overloaded above,—*top-heavy*, and it is as difficult to maintain erect. This large size of the head proceeds from the mass of brain contained within it, which in the newborn infant is one-ninth part of the weight of the whole body. While the brain of the adult is well known to be highly organized, and so easily deranged by any external blow, it might suggest itself to the superficial observer, that there was some oversight in this peculiar construction of the infant's head, which was thus unnecessarily exposed to danger from the falls to which it must often be subject. But a slight examination will prove how carefully such injury has been provided against. The brain, though comparatively large in the mass, is not in infancy highly organized, and hence it is less tenderly susceptible of external injury. This is, besides, mechanically prevented by an arrangement of the bones of the

head to protect it, as beautiful as it is efficacious. They consist of a single layer of elastic bone, joined by tough membranes which have not yet assumed that form, that yield before every external impression, and thus preserve from danger the brain within them. Thus, while a blow on the unyielding skull of man causes instant stupor or even death by the concussion it gives to the brain, one that is nearly as severe, compared with the relatively tender frame of the child, falls light on the supple elasticity of its bones, which, after yielding to its impression, instantly resume their wonted form and position, without deranging the soundness of the brain within. How admirably is this portion of the frame thus arranged in relation to the constitution of the heedless and cautionless child; and how effectually is it thus preserved from the danger that would otherwise inevitably befall it in its first attempts to walk, and in all the feats of activity that are then so naturally indulged in!

By the time the child has reached the fifth or sixth year, he has attained, though even as yet but imperfectly, the use of his limbs; and with the improvement in their development do their powers of motion regularly increase. But it is not till manhood that their growth is completed: that the hands are capable of all the intricate manual operations of civilized life; the limbs of agility and constancy of action; and the whole muscular frame endowed with strength and vigour to serve a manly intellect, then also nearly reached its prime.

The arrangement by which a powerful physical development is rendered complete only about the period when the mind reaches its maturity, is cha-

racterized by the same wisdom that is observable throughout the whole human constitution. Were bodily strength conferred in early youth, thus under no moral restraint, and undirected by reason or principle, such endowment might prove highly dangerous to a community. "Observe," says Dr Symonds,* "a child of seven years old; his senses are sufficiently acute for all ordinary purposes, although they are deficient in precision and delicacy; he has seen many attractive objects, he has heard many wonderful stories, and tasted many exquisite delights; he remembers them vividly, he associates them rapidly, and often in shapes very different from those in which they were formerly combined. Desires follow which would prompt him to execute the most ridiculous and mischievous schemes. But happily the muscular system, by which alone he could accomplish them, is too immature and feeble for his puerile purposes."

Sect. 2.—*Proper Nourishment necessary for the Health and Growth of the Physical Frame.*

One of the most important objects of infant management is to promote by natural means the growth and development of the Physical frame; as well as to preserve its health and soundness, on which human happiness in after-life is so intimately dependent. All that distinguishes man in moral and mental qualifications depends on his physical constitution; and when it is considered that the latter is chiefly formed in childhood, the importance of a knowledge

* In the able article "Age," Cyclopedia of Anatomy and Physiology.

of the child's physical nature to parents and teachers of youth, enabling them to avoid what is hurtful, and guide to what is beneficial, it would be almost impossible to overrate.

The first requisite for the preservation of the physical structure in health is its adequate nourishment. The enjoyment of life implies a waste of the materials composing the body: to supply this waste a constant stream of new material is flowing through every part with unintermitting regularity, and deposited where needed, in room of the old particles that have been removed from the system.

But youth is peculiarly the period of growth; and not only is there necessity for a supply of new matter to replace the mere expenditure of life, but for an *excess* of the new material, for the purpose of admitting of that enlargement of structure which it is the chief object of Nature to accomplish at the early period of existence. Hence, in the child, when in a state of health, there must be a preponderance of the new material which is received into the system, over that which is removed from it; the surplus that remains over and above supplying the previous waste being applied to its growth and development. And when youth is bursting with life and vigour, and all the vital organs are in a high state of activity, this growth is accomplished rapidly and effectually.

It is to subserve this purpose that Nature has given the young so keen a relish for their food, and so constant an appetite,—an instinct which, as already remarked, may sometimes produce bad effects if not carefully controlled by parental management. But it is at least clearly indicated to us by this arrangement of Nature for its preservation, that the

child should be supplied with abundance of healthy nourishing food. Its good effects are observed in its lively and buoyant muscular action; its plump, rosy, and fresh skin; its keen and vivid attention to surrounding objects; and its rapidly expanding powers of observation.

When stinted of food, on the other hand, these characteristics remain stationary or decay. Since the blood, the medium through which the nourishment is conveyed through the system, becomes thus deficient both in quantity and quality, the muscles languish and pine; their activity progressively diminishes; they become pale, flaccid, and enervated. The senses, too, as well as the mind, are equally debilitated and exhausted: the child becomes languid and listless, and remains unconcerned about what passes around him; the smile that played on his lip disappears, and the vivid glance of his eye is sunk in dimness; he becomes vapid, passive, inanimate. Even the bones, the firmest texture of his frame, suffer from the blight of decay as thus produced. For the same exchange of particles takes place in the firmest as well as the softest texture,—all undergoing their regular nourishment by change and renovation. And when thus insufficiently nourished, the hard particles, which give the bones the durable consistence so peculiar to them, cease to be deposited, and they become soft and flexible, no longer acting as the firm supports of the frame. Hence the disease called Rickets, which is a softness of the bones caused by want of their due nourishment by deposition in them of new particles. In this disease the peculiar state of the bones is consentaneous with that of the other parts of the system;

the muscles are soft and flabby; the skin pale and flaccid; and every organ deficient in texture and activity. The hopeless distortion and deformity it leaves behind it render the unhappy sufferer the pity of his friends, and his existence, if protracted, often a miserable burden to himself.

This, as well as the other diseases arising from insufficient nourishment of the physical structure, is chiefly known as occurring among the poor manufacturing population of large towns, where the care-worn and toilworn student of the loom, as a relief from the painful and insupportable sense of physical exhaustion, too often resorts to the temporary excitement of ardent liquors, and thus, instead of his children, feeds the diseases that are lurking within him and preying upon his own vitals. And he thus too sows the seeds of hereditary affliction which he bequeaths to his weak and imperfect progeny as their only birthright. Besides improper food, the constrained position factory children are forced to assume, the close and mephitic air they breathe, are nearly as hurtful in their effects, and greatly add to the deterioration of their physical wellbeing. The evidence of the most eminent medical men before the factory committee appointed by Sir Robert Peel, proved that the effects of such confinement were not only to stunt the growth and produce deformity, but to enervate the mind and destroy the influence of moral feeling. Such a life, both of parents and children, is too often a mere ginhorse round of labour and fatigue, alternated with the temporary excitements of liquor or passion, that reduce man from the high destinies which his humanity involves, to the humble, and even more debased than humble,

condition of a mere beast of burden and labour. Would that a portion of the philanthropy which is so keen-sighted in spying out the wants and sorrows of those some thousand miles off, were expended in the alleviation of the wretchedness that is so much overlooked in our own land,—often at our own doors! Many a town,—nay, many a single street in many a town,—presents objects of physical and moral destitution as worthy the notice of the really benevolent as any beyond their limits, within the widest range of vision which the most expansive benevolence could reach.

Sect. 3.—*Exercise necessary for the Health and Growth of the Physical Frame.*

Of as much importance as even food and air for the due development of the physical structure is its due use and Exercise.

The slightest examination of the frame proves that it is intended for action and exercise. Every part appears to have been carefully constructed with this object especially in view. In the exquisite formation of the joints, so highly lubricated on their moving surfaces, whereby the most ample movements are allowed with the least amount of exertion; in their careful protection from external injury and firm connexion by ligaments and tendons; in the extraordinary combination of muscular power, so arranged as to act on them in the most efficient and beautiful manner,—we recognise the careful arrangement of our Creator for the action and exercise of the physical frame.

The necessity of exercise for preserving soundness and promoting development, nature appears to have

deemed so indispensable, that a certain amount of it has been provided for the child at a period when the will has no influence over the bodily movements. In early infancy, when the acts are merely instinctive, it is nevertheless engaged in regular muscular exercise. The moment the live child is born this is observed to commence: the little hands are grasping, and the arms stretching out, alternately relaxed or contracted after longer or shorter intervals; the tiny limbs are kicking in their feebleness of action; and the body often writhing and twisting in all directions. By this arrangement the beneficial effects of exercise are attained, and the development furthered; at the same time that this practice of the muscles gradually enables them to attain precision and regularity in their motions, when at length they come under influence of the will. In addition to this, the instinctive efforts of the child in crying materially contributes to its growth and strength. (See chap. iii. sect. 7).

In so far, then, as regards the muscular motion of infancy, any management, further than non-interference with it, is of little avail, inasmuch as nature has then provided sufficient exercise independent of any other control. It is when infancy has grown into childhood, and the feelings and motions, that at first were instinctive, have become merged in the will and the budding powers of human resolution; when the innate preservative powers that nature has provided only for the period of helplessness, have begun to lose themselves under the superior envelope of reason; it is then that the exercise of care is required, lest, in attending too exclusively to the development of these intellectual

functions, we interfere with nature's arrangements for the growth of the physical frame on which they are dependent. And when the intellect has begun to bud in childhood, the parent's attention is often chiefly directed to its rearing and cultivation, to the neglect of the body itself. Mental education is even *urged* on the tender manling; it grows, and perhaps every thing appears in bloom; intelligence progressing to the wonder of its fond instructors; but a canker may be at the root, inasmuch as the physical frame may have been allowed to decay, and often all at once the flower and the plant perish together, to the inexpressible sorrow of relations, and their wonder at the agency which has produced it. Yet what need is there of wonder? Will the withered branch of the vine-tree bring forth grapes, or the rootless stem of the fig-tree grow its proper fruit to perfection? As little will the feeble frame, checked in its infant growth, or poisoned by neglect of its physical health, bear in its age the high attributes of an intellectual being. The human species, no less than the vegetable, must grow, and flourish, and bring forth their proper fruits, only by the due development of their physical structure.

Seeing, then, of how much consequence it is that the soundness of the frame should be preserved, it obviously becomes the duty of parents to further the efforts of nature in effecting it by natural means. And in order to enforce, if possible, the importance of exercise for this purpose, it here becomes us shortly to explain the *rationale* of its operation.

Physical exercise, then, implies the active use of the muscles and bones; the former contracting and relaxing alternately, the latter operated on by them,

and changing their relative position according to the varieties of their contraction. Now, it is a law as invariable in the human body as the law of gravitation in external nature, that the exercise of every part increases its development and capacity for action. When the muscles are thrown into contraction by the stimulus of the will, the blood is thus circulated with increased rapidity; nutritive arterial blood more quickly supplies the place of what has already imparted its nutritive properties to the muscles as it is carried through them; their nutrition is thus more regularly kept up, and they increase in size and strength. Hence it is always observed, that those muscles which are most exercised become more fully developed than those kept in a state of quiescence, and contract with greater force, precision, and readiness.

Even to the bones exercise is necessary for their increase in growth and strength. The action of the muscles on their apparently insensible fabric excites their vessels to an increased secretion of their hardest part, and by the more abundant supply of nutritive particles which the muscular exercise produces, they quickly increase in size and strength.

Such are the effects of their exercise on the agents of muscular motion themselves,—the bones and muscles. But its most important effects are unquestionably produced through the medium of the nutritive functions. We have said that the active use of the muscles favours their growth by quickening the circulation of blood through their substance, and thus producing a more rapid accumulation in them of new particles, whereby they grow and become strong. But besides the mere mechanical

impetus it gives to the circulation, as the stimulus of the blood is necessary to efficient muscular action, by a certain arrangement, the muscles, when excited, attract to them the nutritive arterial blood in a greatly accelerated flow. Waste during exercise is thus greater, for wherever there is increased circulation there is also increased expenditure of the material of life. When a natural degree of exercise is taken, and the supply of this waste is within the powers of the constitution, it proves most healthy, by sympathetically increasing the activity of all the nutritive functions, and thus promoting the nutrition of the whole body, as well as of the muscles and bones themselves; but when the exercise is too much prolonged, there is risk of the waste so produced exceeding the powers of the constitution to replace it so as to preserve unimpaired the soundness of the body.* The increased activity of the nutritive functions by muscular exercise is thus produced: The increased flow of blood through the muscles produces a proportionally increased flow through the lungs, as well as every other part of the circulation; and the greater waste caused by the muscular action requires accordingly a more rapid series of changes in the blood undergoing the necessary purification in the lungs (see chap. iii. sect. 2). For this pur-

* "If exercise be resumed frequently and at moderate intervals, the increased action of the blood-vessels and nerves becomes more permanent, and does not sink to the same degree as formerly; nutrition *rather exceeds waste, and the part* GAINS *consequently in size, vigour, and activity.* But if the exercise be resumed too often, or carried too far, so as to fatigue and exhaust the vital powers of the part, the results become reversed; WASTE *then exceeds nutrition, and a* LOSS of volume and of power takes place, accompanied with a painful sense of weariness, fatigue, and exhaustion."—Dr Combe's *Physiology applied to Health*, &c. p. 142.

pose the inhalation of pure air is rendered more frequent, and respiration is thus quickened. But the waste of the old material necessarily requires the substitution of *new* to replace it. And as the stomach is the main avenue through which this gains admission to the system, its activity is also considerably increased. Hence the increased relish for food, and keenness of appetite, which at longer or shorter intervals succeed healthy exercise, and the quickened digestion that is the invariable consequence. Thus, too, the nervous system and brain are nourished, and enabled to perform their functions with increased vigour. The senses also become more acute during muscular exercise, and the pleasure arising from their enjoyment more intense. The thoughts become more vivid, and their operation more steady and better sustained; for a supply of healthy blood is as indispensable to the nutrition of the brain, and the performance of its highest mental operation, as it is to the performance of the meanest of the nutritive functions. Thus the tone or vigour of the whole system is kept up by means of muscular exercise; its nutrition is promoted, its growth accelerated, and its healthy existence prolonged.

Sect. 4.—*Varieties of Exercise, and its Management.*

The greatest benefit is derived from that exercise which calls into action the greatest number of muscles, and in which the action of these is intermitted at the shortest intervals. This constitutes, besides, the chief pleasure as well as benefit of muscular exercise; nature having here associated with the

highest advantage to be derived from it, the highest sense of physical enjoyment. All the exhilarating exercises of childhood thus consist of alternate muscular contraction and relaxation, and those sports are invariably preferred which permit these the most frequently to occur. We have already remarked it as a characteristic of the muscles of the child, that they are capable of the most active and lively motions, but become soon exhausted; thus being altogether unfitted for any thing like the prolonged muscular exertion they can in after-life sustain. Accordingly, in the activity of their motions, and the frequency with which they are renewed, the child may even surpass the full-grown man; but then they are almost totally deficient in that strength and energy of action which distinguishes the enduring frame of manhood. In the running, leaping, grappling, and wrestling, of youthful sports, there is a constant relaxation and contraction of muscles alternately taking place, that yields a great part of the pleasure, and produces the greatest amount of physical benefit. Too constant a state of contraction exhausts them, and produces a sense of fatigue amounting to pain; while it also obstructs the regularity of their nutrition, and produces a waste of material greater than the powers of the system can readily supply. Hence, children often change their play, and though fatigued with one game, commence with the greatest alacrity a new one, that allows the relaxation of those muscles which the former one had exhausted.

In noticing the various exercises that healthy children should indulge in, it is natural first to make a few observations on the management of the

first voluntary motions of the child as they acquire power and precision through their increasing physical development. The infant, while still in its nurse's arms, has begun to exercise its limited powers of voluntary movement. It has learnt by ten or twelve weeks old to spring on its feet while thus supported by her,—and to leap with great activity, —its whole frame in action,—while she tosses and hoists it in its infant joy. Some weeks later, the hands wander about for employment, as if cultivating the sense of feeling; and by degrees it grasps and handles objects, examining them most attentively with all the senses it has yet attained. While engaged in such a task, not only the hands, but the mouth, the feet, the limbs, are in action, and the whole body of the infant often highly agitated with the exercise. If early accustomed to it, they feel pleased in rolling about on the floor, exercising their little limbs and body in inventing various kinds of motion, such as rolling and creeping, long before they can attempt to walk upright. At length, the child shows a desire to gain the use of its feet, slipping off the nurse's knee to the floor, and begins its first rude attempts at walking. The first acquirement is to learn to maintain its balance and stand upright by a hold of some object near it. It is much longer before it can stand without such aid; indeed it can generally walk ere then; for it is more difficult to preserve the body erect when standing still without support, than to keep it up when fairly set in motion. Some time occurs ere the child walks even by means of a hold, and during all such attempts it requires to be constantly under the nurse's management. At length it gets fairly away; it walks a

few steps, or rather runs to and gains its nurse's knee. Many is the tumble which it must now endure, many the knock and bruise which its head is fated to bear. But the admirable arrangement of the bones of this part, already pointed out, prevents any dangerous result; and the memory of their injuries is too easily effaced to act as a preventive of their farther efforts. They acquire caution, and with caution they learn more effectually to control the fitful motion of their limbs, until at length they fully acquire the art of walking.

The management of muscular exercise at this early period is very simple. Nature, indeed, so clearly operates for herself in infancy that she is but rarely thwarted; and there are fewer opportunities for contravening her laws in this respect than in maturer years, when the prejudices and fashions of civilized life conspire so greatly to debilitate the physical constitution. The chief object is then to allow Nature to have full play, aiding her as she partially resigns the control of the voluntary motions, and the instinctive acts become weaker, while those under command of the will grow stronger every day. The ordinary tossing in the nurse's arms is then sufficient exercise, and during this it may be taught to spring upon its feet, and thus exercise the muscles of the limbs. It may be placed on the carpeted floor, or on the bed of a well-aired room, and allowed to roll freely about at its own pleasure; when the weather is fine and warm, this may be permitted in the open air. The exercise of the hand and fingers may also be promoted. Little things should be placed in the hands to bring out their action, as well as cultivate the sense of feel-

ing; generally it is taught to clap them together, in imitation of its nurse. This free and active motion of the child gradually develops its muscular powers, and promotes the nutrition of the frame; while it brings the muscles up to that degree of tone required ere it commences its first attempts at walking.

When at length the infant shows its desire to use its lower limbs in commencing to walk, and impatiently abandons the nurse's knee for the ground, great care requires to be taken lest they remain too long in action, else much mischief may result. The benefits of their action, as an exercise, may be thus lost, and injury done by the fatigue that is then so easily produced. And this caution is not here unnecessary, since it is pretty usual for mothers to feel vain of the early attempts of their children to walk, and urge them to exert themselves beyond their powers, merely for the sake of a little useless display. Any one who reflects on the nature of the bones at that early period (see sect. 1), will observe that they are quite unable to support the weight of the child for any length of time. Although their elasticity and toughness prevent any bending of the bones that cannot easily be rectified, when used only for a short period and at long intervals, if the weight of the infant's body be thrown on them too frequently, they bend, acquire a *set*, and the limb becomes curved or distorted. All the first efforts of the child should therefore be left to nature.*

* The following extract describes the natural progress of a child in walking. It is taken from one of a series of articles in Fox's Monthly Repository, entitled "Memoranda of Observations and Experiments in Education," an attentive perusal of which will amply repay the parent or the teacher in interest and valuable information

If the child be strong and healthy, he will desire to be down, and then the exercise of the limbs, if within due bounds, will always do him benefit; whereas, if he be forced to his feet, it will be more likely to do him harm. When walking is left entirely to the child's pleasure, crookedness of the limbs from this cause never will happen. For these reasons also, the use of go-carts is improper, as they encourage the child to walk while the bones are as yet too supple to carry their weight without bending. Leading-strings are also hurtful in the same manner,—and farther, by mechanically compressing the chest and hindering free respiration.* It is much

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on the subject of early teaching :—" For the first month of his life, he lay almost constantly on a cloak on the floor, or, in fine weather, on the lawn,—his mother judging this to be a more favourable position for him than the upright one, or than lying in bed or on her lap. He soon learned to raise himself upright, and he invented many curious modes of low motion, such as rolling, crawling, &c., before he thought of walking. At last one day he saw a bright-coloured ball on a chair; he rolled to the chair, and helping himself up by its leg, then, for the first time, stood upon his own little feet. His mother took the hint, and, by placing various objects on a line of chairs, she induced him to exercise himself in balancing himself, and finally he ran alone. It is true this great event did not occur until he was thirteen months old; but his limbs were straight, his gait firm, and, better than all, he had neither been coaxed nor threatened into unnatural exertions."

" How *can* they say that man is naturally idle ? That free child worked as hard as possible from morn till night, to the very fullest extent of his nature. The tendency of his first efforts seemed to be the attainment of the use of his muscles; it was just happiness for him, for the first three months of his life, to lie in the sun and work about his little ivory limbs, and this he did crowing with delight."—*Monthly Repository* of July 1834.

* Dr Combe says of leading-strings :—" In the first place, by their mechanical force, they compress the chest and impede respiration; and in the second, by preventing the body from falling to the ground, or rather by preserving an upright position, they cause the whole weight to fall on the bones of the spine and lower extremities, which are not fitted by nature to bear the burden. From this noxious practice, flatness of the chest, confined lungs, distorted spine, and deformed legs, too often originate.—*Physiology*, &c. p. 196.

the best plan for the nurse to place a hand on each side of its chest, so as most effectually to guide its little waddling steps. There is by this means also less danger of exceeding the amount of natural exercise required.

When the child has learned to walk a short distance, it is not unusual for the timid mother to run hastily to seize it when in what she considers a falling position. This is the most apt to produce the very thing feared. The child is alarmed, loses his self-command, and probably falls ere the help can reach him. Prevent the child from being placed in a position where a fall might be dangerous; and when not so, rather allow him to fall, without running suddenly to his assistance ere he needs it. The little adversity will afford a good lesson for another occasion. Besides, too unremitting caution on the part of his nurse is apt to lead to a degree of timidity and dependence unfavourable to the development of his powers, and inconsistent with the high purposes for which, in after-life, he is destined.

After the child has got fairly on his feet, and is able to run about, his activity exceeds all bounds. He darts from object to object, examining and handling every thing within his reach. It is not enough that he sees their outward form and colour, he must handle and take them, if possible, to pieces. Papers, and every thing that will tear, are to him a pleasure and a delight, and he surveys the destruction that he causes with cacklings of infinite joy. A book, above all things, is a study to him, but it is for the purpose of tearing it up; and he certainly makes no bones of the matter, handling it in a style that the most approved reviewer could not surpass. Carpets

are strewed with the "literary remains," boxes are emptied, and chairs overthrown; and what will break is smashed without delay. Every thing within the range of his limited horizon is by turns examined and abandoned, till he becomes exhausted with his efforts and impatient for farther novelty. This is emphatically the age of mischief. The little domestic Goth destroys what he cannot re-create, and demolishes the careful works of years, to his delight and the careful housewife's annoyance. He is branded with the name of "destroyer," and banished from the drawingroom and parlour to where his love of investigation can do little or no harm.

But, in taking such summary process for his ejection, and before throwing the child upon the barrenness of his own mind, it were wise to consider whether or not this instinct for examination, which we term "mischief," be not implanted in him for some wise purpose, which at first we may be apt to have overlooked. It is, in fact, but a beginning of the laying up of that store of useful knowledge which is yet to be made use of in the active business of life. It is not to be expected, indeed, that he is born acquainted with the intrinsic value of objects within his reach; he is a utilitarian every inch of him, valuing them only in so far as they are useful for his present purposes; and in seizing and reducing them to their elements, he is merely obeying an uncontrollable instinct for muscular action, and a desire to examine and understand those objects with what senses he has yet attained. This impulse therefore ought not to be restrained, but rather guided and directed to suitable objects of examination.

Place valuable things out of his reach; his physical weakness renders this an easy matter. Let him have a piece of good playground where he may enjoy himself with his companions, or, when within doors, a large and well-aired nursery. Here he will find employment, though supplied with only the rudest materials. If provided with playthings, let them be such as he cannot demolish; and keep articles out of his reach that might be injurious to him. As children instinctively imitate the occupations of manhood, they may be supplied with materials and tools whose use will fully exercise their limbs and body. Besides, they will by and by come to acquire a more certain degree of knowledge of the mechanical properties of objects,—to them an acquisition certainly of no mean importance.* Provide them with

* "The continual exercise of a child left to the sole direction of nature, not only strengthens the body without weakening or blunting the mind, but, on the contrary, it tends to form the only species of reason the age of infancy is capable of, as well as that which is the most necessary to persons of any age whatever. It teaches us to become acquainted with the proper exertion of our forces, the relation our bodies bear to those which surround us, the use of those natural implements which are within our reach, and which are adapted to our organs.....Our primary impulses, therefore, urging us to compare our forces with those of the objects about us, and to discover the sensible qualities of such objects, as far as they relate to ourselves, the first study of mankind is a sort of experimental philosophy relative to self-preservation, from the prosecution of which we divert the attention of children by the premature introduction of matters of speculation. During the time that their supple and delicate organs are adapted to the making of experiments on bodies, while their senses are as yet exempt from illusions, this is the interval in which we should exercise both the one and the other in their proper functions; this is the time to teach children the perceptible relations of things. As every thing that enters the human understanding is introduced by the senses, the first kind of ratiocination in man is a kind of sensitive reasoning; and this serves as the basis of his intellectual reason. Our first instructors in philosophy are our feet, hands, and eyes. In substituting books in their place, we do not learn to reason; but to content ourselves with the reasoning of others: we learn, indeed, to believe a great deal, but to know nothing."—Rousseau's *Emilius*. Book ii.

wooden bricks, a hammer, and other little tools, to call up in them their unawakened talent for construction. This is certain to interest them, and when fairly interested and pleased with the work, their exercise is of tenfold more advantage than when labouring merely as a task or duty. Keep up the interest of their exertions, and nothing is easier than to manage them ; allow it to flag, and a new Gothic irruption takes place upon the most classical and sacred precincts of the housekeeper.

With regard to the games of children, they will best discover these for themselves. The ordinary ones, shuttlecock, handball, ninepins, hoop and trundle, for boys,—skipping-ropes and romps for girls,—children have established by universal consent and precedent as the best, and they may therefore be safely left to their own choice of them. And the amount of exercise they take may also be left entirely to themselves, as they are determined to it by motives as much instinctive as the taking of food or drink, and therefore chiefly obey it as the call of nature within them for muscular occupation.

As yet there is no difficulty in exciting the child to muscular exercise ; the difficulty, if any, is rather to restrain or direct it. But as the child grows into the boy or the girl, and their instinctive propensities come to be chiefly controlled by the will, the romps and games of childhood are abandoned, and they become subject in a great measure to the restraints of civilized life. The mind also comes into operation, and its proper education is justly considered so important an object, that the hours are economized for the purposes of tuition. It is about and after this period, however, often entirely lost sight of, that the

body is still composed of bones and muscles as necessary to be exercised, for the due enjoyment of health, as ever it was. The boy and the girl, from romping, elastic-limbed, active and gay children, are suddenly transformed into the staid or precise little man and woman. What a sudden transition! But with this change of habits there is too often an accompanying change of the health of the body. The eye often loses its lustre; the skin its clear freshness; the muscles their alacrity; and the canker that in after-life destroys the plant, then appears in the tender bud. Does any one feel surprised at this? Such surprise must totally cease in referring to the effects of muscular action upon the physical health.

But let us now briefly consider what exercise the young, after the period of twelve or fourteen years of age, can indulge in with propriety. Young men have still various exercises out of doors to which they resort without infringement of ordinary custom or fashion; but girls have altogether abandoned their games and romps, and are confined to the acquisition of the graceful and mental accomplishments that now engross so much time and application. The conventionalisms of civilized life, too, require the observance of a great degree of reserve and inaction; so that what with these and the stiff dresses in which they are encased, the movement of a muscle, besides those which turn the head from side to side, and carry the body forward in simple progression, is with difficulty accomplished.

Now, there can surely be little occasion for this so strict adherence to reserve and muscular inaction. In all the arrangements of nature we observe no-

thing provided that is not needed; no unnecessary multiplication of means to effect a proposed end; but merely a sufficiency for the purpose, given for use and employment. In accordance with this arrangement, therefore, had nature intended the female for such inaction, all their complicated and beautiful arrangement of muscles, bones, and joints would certainly have been dispensed with; and some other simple construction granted for the purpose, such as required no exercise for the preservation of its soundness. But as such is not the case, we are entitled to presume nature to have intended the girl or woman for action as much as the boy or man; and associated with the observance or neglect of her laws, the same consequences of health or sickness, strength or debility.

Though fully granting the high importance of mental cultivation, we maintain that it is the design of nature that the physical frame, as well as the mind, should be duly cultivated and exercised; and that not only in boyhood and girlhood, but in womanhood and manhood, throughout the duration of human existence, should it be regularly persevered in. Indeed, physical health, which requires as its most essential condition physical exercise, is the soundest basis of intellectual enjoyment; without it the most highly cultivated and most gifted mind being but as a crown of thorns to its possessor.

One of the most natural and interesting exercises for both sexes in advanced youth is unquestionably that of *gardening* and botanizing. Conjoined with the physical exertion of digging, hoeing, and planting in gardening, there is a degree of mental occupation which gives a zest to the exertion and in-

terest to the labour. Cultivation of the ground is the most primitive of all occupations, and probably the first object for which the perfect muscular structure of man was designed. It is therefore an exceedingly natural exercise, as well as one highly recreating to the buoyant frame of youth. *Botanizing*, and the study of the other sciences that can be pursued out of doors, present peculiar advantages as an exercise, to be presently noticed.

Dancing is an excellent exercise for the body and limbs, which it brings into action and contributes to develop. Under an intelligent teacher, who avoids contorted attitudes, and rather studies to bring out the natural play of the limbs, and the easy, unaffected carriage of the body, it may be productive of much benefit. And were dancing more of a family amusement, and less a business of routs and large parties, the benefits that it naturally tends to produce might be easily attained. But practised, as it generally is in this country, within doors, in the contaminated air of a crowded room—exposed, perhaps, when slightly dressed and perspiring copiously, to draughts of cold air on every side—it is as likely to be productive of harm as good.

A substitute for natural exercise, very much in fashion of late years, is *gymnastics*, whereby young persons are urged to muscular exertion and feats of activity as a task,—irrespective of their own feelings and the natural impulse which should excite them to exercise. In so far as these are a toil or task, they are useless or hurtful; for though they climb, hang by their arms, struggle against each other, or leap, if there be awanting the nervous stimulus that excites to muscular exercise and renders it so beneficial,

these motions are of little use, and give no pleasure. Ten or twenty minutes of natural exercise in the day is worth them all. In all such tasked movements, the natural impulse is generally absent; accordingly the ends of nature are not efficiently accomplished. "The great superiority of active sports," says Dr Combe, "and such occupations as gardening and turning, as a means of exercise, over mere measured movements, is referable to the same principle (viz. the nervous impulse and muscular action being in harmony). Every kind of youthful play and mechanical operation interests and excites the mind as well as the body; and by thus placing the muscles in the best position for wholesome and beneficial exertion, enables them to act without fatigue for a length of time, which, if occupied in mere walking for exercise, would utterly exhaust their powers."

We may here incidentally notice an excellent mode of combining intellectual cultivation with physical exercise as lately adopted in several parts of the United States, in the form of Manual Labour Academies. The leading feature in these institutions is the union of academic studies with systematic bodily labour. They have generally a large piece of ground attached to them divided into a farm and garden, where the operations of agriculture and gardening are carried on by the students themselves. They have also workshops fitted up with tools of all descriptions, and proper materials to work upon. Their diet is plain,—as much varied as is consistent with health, and as much as possible the produce of their own labours. Those who are engaged in the workshop execute carpenter-work for the repair of the buildings, and make the greater

part of the household furniture. They sometimes also undertake orders sent in to them, the profits of which contribute to defray the necessary expenses of their education.

The effects of this system, as might be expected, are highly beneficial. Their health and strength are established, the equal development of their muscles and bones effected; at the same time that the powers of the mind are themselves strengthened and enlarged. And it is generally observed that those who are fondest of their manual employments, and improve most rapidly in dexterity and skill, make at the same time the greatest improvement in their academic studies.

The object for which these Manual Labour Academies were first instituted, was the education of indigent youths for the ministry at the least expense; at the same time to invigorate their bodies, and early form in them industrious and moral habits. The first was that of Germanstown near Philadelphia, opened in May 1829. It was found, after the institution had been open not more than four months, that the labours of the pupils had nearly defrayed the expenses of their mental education; the greater part having only very small balances standing against them for board and tuition; some almost none.

But while the first institution of these Manual Labour Academies was in a great measure recommended by necessity, and while they have thus fully effected the end contemplated in their establishment, their results also afford invaluable suggestions for the improvement of academic education in general, which, as at present conducted, is the

prolific source of diseases that imbitter the student's existence, and often make him the prey of an early tomb. To those who cannot make it convenient to alternate study with out-of-doors exercise, manual labour within doors might prove a most useful substitute, and besides be rendered conducive to improvement in the experimental department of physical science; while it would produce, at the same time, all the good effects of muscular exercise,—development of the physical frame, equal nourishment of the whole body, sound health, and sound mind.

Similar institutions have, it seems, been also established in Germany, Prussia, and Switzerland, and with the same good effects; and many others besides the one above mentioned are now in active operation throughout the United States. It is earnestly to be hoped that the same system of combining physical exercise with sedentary study will be soon introduced into this country, where it must prove, as it has already done abroad, a most valuable auxiliary to intellectual cultivation.*

Sect. 5.—*The Advantages of making Physical Exercise subservient to the Mental Education of Children.*

In all the exercises of children there must be motives to exertion, else, instead of being a pleasure, they become a tedious task. We have seen, how-

* We have much pleasure in acknowledging, as the source from whence we have derived the above information regarding Manual Labour Academies, one of the valuable notes contributed by Mr R. Cox to the Edinburgh reprint of Caldwell's Thoughts on Physical Education. It contains an extract from the first Report of the Germanstown Institution, which is throughout well worthy of perusal; and, accordingly, to this work we refer such as wish farther information on the subject.

ever, that there need be few motives held out to them for muscular exertion, if nature be left to herself. She has implanted in the young a powerful instinct for action, and an impatience of restraint, as well as an instinctive love for out-of-doors enjoyment, that is far more agreeable both to their mind and body than the vacant tedium of the confined and heated school-room. How they long to inhale the fresh air after hours of restrained position at their desks, counting the slow progress of time till their dismissal; and how buoyant they feel at release from their durance! Then why not allow them the use of exercise in the open air more frequently? Why pinion down children for many hours in the day to the seats of a close confined school-room, when there is so much enjoyment for them without doors—so much yet to be known and admired by them in the works of Nature? Is it because knowledge is to be gained by it? Then this is a deception,—for children will gain a *greater* amount of information out of doors: at the same time combining pleasure with instruction, health and enjoyment with physical exercise. Instead of keeping tender children poring for hours over the "Child's Ladder," or the "Child's Guide to Science," rather turn them out to the fresh bracing air; lead them to the green fields, and interpret to them the language of nature; let them see the brilliant hues, inhale the delicious fragrance, and pluck the beauties of the vegetable kingdom; let them feel the action and use of their limbs, enjoy the freshness of the free open air as it blows in their face: then all gloom will fly before them, pleasure beam in their eye, and health glow in their every fibre. Why condemn the delicate girl for many hours in the

day, and for many days in the week, for months and years together, to a music-stool, strumming at an instrument for whose sounds she may have no possible taste; labouring to acquire a science in which *she may be perhaps totally unable, from the peculiar conformation of her mind, to make any progress?* Far rather send her out to learn the music of nature; to hear the lark singing in mid-heaven, the mellow voice of the blackbird, or the lowing of cattle. Nay, even let her idly chase the gaudy fly from flower to flower, or pluck these to weave as garlands for her little brow, rather than sit and pine for so many hours within doors, poring over words whose sounds only enter her ears,—thus making of education a complete mental treadmill of labour. Rather let them even *roll large stones*—an occupation for which the celebrated Dr Adam Clarke in youth was famous—than thus sacrifice health and physical comfort for life, in vain efforts prematurely to acquire knowledge, for whose reception their minds are as yet totally incompetent.

It is not in early youth that the reflective powers can be highly cultivated with advantage. If they are then forced in their growth, they are proportionally the more quickly exhausted. They at least never on that account reach greater perfection in manhood, or, if their years extend till then, their early talent will have proved no certain index of future ability, and but a useless aid to its adult cultivation. The main object of early education should be to direct the sentiments and emotions, and implant in the mind the germ of virtuous principles. The temper and disposition may be regulated, and sound rules of action enforced; while

the senses are developed, and the powers of observation gradually drawn forth. And how much better are these latter awakened and delighted when exercised abroad with nature, than when listlessly seated in the confined school-room? How much more likely is the youth to be interested and instructed by the appearance of real objects, than by their mere representation in words; to feel delight, for example, at sight of the various forms of vegetable life, and of animals in their native condition, when roaming about in glee and joy, and while the awakening mind partakes of the alacrity which physical exercise produces! How much more rapidly will he acquire a knowledge of all external objects; the nature and habits of animals, attracted, as he is, by their gambols and various motions; or of shrubs, flowers, and trees, which delight him by the brilliancy of their hues, or the beauty and majesty of their form and proportions! In ten minutes' personal observation of these he will acquire more real information regarding them than he could in hours and days of reading their most interesting description. In the one case the mind is directly informed through the medium of the senses, while in the other it only passively hears the sound of the words in which they are described.

Thus a great part of the labour at present bestowed upon in-doors education goes for nothing. For many years it is like the door upon its hinges, making little or no progress; and though the youth gains in mere acquired words and forms, he often stands still in information, and often loses more than he may thus gain, in health and strength. Like labour of the body, labour of the mind is useless or

hurtful to the youth unless the object for which it is undertaken presents to him some interest or gratification. Forced studies, like the forced labours of factory children, are alike bad. The one is as apt subsequently to stunt or destroy the mind,* as the other does the body. But place some object in view—give an interest to the pursuit, whatever it be—or apply instruction suitable to the nature of the faculties in whose exercise the youth finds pleasure, and he will enter into it with interest, and reap the advantages of the pursuit.

The question, then, here occurs, How is education to be managed? Is school-teaching to be abandoned in favour of romping and idle play out of doors? We answer—By no means; only let it be so improved as to be rendered more in accordance with the nature and constitution of children, when we may reap the whole of the advantages legitimately to be expected from it. And here we may state what we consider is the kind of education that nature points out as adapted for the infant man; that is calculated to give the twig the proper bend in the direction of knowledge and virtue.

Those who think that the child is idle when not engaged in school, know little about his nature and constitution. It is indeed in school chiefly that he is listless, inert, dull. He must then be quiet. His senses, that in youth are naturally so much

* In Dr Brigham's "Remarks on the Influence of Mental Cultivation and Mental Excitement upon Health," we have a powerfully drawn, but not, we think, too highly coloured a picture of the deplorable effects of forced mental labour upon children. It proves beyond a doubt the highly injurious consequences, in all cases, of too exclusive cultivation of the mind to the neglect of exercise of the physical structure; and ought to be carefully perused by all who have control or management of the education of youth.

more acute than the mind they serve, are rendered there of little use to him. All he can do is to hum over the words of his task; scarcely an idea ever there enters his mind. But observe the same child out of doors, and he is all life; he is exercising his senses upon objects, acquiring at every step new ideas regarding their forms, characters, nature, and properties. Besides, he is accomplishing what physiology teaches us is the chief object of nature in childhood—the healthy development of his body and limbs, their growth and increased vigour of action. Observe him for a moment. The little mind he is as yet endowed with is as active as his body. He is running about from object to object with eager gaze inquiring, "What for?" "What is that, its use, its functions?" He is thus acquiring knowledge: nature is then at work, and the first intellectual powers, the knowing faculties, are developing themselves,—laying up in the storehouse of the mind facts and events it may be for future practical application.

What then? Let us here take a page out of nature's book, study it, and act accordingly. It surely does not teach that that busy child should be debarred from the exercise of his senses, and shut up in a close school-room with a book of letters in his hand, which to him communicate no ideas or information; and this for four, five, or six hours in the day. It rather teaches us to aid the development of those powers which are naturally active—to educate the senses and observant faculties at the same time with the physical structure. Accordingly, reading and all the in-door branches of education should be rendered more of a pastime than a task—rather a

pleasant relief than a nauseating drudgery. By this means all which it is the object of school-education to communicate will be both more readily learned and better retained in the memory. Confinement to school for this purpose should therefore, we think, occupy no more than two or *at most three* hours a-day, and the remainder of the time spent in education be employed in fine weather *out of doors.*

It is abroad with his pupils that the teacher's chief duty should be performed; and it is that part of it in which he will have most satisfaction, such as every good teacher feels, in their progress and improvement. And why? Just because he is then working out the designs of Nature, and aiding her to accomplish the development of the intellectual human being in the way she has so clearly indicated. He is walking hand in hand with her; obeying her dictates; furthering her intentions; and accordingly the performance of his duty in such a manner is congenial as well to his own feelings as to those of the buoyant, elastic, and merry scholars under such a mode of tuition.

Suppose we have them here under a green tree, and their teacher discoursing to them in familiar language of the nature of vegetable life; its various beauties; the uses of its structures and products; how it supplies us with food, with raiment, and dwellings: or, describing the birds of the air and animals of the field; their habits, peculiarities, construction, and various uses: or, the nature and properties of the light and of the air around them, and their importance for the preservation of life and health; what relation the sun,—their chief source,

—bears to our earth and the other planets that revolve around it: or, turning to the stones beneath his feet, he diverges into a familiar description of the importance of minerals to man in his state of civilisation; the peculiarities of their formation; the changes that may have taken place upon the earth's surface, and its progressive change during every moment that we speak:—What a delight of knowledge he can thus make to his pupils; how profitable and interesting can he thus render his instructions, finding, as he does,

> Tongues in the trees, books in the running brook,
> Sermons in stones, and good in every thing!

More interesting, and as useful as interesting, knowledge could by such means be acquired by the pupil in one short hour, than in months and even years of drudgery through their "Primers" and "Ladders to Science."

To enhance the interest of such educational excursions, the child's talents for drawing might be made available, and his memory afterwards exercised either by journal-writing, or examination on the objects about which he had been instructed. These educational walks, with which his healthy physical exercise may be so well combined, might thus be the beginning of his knowledge in the Sciences of Botany, Mineralogy, and Natural History and Philosophy: thus early awakening a taste for the beauties of nature, which is one of the most delightful of all the enjoyments of manhood. How might all be thus led to feel themselves to have been formed in harmony with external nature, and enjoy the exquisite beauties of creation, who now pass through life blind, and deaf, and insensible to the perfections

of their Creator as displayed through his works! What a humanizing effect might not such an early instruction have upon our existence; in calming the turbulence of passion, and drawing out all the tenderest sensibilities of our nature!

> Passing even into the purer mind
> With tranquil restoration; feelings, too,
> Of unremembered pleasure; such, perhaps,
> As have no slight or trivial influence
> On that best portion of a good man's life,
> His little, nameless, unremembered acts
> Of kindness and of love.—WORDSWORTH.

Such a mode of tuition as above suggested may to many appear strange and unusual; but there is nothing chimerical in it if fairly considered. It presents the best means of exercising and developing the young body, and preserving its health and vigour; at the same time that the mind itself, whose object education is to improve, becomes invigorated, instructed, and stored up with useful knowledge. It presents the best means by which amusement can be rendered conducive to instruction, and healthy physical exercise made the handmaid of the moral feelings and intellect. And by the steady practice of so exercising the body, the constitution will have become consolidated, the brain more fully organized, and the mind prepared for the reception of the higher branches of education in more advanced youth; the whole physical and mental frame growing up in harmony, and at length reaching together the summit of intellectual attainment with the full enjoyment of bodily health.

Though as yet little known in this country, it has now become almost a general practice throughout Germany for the teachers to lead out their pupils in

many such a juvenile ramble; discoursing by the way of the beauties of nature, of rocks, herbs, flowers, and animals; interesting their young minds, and thus drawing them onwards, by the attraction of their teaching, to the pursuit of knowledge as a pleasure and a delight, instead of the toil and weariness to the flesh, in which light, children, through the present absurd mode of teaching, are usually led to consider it. Only in a few of the schools at home, where natural principles, rather than "use and wont," have been allowed to operate, has this practice been adopted. But let us hope that as the acting on these becomes more prevalent with parents and teachers of the young, and the nature and constitution of children becomes better understood, that sense and reason will be allowed the ascendency over prejudice and custom; and then physical exercise will be employed, and physical health sought after by natural means, as one great source of mental happiness and improvement.

Sect. 6.—*Consequences of Infringement of the Laws of the Constitution regarding Exercise.*

We have thus seen the many advantages to be derived from observance of the laws regarding exercise, in the due development together of the mind and body. It now becomes us summarily to point out wherein these laws are contravened, and the consequent results that proceed therefrom.

Any attempt to contravene the laws of nature in the regulation and maintenance of the constitution, is certain to bring punishment on the individual, either in his mind or body, or perhaps both. It is a law of nature that the whole constitution should

be exercised,—in its mental as well as corporeal parts; and if they be allowed to remain inactive, they lose capacity for exertion, and become subject to disease and decay.

The health of the body, we have seen, requires the active use of its muscles and bones, in order to effect its full nutrition and development. It is necessary to the healthy circulation of the blood, and to the health of all the other vital functions,—digestion, respiration, secretion, and the rest. And when this law relating to their exercise is *not* observed, the legitimate consequences are produced:—The circulation becomes ill-regulated; the blood imperfectly vitalized; the stomach weak in its digestive powers; respiration imperfect; and all the secretions more or less vitiated. The blood, from not being drawn outwards to the muscles, tends to accumulate in the internal organs, that thus become overloaded and deranged; while the skin is pale and bloodless, and the muscles fleshless and ill-developed.

The present practice of sending children early to school, where they are kept in a restrained position, as quiet as the fear of the teacher's rod will make them, for many hours at a time each day, without release or relaxation, is a fruitful source of their debility and disease. The evils of this, too, are not unfrequently aggravated by the usual mode of seating school-rooms, with forms without backs, that allow no rest for the weak muscles of the child's back, when kept for hours upon the stretch. What is the natural consequence? When they become exhausted, the trunk takes a laterally inclined position for the sake of ease; and as the bones of the spine are as yet but imperfectly formed and exceed-

ingly flexible, it takes the peculiar *set*, and a lateral curvature or distortion is the result. Now, children should not be kept at school for more than two or three hours at most, in the day, and this at considerable intervals between the hours. And instead of being confined to their seats during the time they are within the school, few minutes total rest there should be permitted: they ought to be kept often in motion. The practice introduced into infant schools is in this respect admirable; and it is the improved regulation of such a system of exercising and usefully occupying the physical powers of the child, that will yet render these useful institutions what they have been so expressively designated by Lord Jeffrey,—"well-regulated systematic nurseries." But as the proper physical management of the child at this early period has already been sufficiently explained, this need not here be farther insisted upon.

We cannot, however, conclude this subject without alluding to a practice which has justly occupied the attention of all writers on Physical Education, and called forth their severest reprobation. We mean the almost total neglect of exercise by young females, and the evils which are added to this by the use of tight compresses or stays round the body and chest. This is a kind of *vexata questio* between physiologists and the female sex. But though the denunciations of the former are founded solely on reason and sound principles, they have as yet proved of little service; perhaps even by the oft-told tale of the horrors produced by the obnoxious practice referred to, their impression has become blunted, and they have come to be looked on merely as a

bug-a-boo held up to frighten them. The facts, however, on which these appeals have been founded are incontrovertible, and worthy of the serious consideration of every parent that values the health and future comfort through life of their female children.

In the first place, we ask, What is the ordinary practice of females, while at school, in regard to exercise? Young ladies sit for eight or ten hours a-day at reading or learning their lessons, or in acquiring their several accomplishments of drawing, needlework, or music. Perhaps the only muscular exercise they may receive, is a short and often melancholy-looking walk for half an hour or an hour in the day, in good weather. All natural exercise, in the shape of outbursts of animal pleasure, of laughing, or romping, is strictly prohibited. This would be improper, or perhaps "vulgar." "It is reckoned vulgar," says Mr Thackrah, "to use the limbs as nature designed; it is vulgar to take the food which nature requires; and young ladies must not do any thing that is 'vulgar!'" Thus the muscles which were given for exercise, languish and pine for its want; and thus the legitimate effects of deficient exercise are produced; accumulation of blood in the internal organs, producing internal disorders, while the muscles are bloodless, the skin is pale and dry, and as inanimate-looking as a statue.

But not only are the muscles thus *passively* allowed to remain unexercised; even *active* means are farther employed to bind them up and restrain their action, as well as to alter the form of the bones on which they operate. At an early period in the girl's life, when the bones are yet comparatively soft

and flexible, the stays are applied, and by them they are moulded into the desired form and fashion. The pressure, at first perhaps slight, is progressively increased towards adult age; by which period the waist has acquired the peculiar wasp-shape that is needed. The consequences of this infringement upon nature, as might be expected, are any thing but beneficial; being injurious to growth, health, and physical comfort through life. Under another section we have noticed the baneful effects of such pressure upon the organs and functions of respiration (chap. iii. sub-sect. *b*); but it yet remains for us to mention its effects upon the muscles, the bones, and through these upon the general health. The *rationale* of these will be most satisfactorily understood, if the nature of the spine, the basis of support it affords to the head and the weight of the body, and the action of the muscles of the back, be slightly considered.

The spine is the main pillar of support of the body: it consists of a vast number of small bones, piled, as it were, on each other, and sustaining the weight of the head, which is placed upon their upper extremity. The muscles are the natural stays of the spine; their contraction preserving it erect, and effecting its various motions. They stand in the relation to the spine that the stays of a ship do to its masts; their action and support being as necessary for preserving it erect. This is the shortest and most familiar description we can, in our limited space, offer of these parts; but it may be sufficient to explain our case. The back is most abundantly provided with strong muscles, evidently given by nature for use and activity; and accordingly when

the body is left to them as its natural stays, they are large, powerful, and perfectly sufficient for the purpose of preserving it erect. But suppose we substitute some artificial support to the spine; that we prop it up on either side with some unyielding machine, and the action of the muscles is no longer needed; the spine and body is supported without them; they therefore fall out of exercise; they become idle, and their office a sinecure. The ordinary effects of deficient muscular exercise appear in them: they become shrunk, bloodless, and almost useless; nature has been interfered with, and the result is their almost total debility. But not only this: from being relieved of the natural support of the muscles, whose action gave strength to the bones of the Spine, and promoted their development, it now *leans* on the artificial support substituted for them; and as the bones are consolidating, it at length acquires permanently the peculiar shape in which it is chiefly placed; in other words, *it will become curved or twisted, and a partial deformity of the spine be thus produced.*

All this a sufficient knowledge of Physiology might predicate to any one as what should happen if the natural action of the muscles and bones of the spine were interfered with. Accordingly we find these effects to be almost invariably produced by the use of stays or corsets, whose operation is that of an artificial support to the spine and trunk. Besides actually injuring life by diminishing nutrition by breathing (see Respiration), they destroy the healthy action of all the muscles which preserve the body erect, and thus injure the sound nutrition of the whole frame. But, in addition to this, the bones of the spine lose their firmness, and the straightness

of their connexion with each other; the muscles of the back being now too feeble to preserve them erect, they incline to either side as the weight of the head or a sense of ease may induce them; the spine acquires a *set,* and a curvature or distortion is the consequence. The celebrated Soemering mentions that "from 1760 to about 1770, it was the fashion in Berlin and other parts of Germany, and also in Holland a few years ago, to apply corsets to children. This practice fell into disuse, in consequence of its being observed, that children who did *not* wear corsets grew up straight, while those who were treated with this extraordinary care, got by it a high shoulder or a hunch. Many families," continues he, "might be named, in which parental fondness selected the handsomest of several boys to put in corsets, and the result was, that *these alone were hunched.* The deformity was attributed at first to the improper mode of applying the corsets, till it was discovered that no child thus invested grew up straight, not to mention the risk of consumption and rupture which were likewise incurred by using them."*

That deficiency of exercise, aggravated by the use of stays, is in females the pregnant cause of crookedness of the spine, there can be no possible doubt. One of the most striking facts we have ever met with corroborative of this statement, is supplied by Dr Forbes in Dr Barlow's excellent article on *Physical Education* in the *Cyclopedia of Practical Medicine.* After copying the programme of studies and exercise of a boarding-school for young ladies, in which *nine*

* Soemering on the "Effects of Compression of the Waist by means of Corsets." See farther, Coulson "On Deformities of the Chest." This author enumerates 87 painful symptoms and diseases caused and aggravated by the use of stays.

hours at tasks, and three and a half at optional studies or work, are the allotment of the first, and *one hour's exercise,* consisting of a walk arm-in-arm on the high road when the weather is fine at the particular hour allotted to it, that of the latter; he goes on to state the following astounding fact as the consequence of such regimen, which, he ventures to say, "may be verified by inspection of thousands of boarding-schools in this country." "We lately visited," says he, "in a large town, a boarding-school containing forty girls; and we learned, on close and accurate inquiry, that *there was not one of the girls who had been at the school two years* (and the majority had been as long) *that was not more or less crooked!* Our patient was in this predicament; and we could perceive (what all may perceive who meet that most melancholy of all processions—a boarding-school of young ladies in their walk), that *all* her companions were pallid, sallow, and listless. We can assert, on the same authority of personal observation, and on an extensive scale, that *scarcely a single girl* (more especially of the middle classes), *that has been at a boarding-school for two or three years, returns home with unimpaired health;* and for the truth of this assertion, we may appeal to every candid father whose daughters may have been placed in this situation."

There is then every reason to suppose that the confined occupation of young ladies in pursuit of accomplishments, added to the evils arising from the use of noxious articles of dress, is at least the chief cause of their delicate constitution, as distinguished from the comparatively hardy and vigorous frames of young men, the exercise of whose bodies is not so greatly prevented by such causes. Inveterate

stomach complaints, too, are thus induced; also debility and disease, especially of the breathing organs, and disorders of the circulation, as indicated in excessive palpitations and frequent sickness, approaching to faintness. The nervous system being enfeebled and delicate, they are thus prone to agitation from the slightest causes, and "so wild with fear, that they hear the wing of the angel of death in the rustling of the gentlest gale of heaven." And what ornament, after all, is the highest accomplishment, or what is the pleasure arising from its exercise, if there be awanting the enjoyment of bodily health and comfort? What signifies the number of languages into which a young lady is able to translate one idea, if she cannot with truth utter the single short sentence, "I am in sound health?" In such a case all such learning and accomplishments are surely as but vanity and vexation of spirit.*

Need we point out the remedy for these evils? It is—Leave Nature to herself in the formation of the body, and follow her dictates in the use of nourishing food and regular exercise of the frame, so exquisitely formed for use and activity. What need

* All the bad effects above alluded to, as being produced by too exclusive mental cultivation, without regard to due exercise of the body and limbs, are particularly to be observed in the American ladies. This arises from the high literary as well as scientific education they receive, which prematurely quickens their intellect at the expense of their physical frame, and dooms both to an early decay. A late intelligent writer, M. Francis J. Grund, thus notices them:—"An American lady in her teens is, perhaps, the most sylphlike creature on earth. Her limbs are exquisitely wrought, her motions are light and graceful, and her carriage at once easy and dignified. But these beauties, it is painful to say, are doomed to an early decay. At the period of twenty-four, a certain want of fulness in proportion is already perceptible; and once passed the age of thirty, the whole fabric goes seemingly into decay." When their different courses of study are stated, it will require little discrimination in the physiologist to perceive that this

is there of artificial supports? The Creator has formed the constitution so as to thrive best, and attain better the perfection of its symmetry, when altogether independent of them, and arranged it so that while the natural exercise of the muscles is highly pleasing in itself, and develops the beauty of the human figure, it is also indispensable to the enjoyment of bodily health.*

It is certainly preposterous and absurd, that the use of artificial compresses on the body should be so tenaciously persevered in after it has been so often proved beyond the possibility of a doubt that they defeat the very end in view, by *actually producing the deformity* of the shape they are employed to improve. It argues slavish devotion to a fashion that, like other similar attempts at changing the human figure, had its origin in a barbarous and rude age, and was founded, not in the "wisdom" but the almost entire ignorance of our ancestors of the perfec-

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early decay of their fabric arises from the contravention of the laws of nature regarding physical exercise. Mr Grund farther states, that "in addition to Latin and Greek, a young miss of respectable parents is expected to become versed in the elements of *chemistry, mineralogy, botany, natural philosophy, algebra, geometry, and astronomy, to which the more gifted add even Hebrew and the higher branches of mathematics. In pursuit of these studies they are generally allowed to spend as much time, and even more, than the young men at college.*"—What reason is there, after this, to wonder at their "early decay?"

* We quote the following remarks from Mrs Bakewell's Treatise, which we doubt not mothers will find of use:—"Loose stays, made of double jean, which button up behind, with the shoulder-straps, and the straps to which the button-holes are attached, made of elastic cloth, are the only allowable supports to the female figure; and even these are not necessary until a girl is upwards of six years old. Until that time, the binding commonly worn on children's petticoats is quite sufficient. But it will be of little use to make children go without stays, if the bands of their frocks are to be so tight round the waist as to render breathing a difficulty, and romping an impossibility, without producing a rent in the garment."—*Mother's Practical Guide*, pp. 60, 61.

tion of the human construction. Similar fashions, indeed, at this day prevail among barbarous nations:—The Charibs flatten the heads of their infants between two boards, to improve, to their taste, the form of the head; the Chinese cramp the feet of their ladies into the smallest possible dimensions; and various savage nations indulge themselves in the possession of slit ears and noses, and pointed teeth, in the most infinite and in their estimation *beautiful* varieties. There is, however, this circumstance to be stated in favour of these untutored children of nature, that their practices do not tend to shorten life by interfering, as the fashion of civilized people above alluded to does, with the performance of any indispensably vital function. But the latter, nevertheless, consider themselves fully privileged to laugh at these rude attempts, though even less absurd than their own custom of forcibly confining the chest within an unyielding case of bone and buckram. All this, to say the least of it, is but in accordance with that peculiarity of human nature which renders individuals unobservant or even unconscious of these follies in themselves, which they are so quick to discern in their fellow-creatures. We look carefully into our neighbour's wallet of faults and frailties, but seldom even think of taking the slightest peep into our own.

O wad some Power the giftie gie us,
To see ourselves as others see us!
It wad frae monie a blunder free us
An' foolish notion:
What airs in *dress* and gait wad leave us,
And even devotion!

Burns.

CHAPTER VI.

OF SLEEP, AND ITS MANAGEMENT IN CHILDREN.

EXERCISE of the physical structure must have its alternation in repose; and this period in the infant is chiefly spent in sleep. The infant, for some time after birth, sleeps almost continually; sucking and sleeping alternately being its almost sole occupations. It is only after it has begun to perceive objects by means of its senses, and its attention is arrested by them, that it can be kept awake for two or three hours at a time. From the high state of activity of the digestive organs, and the constancy of their action, sleep is in a great measure produced; for the concentration of nervous power on the stomach naturally attracts it from the brain and the other organs, and leaves them to repose. Besides, the organization of the brain in infancy is exceedingly defective, nor can it be kept employed for any continuous period. By this arrangement, however, between the activity of the stomach and the imperfect action of the brain in infancy, the purposes of nature are fully attained, and the nutrition of the body promoted. Indeed, sleep is necessary to complete the nutritive process commenced in the stomach; a regular amount of both sleep and food

being indispensable for the purpose. Thus, weak persons recovering from long illness sleep a great deal more than usual, because growth to supply the previous waste is more rapid, and repose is necessary for the full accomplishment of their nutrition.

Such being the importance of sleep to their growth and nourishment, the necessity of allowing children a full proportion of it will be sufficiently obvious. In addition to sleeping throughout the whole night, infants should be allowed as much as they please during the day also ; for long-continued sleep is thus one of the most favourable signs of their healthy growth and nutrition. But a certain degree of care ought to be taken to make the infant's periods of waking during the day occur, as nearly as possible, at certain regular intervals ; as by this means the nurse may be saved many a sleepless night. Besides, nature has informed us that sleep, like appetite, is periodical ; and that slumber is more regularly attained, and more beneficial in its effects, when occurring after the lapse of these intervals, than at any irregular period. It is not until between the third or fourth year that sleep should be dispensed with throughout the day ; an hour or somewhat more being appropriated for that purpose. The time when it is at length entirely discontinued may safely be left to the child's own feelings, which are the surest and the most natural guide. The child, however, will require to be early put to bed,—by seven o'clock say,—and allowed to sleep according to its own pleasure, till morning. When grown older, the length of time appropriated to sleep should be gradually shortened ; and about one hour by degrees taken from them each suceeeding year until

the age of seven or eight, when they may be allowed to pass nine or ten hours out of the twenty-four in the repose of sleep.

Little solicitation is in general required to induce children to sleep. If properly managed, their periods for this purpose occur as regularly as those of feeding, and they will drop asleep without any artificial means being used. The ordinary plan adopted of soliciting sleep to the infant by rocking may well be dispensed with, though sanctioned by long custom and habit. Such a method of producing slumber is, to say the least of it, artificial; and most probably by the agitation of the infant's body, immediately after it has been suckled, may give rise to disorders in the digestive organs, more pernicious than even the want of some hours' sleep could be. It is general at the return of the usual period of slumber for the child to become drowsy and heavy, when it may be simply lulled to repose, and quietly deposited in its cot or bed. Above all things, the use of narcotic drugs for the purpose of soliciting sleep to children should be carefully avoided. There can be no excuse for giving these unless under the control of the medical adviser. By first exciting the nervous system, they produce nervous disorders often ending fatally; and their least effect is to derange digestion and other nutritive functions. Besides, the sleep they produce is artificially solicited, and, as such, cannot have the proper nutritive effect on the child's frame. Above all things then, we repeat, let mothers and nurses eschew the use of narcotics with children, whether brandy or other spirits, preparations of opium, poppy, or similar drugs; for, however small the quantity given,

they are most likely to prove pernicious in their effects.

During the first months of the infant's life it may sleep with its mother or nurse; for as the power of generating animal heat in infancy is considerably deficient, the proper addition may be thus imparted which it requires. But at the age of about two months this practice ought to be discontinued, and the infant may then be allowed, if convenient, to sleep in a cradle or bed by itself.

The sleeping-place of children is of some consequence, and may be here noticed. The bed or cot in which they sleep should be placed in a well-ventilated room, not large, and at the same time as warm as can conveniently be procured; not to admit sensible draughts of cold air, but merely allowing efficient ventilation. Hangings round the bed should be dispensed with, as these impede the free access of air required for healthy breathing; but it may be shaded from any glare of light, as this might disturb their repose, and produce too great sensitiveness in their tender eyes. As few children as possible should sleep in one room; and as few as possible also in one bed. The reason of this will be apparent on referring to the effects of breathing upon the air inspired (chap. iii. sect. 2). The bed should be composed of a chaff or hair mattress that can readily be dried or washed. It should be daily exposed to a free current of pure air, and exposed to the influence of the sunshine for an hour or two when practicable. The pillow should be moderately soft, and daily aired and exposed in the same manner.

The night-dress of children has been elsewhere alluded to (chap. iv. sect. 4). Its object is

warmth and comfort; and the bed-clothes also should be arranged for the same purpose, without unnecessarily loading and heating the child so as to excite profuse perspiration or interfere with its comfortable rest.

There is one among many good habits that may be taught to children in early life, namely, early rising; and this, if they be early encouraged to practise it, may be the means of averting much moral and physical injury in after-life. The best method of bringing about this desirable habit is, to make them retire to rest early on the approach of night, and encourage them to rise in the morning immediately on awaking, of their own accord. As an inducement for this purpose, every thing should be carefully provided for their comfort as soon as they are up, and their early hours made as pleasant and joyous as possible. This is an easy matter, for the animal spirits are most exuberant in the morning, and partake of the joyful and happy condition of the whole animated creation at that period. They are then most cheerful and heartily disposed for enjoying the pleasures of juvenile existence.

But while the formation of such a habit is of so much importance, and its encouragement so proper on the part of the parent, it must, however, be carefully provided that the young are not on any such account curtailed of their fair proportion of sleep; for such deprivation might then do much harm, and the good effects of early rising be wholly sacrificed. Sleep, as above stated, is as necessary to the young as food, and it must, accordingly, be liberally indulged in within the demands of nature.

In concluding this short account of the early man-

agement of our species, we present, in a tabular form, what we conceive ought to be the proper disposition of time in childhood, boyhood, adolescence, and adult age, in order to the attainment of a full development of the mental faculties, with a corresponding healthy completion of the physical structure. It is not offered as a near approach to certainty, for it must be liable to various modifications under varying circumstances. But it presents, as it were, a bird's eye view of the average disposal of a day's time in carrying out any sound system of physical and mental education.

One year is selected, for the sake of example, from each Period of Age, and the hours that should be devoted to exercise, exercise with instruction, tuition, relaxation, and sleep, stated in the corresponding opposite columns :—

Periods of Age.	Hours of Play or Physical Exercise.	Hours of Physical Exercise combined with Mental Instruction.	Hours of Study or Tuition.	Hours of Relaxation, for Nourishment, Repose, or Light Amusement.	Hours of Sleep.
CHILDHOOD. (Example at 4 years)	5	2	1	5	11
BOYHOOD OR GIRLHOOD. (Example at 9 years)	4	3	2	5	10
ADOLESCENCE. Example at 14 years)	3	4	4	4	9
ADULT AGE. (Example at 21 years)	2	4	6	4	8

CHAPTER VII.

CONCLUSION.

PHYSICAL EDUCATION THE BASIS OF MORAL AND INTELLECTUAL CULTURE.

It has been our aim to present in the preceding pages a general view of the constitution of the human frame in early life, and the conditions necessary to its healthy existence; while our object was at the same time to suggest a natural system of management founded thereon, in as plain language, and in as common-sense a manner throughout, as within our ability. But our description of that constitution, and the several functions ministering to it, is necessarily very imperfect; indeed, we have cursorily alluded to them only in so far as they are subject to external management, or modified by those natural agencies over which we possess a power of regulation or control. Into the detailed consideration of the Physiology of the Vital Functions, the limits prescribed to this short treatise have precluded us from entering. We have merely glanced at those of Digestion, Respiration, Depuration by the Skin, and Voluntary Motion, in order to afford us sufficiently clear grounds whereon to enforce a natural management and education of the body through means of their respective organs; while the functions of Circulation, Secretion in all its varieties,

the Brain and Nervous System, remain altogether untouched. Even in so far as we have gone, however, the importance of the study, and the value of the principles it suggests, must be apparent to all who reflect for a moment upon the influence of a proper Physical Education on the health and happiness of maturer years.

We will have been but imperfectly understood by our readers, however, if they have supposed us to imply as the main object of education, or as the chief end of existence, merely physical health and development. This forms the basis, but mental cultivation is the ornament of education; the healthy frame ministering as the instrument of the mind's intelligence, which forms the noblest attribute of humanity. The value of a Physical Education, properly conducted in infancy and childhood, thus chiefly consists in its being a preparation for adult life, when the higher powers of the human being have become developed. It is what cultivation is to the plant which is yet to bear fruit in its maturity. In short, it is as the chief means to a great end: that end is moral and intellectual happiness. In securing, therefore, the proper Physical Education of the child, and training him up in the full enjoyment of health and strength, the first part only of education has been accomplished. The first means have been secured, at least so far as they have lain within our reach of attainment: the grand ulterior object must likewise be gained. And if the child have not been taught to make a proper use of all his faculties; if, especially, the moral part of his constitution have been allowed to remain uncultivated and undirected; the great end of education has been overlooked.

The physical and mental parts of our nature are so intimately connected and related, that the health and development of both must be equally the object of a rightly conducted education. For, if either be neglected, the result is want of harmony in the constitution, arising from debility or derangement of one or other of them. As we found active exercise necessary for the growth and development of the physical frame, so also is active exercise necessary for the growth and development of the moral and intellectual faculties. And as defect of such exercise tends to enfeeble and stunt the growth of the one, so does want of proper mental exercise equally enervate and stunt the growth of the mind itself.

But while the due cultivation and exercise of the mind is of so much importance, there are certain laws which regulate its operations, as necessary to be observed as those which we have seen to regulate the existence of the physical frame. The mind indeed operates through a part of that frame—the brain; and on some knowledge of the functions and sympathies of this organ should its education and training be mainly conducted. Much regarding this organ has yet to be revealed to us by farther study and investigation—if such knowledge be within our reach even by these means; but it is at least proper and reasonable that whoever undertakes to train the tender mind of the child should have some correct idea of its powers; its propensities and faculties; at what period they come into operation; and what progress in the acquisition of information the mind is calculated to make in the early stages of life.

We can here but briefly allude to such training of the mind as we consider to be most in accordance

with nature in infancy and childhood. In an early chapter—to which we refer the reader's attention*—where the development of the infant constitution is traced through its various stages, the development of the brain is described as being exceedingly imperfect; consequently that action on which the mind so intimately depends is comparatively deficient in childhood and early youth, only attaining maturity as the organization of the brain becomes more complete. This is the more remarkable since those functions which are subservient to Nutrition are as perfect at birth as at any future period in the child's life. It is therefore obviously the design of nature, that, like physical strength, high mental power should not exist in childhood; and farther, from the slowly improving organization of the brain, that it should at length only slowly come into operation. For were it intended that the human being should possess high intellect in early youth, the Creative Power which formed the heart, lungs, and other nutritive organs, perfect at birth, could have as easily completed the organization of the brain so as to accomplish this object. But since this is not the case, it must be in accordance with that Wisdom which has so exquisitely arranged the harmonious condition of the human system, rather that it should not be so.

Notwithstanding, however, this evident arrangement of nature, the tender minds of children are too often early tasked and wrought beyond their abilities, their memory laden with words like the veriest packhorse, drugged with knowledge, through the medium of sounds, which to them convey, as yet, little or no meaning. Because parents and teachers

* Chap. i. sect. ii.

estimate at a high rate (and with justice) the advantages of mental education, they too often overlook, in early urging children after its attainment, their physical health and soundness. How little such a mode of training is in accordance with the designs of nature, and how injuriously it affects the subject of it, any one may be satisfied who reflects upon the tenderness of the constitution of infancy and childhood. That the mind itself is ultimately weakened is beyond a doubt; for inasmuch as their brains are over-excited by premature exertion, they are the earlier debilitated and exhausted. In the elegant language of Dr Caldwell, "from an unwise attempt to convert their flowery spring into a luxuriant summer, that summer too often never arrives. The blossom withers ere the fruit is formed."

The main design of Nature in early youth, as already fully shown, is,—*not* the speedy development of the mind, for she has designedly, as it were, withheld this agent,—but the development and growth of the body, by means of the Nutritive Functions so carefully provided for the purpose. All the energies of the constitution are then required for the promotion of this object; and if the brain be then cultivated too assiduously, these energies are abstracted from their legitimate purpose, and physical debility, ending most probably in disease and decay, is produced. Does it not thus clearly and manifestly appear, that premature and too exclusive mental cultivation is to thwart Nature by interfering with her operations in the careful development of the physical constitution in youth?

It was an opinion of Rousseau's—wherein, perhaps, he was very near the truth—that the chief art of education in childhood is *to lose time;* that

every delay should be considered an advantage; care being taken not to give that instruction to-day which may be deferred, without danger, till to-morrow; and rather to guard the heart from vice, and mind from error, than to instil positive instruction. In the words of this highly ingenious writer: "The most critical interval of human life is that between the hour of our birth and twelve years of age. This is the time wherein vice and error take root, without our being possessed of any instrument to destroy them; and when the implement is found, they are so deeply grounded, that they are no longer to be eradicated. If children took a leap from their mother's breast, and at once arrived at the age of reason, the methods of education now usually taken with them would be very proper; but, according to the progress of nature, they require those which are very different. We should not tamper with the mind, till it has acquired all its faculties; for it is impossible it should perceive the light we hold out to it while it is blind; or that it should pursue, over an immense plain of ideas, that route which reason hath so slightly traced, as to be perceptible only to the sharpest sight. The first part of education, therefore, ought to be purely negative. It consists, neither in teaching virtue nor truth; but in guarding the heart from vice and the mind from error.*

Though not disposed wholly to subscribe to these sentiments, we cannot help being attracted by the strong light of truth, founded on sound observation, which characterizes them; though tinged, in some respects, by the peculiar notions of the distinguished author. It is surely, however, enough that nature

* Emilius; or, a Treatise of Education. Book ii.

has implanted in children a prying curiosity to learn by means of their senses; to handle and examine every thing they can reach, with all the sensation they are as yet endowed with. This instinct, as we may term it, should certainly therefore be satisfied and directed. And while engaged in learning by such a natural process, they exercise all their organs equally,—their physical structure, their senses, and their observing faculties; thus, too, acquiring a greater amount of actual knowledge than could be instilled into them by the most laborious drilling by means of printed books. The conduct and behaviour towards the child, of his nurse or parent, is to him a book; the actions and conversation of those around him, is a book; all nature, indeed, is a book; and from all these sources he is almost incessantly engaged in storing up information and ideas—not mere transient sounds, but actual impressions, such as are best fitted for his slender capacity, and constitute the only intellectual food by which his mind is as yet capable of being nourished.

It is in the proper selection of objects presented before him, and in familiarizing him with worthy examples for imitation, that the value of infant education consists. And it is by such means that that store of knowledge is at length amassed which aids him in the attainment of higher mental improvement, and serves mainly to regulate his conduct in after-life. From moral as well as physical examples and impressions, knowledge is acquired at first hand as it were; while from written books it is at second hand, and by a routine which children cannot as yet comprehend. They present to children the shadow—nature itself is the substance. Besides, the little that children really *do* succeed in learning

is so often useless,—sometimes absolutely hurtful, by prematurely exciting their brain to the prejudice of their physical growth,—and that little so often needs to be unlearnt in after-years, that, to say the least of it, much book-learning is to children a waste of that time in irksome and profitless tasks, which might be otherwise spent both to their physical and mental profit and enjoyment.*

To familiarize the child, through the medium of his senses, with the properties of those objects which surround him; to instruct him in the physical relation which they bear to each other, and to his body; to develop his own physical structure by which he is so related to external nature; and to draw out those moral sympathies by which he is related to beings of his own species, in all the fairness and beauty of their proportion; these ought to be the objects of education in childhood. And if the sum of knowledge be calculated which any competent acquaintance with these objects presupposes, surely the earlier period of existence is not idly employed. To use the words of the eloquent writer already quoted:—"The moment the child knows

* "As no science consists in the knowledge of words, so there is no study proper for children. As they have no certain ideas, so they have no real memory; for I do not call that so which is retentive only of mere sensations. What signifies imprinting on their minds a catalogue of signs which to them represent nothing? Is it to be feared, that, in acquiring the knowledge of things, they will not acquire also that of signs? Why then should we put them to the unnecessary trouble of learning them twice? And yet what dangerous practices do we not begin to instil by imposing on them, as a science, a heap of words which to them are without meaning! In the very first unintelligible sentence with which a child sits down satisfied, in the very first thing he takes upon trust, or learns from others, without being himself convinced of its utility, he loses part of his understanding; and he may figure long in the eyes of fools before he will be able to repair so considerable a loss."—*Rousseau's Emilius.*

the features of his nurse, he may be said to have acquired considerable knowledge. Trace the progress of the most ignorant of mortals, from his birth to the present hour, and you will be astonished at the knowledge he has acquired. If we divide all human science into two parts, the one consisting of that which is common to all men, and the other of that which is peculiar to the learned, the latter will appear insignificant and trifling in comparison with the other. But we think nothing of general acquisitions, because they are made insensibly, and even before we arrive at the age of reason; knowledge becomes conspicuous only in its difference on comparison, just as in working algebraic equations, common quantities are struck out and stand for nothing."

The child, then, that has acquired the use of his senses, and through these an acquaintance with external nature, has acquired no small share of knowledge: he has acquired indeed the *materiel* of future ideas; he has made the beginning of that storing up of useful knowledge which is the product of cultivated sensations. The time will arrive in due season when knowledge can be gleaned by him from books; when he will feel interested by tales of bygone times, by descriptions of foreign countries, and their varied animal and vegetable productions; when the actions of man in past ages, their deeds of heroism, adventure, honour, virtue, or piety, will possess charms most intensely interesting to him; and when every thing in the form of knowledge will be sought after with avidity. The mistake is in forcing book-learning on children before they can relish it, before they can comprehend it, before they can profit by it.

The great object of infant education ought unquestionably to be Moral Culture, to draw out the affections and higher feelings as they develop themselves in infancy and childhood, watch them in their growth, and lead them out in the direction of proper objects; while the selfish feelings and propensities are restrained where over-active and in excess. Evil may thus be overcome with good; the bad so repressed and the good so cultivated as to bring the whole faculties into due proportion. Children have a high perception of moral as well as physical beauty, and generally a strong impulse for its imitation. All those feelings in which the affections consist are easily excitable and awakened into activity. Love is the element nature has designed them to move in, for parents, for friends, for playfellows; and that this feeling so often appears awanting in children, arises from erroneous or perverse systems of moral training (if system really do exist), which neglect and pass unheedingly the little flowers of human nature, trampling and injuring them.*

In cultivating the better feelings, and instilling a taste for the Beautiful in both the moral and physical world, consists the chief value of infant schools, which in this respect promise to be the most valua-

* Children are frequently great sufferers in consequence of adult indifference, unthinkingness, or want of a present sense of the nature and condition of these little beings. They require to have more attention paid to their feelings, more encouragement yielded for unfolding them. Many a sweet fountain of thought and emotion, which would have relieved and have awakened feeling, lies injuriously and unprofitably stagnant in bosoms often panting to give them forth. The unsleeping eye of sympathy must watch these indications, and heeding only *them*, disregard every circumstance of age or condition in those they agitate. If the earth heaved, and cried "Here is gold," should we fail to dig it forth? And how much more precious is the moral ore of the human breast! —*Mrs Leman Grimstone.*

ble means the world has yet known for the moral advancement of our species. Not for their fostering the infant memory for words, not for prematurely exciting the intellect, nor loading with instruction their tender minds; not for these, but for the greater opportunities it affords for *Moral Culture*, and promoting physical health and development, do these institutions promise, by more matured arrangements, to prove so valuable in the improvement of mankind.*

As the higher intellectual powers, in the ordinary course of nature, come into operation, they also should be carefully educated and trained to fulfil the high purposes for which they have been granted The mental desires should be directed after what is good and useful in attainment, the mind chiefly led after humanizing studies whose object is the

* Much, however, yet requires to be done, ere this promised good will be generally obtained. A great many abuses have crept into the infant school system in England, which have considerably neutralized the good effects of infant teaching (see *Biber's Lectures on Christian Education*); and much actual mischief has resulted from it in America, according to Dr Brigham (see *Influence of Mental Cultivation and Excitement upon Health*). Probably much of this evil may with justice be referred to a want of normal schools for the education of the teachers themselves. In infant training especially, this is a matter of no small consequence; for it must be kept in view, that while the mind in infancy is highly susceptible of impressions, it is so of *bad* as well as good; either injury or benefit being produced as infant education is erroneously or properly conducted. The body likewise so intimately sympathizes with the mind in all its states, as well as the converse, that its health is in no small degree influenced by the degree and kind of education given to the child. From these circumstances will appear the absolute importance of the teacher having an adequate knowledge of the child's mental nature and development, and the kind of instruction suited for them, as well as being able to vary and modify their education according to their diversity in temperament, and mental and physical constitution. Nothing less than a regularly conducted course of study and instruction can qualify him to engage in the important business of infant teaching, so as to effect the important advantages referred to, without incurring those evils which knowledge alone can enable him to avoid.

advancement of knowledge and the promotion of the happiness of our race. Man should especially be taught the knowledge of *himself*, of his own nature and his relations to his fellow-beings, and thus fitted for his sphere of usefulness in society. By these means the mind is healthfully exercised, the brain, on which its action depends, as well as the physical frame itself, improved; for regular exercise of each part of the system is beneficial in its effects upon the development of the whole. And by thus bringing the powers and faculties into operation, the whole constitution may become strong and vigorous, and have attained the highest development of which in the present state it is capable, in its physical, moral, and intellectual condition. Thus carried out to its legitimate results, Physical Education will greatly improve the condition of mankind, promote human happiness and enjoyment, and by enabling him to cultivate his higher faculties and affections, raise man, on earth, to the very summit of his nature.

THE END.

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