

Spinal curvature and awkward deportment : their causes and prevention in children / by Dr. Georg Müller ; english edition edited and adapted by Richard Greene.

Contributors

Müller, Georg, 1861-
Green, Richard.

Publication/Creation

London : The Scientific Press, 1894.

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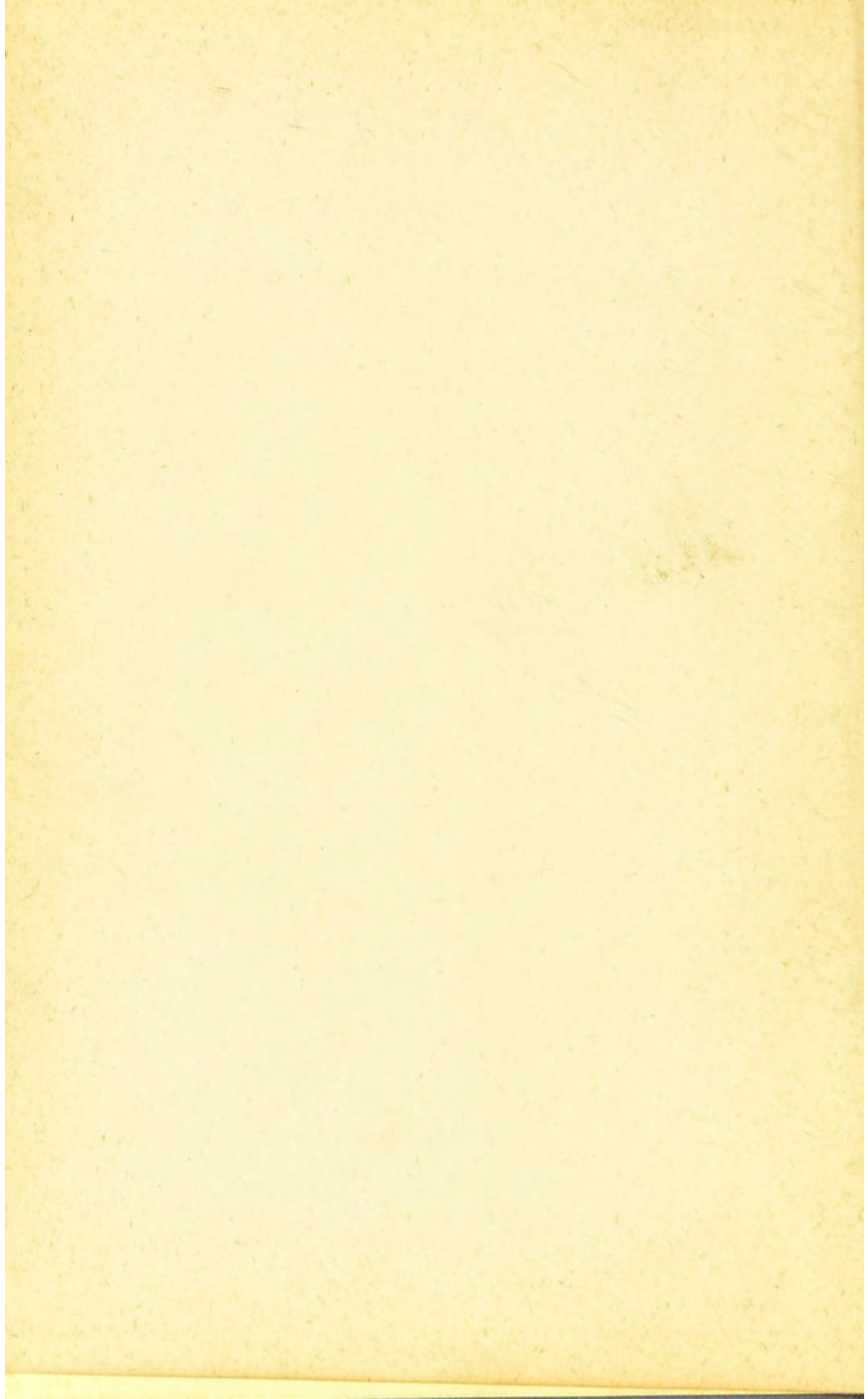


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SPINAL CURVATURE

AND

AWKWARD DEPARTMENT

Their Causes and Prevention in Children

BY

DR. GEORGE MÜLLER

PROFESSOR OF MEDICINE AND ORTHOPÆDICS, BERLIN

ENGLISH EDITION EDITED AND ADAPTED BY

RICHARD GREENE, F.R.C.P. Ed.

(WITH TWENTY-ONE ILLUSTRATIONS)

LONDON

THE SCIENTIFIC PRESS, LIMITED

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AUTHOR'S PREFACE

WITH the advance of medical science and research during the last century, we have learnt that its greatest object lies in the prevention of disease.

Were the physician to bestow upon his fellow-man complete immunity from disease, humanity would indeed be an ideal creation. But if this happy result is ever to be realised we are at present far from its achievement. We must, however, be ready to come forward with active and well-directed measures which will prevent mischievous complications from arising, and by paying early attention to the development of children much can be overcome.

The physician is powerless to do much in this direction without the co-operation of two powerful allies—the parent and the teacher—for whose benefit I have dealt with matters that are well enough known to the profession. I have also assumed a popular tone for the clearer comprehension of a wide circle of readers.

By this means I have sought to treat the matter with the utmost lucidity and to provide a useful hygienic adviser for physicians, parents, and teachers, upon this all-important but, alas! too often neglected subject.

THE AUTHOR.

PREFACE TO THE ENGLISH EDITION.

IN standing sponsor for the English edition of this little book which issued from the Berlin Press in 1893, I would remind the reader that it was originally intended for the German public, and that in England considerable progress has been made in the better regulation of our schools and in the more rational upbringing of our children. School-house furniture has been much improved, and the cubic space allotted to each scholar has been increased; still much remains to be done. Not only is the ventilation of many schoolrooms most imperfect, but it is becoming common now-a-days to warm them by means of various hot-air contrivances, and this unduly warmed air has a tendency to sap the life and energy of our children. It is time that a stand was made against this system, which is alike unscientific in theory and unwholesome in practice.

As regards out-door sports and games of all kinds, we are, as Professor Müller admits, ahead of our continental friends. Indeed with us there is a tendency, not perhaps to overdo these manly sports, but certainly to choose those which are not altogether suitable for growing lads and girls, and it often happens that children are allowed or even encour-

aged to indulge in these sports too long without resting.

When we come to the important matter of dress we are no whit better than our neighbours ; probably we are rather worse. My own observation would lead me to believe that in the streets of our towns, and even in our country lanes, would be seen a higher proportion of pinched waists and high-heeled boots than would be met with in Germany. It is no excuse to say that our grandmothers paid similar homage to fashion, and yet brought up healthy children. Perhaps they did, and diseased ones, also ! Anyway, I think Professor Müller is right in showing the connection between fashion and deformity.

In the last chapter of the book reference is made to the value of the dance as a means of recreation and development, and as the author praises the open-air dancing of Ancient Greece we must all agree with him, for every movement of these dances was graceful, and every posture charmed. But what can be said of that senseless rotatory embrace, now by courtesy termed dancing, which takes place in crowded, artificially-lighted rooms, and which begins at a time of day, or rather night, long after it should have ended ? Could not some leader of fashion put an end to this by introducing something more hygienic and more rational ?

Manifestly the book is intended for parents rather than for physicians. It will aid the former in steering clear of the primary causes of these spinal deformities, and in obtaining knowledge sufficient to detect slight deviations from the normal, at a stage, too, when treatment may be efficacious. Every parent ought to be to this extent a physician.

RICHARD GREENE.

SPINAL CURVATURE.

CHAPTER I.

THE PHYSICAL DEVELOPMENT OF CHILDREN IN THE PAST AND AT THE PRESENT.

IT is a well-known and generally recognised fact that with the advance of civilisation and the improvements in our mode of living, diseases have become more numerous. And it has been said justly that the present generation lives under the ban of a lack of vitality and nervous disorder. We should not err in attributing to this advancing civilisation a correspondingly retrograde movement in respect of physical development; but, on the other hand, there has been an increasing desire to promote general health, and to subdue disease, which statement will be clearly established if we look back upon past history. The ancient Greeks—the most highly cul-

tured people of antiquity—set the greatest value upon the physical development of their race. From the earliest age upwards, their youth were instructed in healthy bodily exercises, the result of which was, that the active, well-developed boy became the healthy, energetic man, whose greatest pleasure was derived from such sports as running, wrestling, and “throwing the disk.”

Excellence in these sports was not only rewarded with the highest honours to the individual, but even his native town was proud of having brought forth such a hero. All will admit that, with this grand physique, the Greeks combined an exceptionally high order of intellectual development, which, even in the present day, commands our deepest admiration.

In the education of their children they showed how deeply the love of the beautiful was impressed on their national character. It was held that the body and the mind must go hand in hand, and that a beautiful, pure mind could not elsewhere dwell than within a well-developed and healthy body. To such a degree of perfection did they carry this intellectual and physical education of their youth that we, even now, in this nineteenth century, go to them for instruction,

From the creations of a Phidias the young artist has learnt his art; and from the creations of a

Homer the young scholar has sought his inspirations!

This pure ideal of a perfect physical and intellectual development seems to have entirely disappeared, else in our present higher education, which is built up mainly upon the past, we could surely trace a faint glimmer of that old ideal of how nearly a man should resemble a god—perfect in body, pure in soul.

Our present-day theories of education are built upon an entirely different basis; we make no efforts to develop the bodily form. Indeed, so much is it neglected, that it is somewhat remarkable that there should still be well-developed men and women amongst our population.

When the Greeks assembled at their public sports, they beheld with conscious national pride the beautiful, slender, well-formed naked bodies of their young men and young maidens. Were such public sports to be instituted in our times, we should have little reason to feel proud of the spectacle presented to us! It is seldom that a completely normal figure is met with; and even when it is, it lacks, in most cases, the charm of easy, graceful movements. By far the greater number have no beauty of form at all.

Unfortunately, experience and exhaustive statistics show that a shockingly high percentage of our youth (especially girls) suffer from curvature of the spine.

The cause of this is to be found in the modern system of extreme high pressure in education, which, at the expense of the bodily health, crams the mind with a superfluity of knowledge which it is not able to assimilate. It would be comic, were it not so sad, to see how in one and the same moment we instil into our scholars the theories of a perfect education from the Greek, whilst in practice we so utterly disregard the precepts which that education teaches.

It is far from my object to reproach anyone for this. The whole system of modern education is to blame; and, in order to remedy this sad state of affairs, it would be necessary to make a clean sweep of that system, and to reconstruct a sounder one. At present this would be impossible, and so we must content ourselves with a compromise—a middle course which will counteract bad habits.

In this book I lay before parents a means by which they can counteract the bad habits contracted by the school system. It should be an universal reproach that so little thought is given to a reasonable physical education for children. Great value is set upon their learning and accomplishments, which is reasonable and right; but an equal share of attention should be given to secure for the accomplished son or daughter a healthy body in which to develop his or her mind. For such an extreme value as is set upon mere attainments is unsound, and is not con-

ducive to the general good, either of the individual or of the world at large.

When the misfortune has come, and a troublesome illness through curvature of the spine shows itself, one learns, alas! too late, that an energetic orthopædic treatment would have prevented the malady. The question then arises: Why is there such neglect? In many cases for the sake of a superficial education, which is worth little or nothing to the child—indeed, owing to its extreme superficiality, it is even harmful to the development both of the mind and the character.

Let us, then, improve upon our parents, and see that in every respect our children are cared for! For parents with an earnest desire to accomplish this purpose I put forward this little book as a guide!

CHAPTER II.

WHEREIN LIES THE DEFICIENT DEVELOPMENT AND AWKWARDNESS OF CHILDREN ?

To prevent an evil it is necessary to ascertain :

- (1) *The existence of the evil,*
- (2) *The cause which originated it, and*
- (3) *The methods of preventing it.*

In order to discover the cause of awkward deportment in children we must consider these three phases of the question.

Many of the various forms of defective carriage, such as one shoulder being higher than the other, one hip protruding, etc., have first and fixedly their origin in the deviation of the spinal column from its normal curves. This defect cannot always be noticed by the lay mind, for whose benefit we now give a brief description of the normal position of the spinal column.

It is situated, at its base, between the two pelvic bones, and at its extreme upper end it supports the head.

From the spine grow twenty-four ribs—twelve on each side—and these partially enclose the chest organs, form its walls, and terminate at the waist.

The spine itself has the appearance of a firm, notched column, and consists of a number of small bones fitted into each other. At the top these are small, becoming larger as they descend.

The connection between these bones is loose enough to permit of a slight movement. They are twenty-four in number, and are called *vertebræ*. The upper seven compose the cervical segment of the vertebral column, and are called *cervical vertebræ*. The next twelve are termed *thoracic vertebræ*, and form the thoracic or dorsal spine. The lowest five are the *lumbar vertebræ*, and form the lumbar segment of the spine. From here the parts are firmly joined, so that no movement is possible.

Between the twenty-four separate bones are cartilaginous cushions, which increase their elasticity, and give to every two *vertebræ* a slight movement. Add all these little movements together and the result is the sum total of the spinal movement,—which is considerable. It has three principal motions—bending backwards and forwards, bending to the right or left, and turning on its own axis. One might compare the vertebral column to a many jointed pliable staff, but the comparison is not altogether happy, because the vertebral column in its

natural position is not stretched to its utmost limit, but has many curves. The curves lie all in the one plane which should constitute the middle of the back ; that is to say, the spine or vertebral column should divide the back into two equal parts—right and left. As soon as the curve deviates to the right or to the left of this imaginary plane, it ceases to be normal, and is diseased.

The uppermost curve lies in the cervical segment of the vertebral column, and is convex. From this, the thoracic or dorsal spine arches backwards, whilst the lumbar segment bends forwards and the sacrum and coccyx backwards ; this shows two curves to the front and two to the back.

These curves must be held within given bounds, or the back will either be what is called a round back, or a hollow back, and no longer normal but diseased.

In order to understand these curves and other deviations, which we will discuss later, it is necessary to briefly examine their origin.

As long as a baby is kept in a recumbent position the spine is straight. But immediately the child is made to sit up the back assumes the form of a curved line. This in its turn is corrected when the child raises itself upright and begins to walk and run ; and the normal curves already referred to then appear, being caused as follows:—The spine has its lower end in the sacrum, which is firmly fixed between

innominate bones, leaving the unimportant coccyx to terminate alone. In sitting, the pelvis rests either upon the ischium and the coccyx (back sitting posture), or upon the two ischii and the two under planes of the thigh (forward sitting posture). The spine then finds the centre of gravity to support the intervening planes, and does not again assume a straight line but becomes curved. With a change of posture the positions of the different parts of the body alter, but, equally in sitting and standing, the pelvis rests upon the legs, which are set into the hip joint on either side of the body, and it is important that the central line, which can be traced between these hip joints, should always be supported and be exactly in the middle of the figure. Now, this is not the case, for the aforementioned line ceases above the extreme end of the spine. Therefore, the person in raising himself out of a sitting position into a standing or walking one, throws the weight of the upper part of the body upon the lower part. Thus, if the centre of gravity of the vertebral column be not exactly in the middle of the figure, it develops a forward inclination, owing to the fact that the pelvis is stiffly fixed to it. Were the whole spinal column to follow this inclination, the figure would sink powerlessly forward, but this is averted by the spine making another curve, and thus ensuring a vertical position for the body. This arrangement is then repeated

with the chest, and the cervical parts of the spine, which adjusts and balances the weight of the head. We have thus three normal curves of the spinal column—the loin curve forward, the chest curve backward, and the neck curve forward.

Let me again emphasise the fact that there is never normally a side curve in the vertebral column. It is an exact perpendicular line down the middle of the back, forming, with the two hip joints, two right angles, which supposes an exact horizontal position of the hips. Many causes induce deviations from this normal position. We find the hips inclining either to one side or the other ; which produces a deviation from the perpendicular of the spinal column, and a repetition on a side plane of its normal curve. To counteract this curve, a compensatory curve must be made to the opposite side, and in order to balance the head the spinal column must again return to the middle of the back. As the shoulders are connected in the same way with the spine, it follows that if one hip is higher than the other, the corresponding shoulder will be also higher.

The most frequent deformity (*see* Fig. 1) is, that one hip comes more forward than its fellow, and as a consequence the corresponding shoulder does the same. An idea may be formed of how easily the hips can deviate from the horizontal when it is taken into account, that the action of standing on one leg,

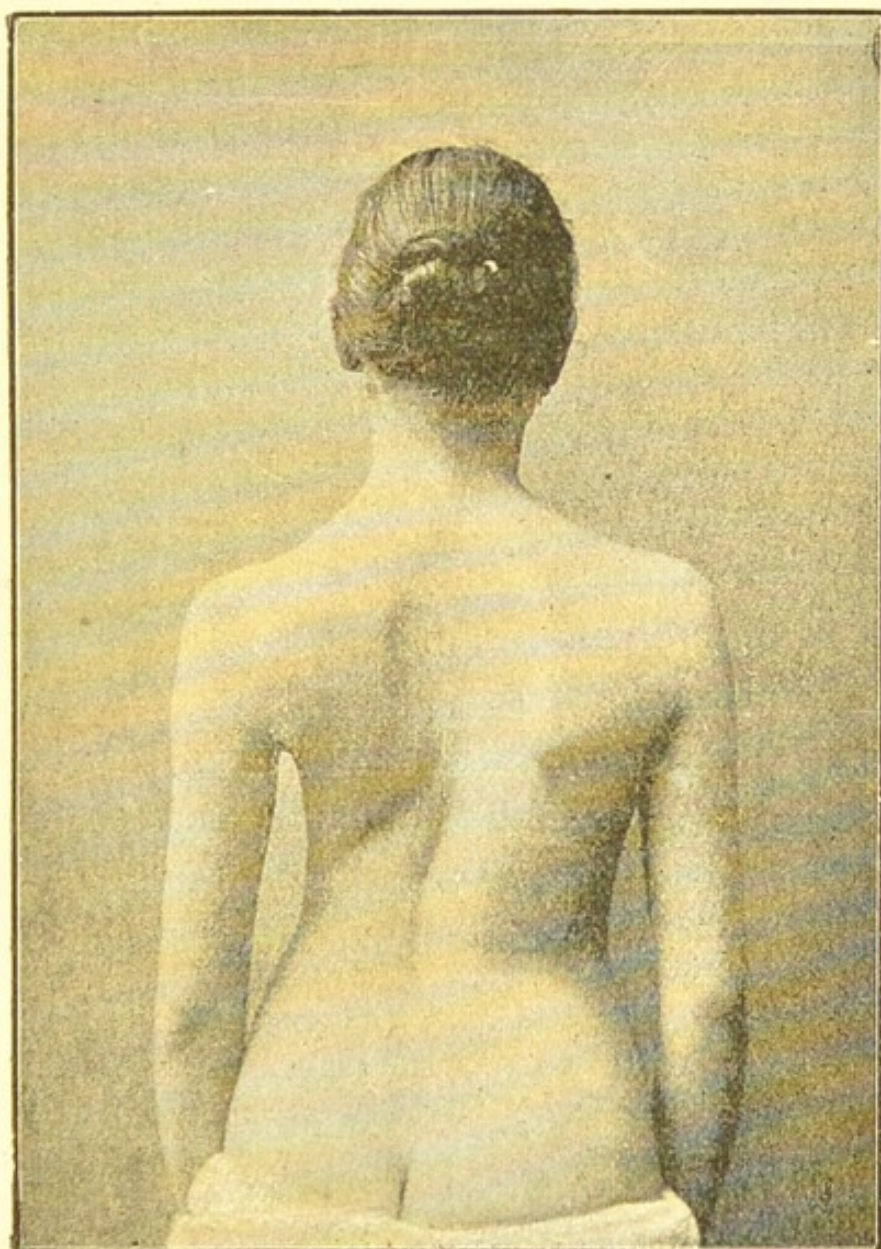


Fig. 1.

or placing one foot in front of the other, causes an inclination of the hip in question to the opposite side, and, in consequence, a shortening of the leg.

For the present we shall content ourselves with this explanation, which will be amplified as the essay advances.

In order to make a somewhat complicated point clearer, we have considered the centre of gravity of the spine as an exact line down the middle of the back between the two hip joints. In reality, the centre of gravity falls somewhat behind that point; but the body is held in its place by ligaments which firmly unite the many little vertebræ of the spine, thus enabling it to support the head in an upright position.

The muscular system comes under two heads—(1) The particular movements of the body. (2) The body in its quiescent state.

To make the relative positions of the muscles clear to the reader, we now give a familiar illustration.

On a roof there stands a high chimney which, if not supported, will be soon blown down by the wind. It is therefore secured on all sides by strong wires which fix it firmly in an upright position: able to resist wind and storm as long as the wires are intact. But when a wire gives way, the chimney falls over, and when it merely stretches, the chimney makes a proportional lean in the opposite direction.

Although the spine is not a fixed form like the chimney, yet in the same manner every muscle must pull with an equal force to keep it in its right position ; for where the force slackens, there will be an inclination in the opposite direction.

The normal upright position of the body is important. The spinal column should be in an exact erect position equally in standing, walking or sitting ; and all the muscles of the body, especially those of the spine, should be strong, and equally balanced.

CHAPTER III.

WHAT IS THE CAUSE OF SPINAL ABNORMALITY IN CHILDREN ?

IN a spine which is physiologically normal, and consequently in no way diseased, a daily change is noticeable.

Most people have remarked that after a long illness the patient has unmistakably grown taller. The cause of this is that the spine has been stretched to its fullest extent, owing to the body having lain in a horizontal position for so long. This increased height, however, does not last ; for very soon the normal curves of the spine return. Indeed, it is not necessary for the person to be ill to establish this fact, for in the early morning every one is taller than when he went to bed the night before. The difference in height varies from 6-10 millimetres, depending upon the kind of work done during the day. As the day advances the normal curves return, and the person resumes his usual height. This is especially noticeable in old people ; for with them the normal curves are steadily increasing, till in the course of

time the spinal column gets so rigidly fixed in these curves, that it no longer stretches out flat.

These natural deviations would never be mistaken for disease: such as for instance, when in a young person the normal curves extend abnormally: the chest curve abnormally extended causes the so-called "round back"; the lumbar curve abnormally extended the "hollow back," and if the normal curves do not exist or fall below the average the back is equally abnormal, and is then called a "flat back." These three forms are, however, comparatively seldom met with; by far the greater number are cases of side curvature of the spine, and these are almost exclusively observed in young people. They begin at a very early age, when they are, unfortunately, overlooked by parents, although it is at this stage of the disease that cure is possible. When the evil is discovered, it is generally too late, and remedies are nearly useless. You hear that a child holds herself badly, or that it tires her to walk much; or that such and such a defect will right itself in time, till the expression, "the child will grow out of it," has become a *terminus technicus*. Let me take this opportunity of explaining that even the smallest curvature of the spine will not grow of its own accord, and will not correct itself without aid.

Already many parents have to reproach themselves with thoughtlessness which has resulted in their child

being crippled for life ! Prominent physicians are always repeating—Parents, be ever on the look-out for curvature of the spine in your children, and take it in time ! This advice falls unheeded on the ears of those who allow themselves to be deluded with the belief that all will come right by time. This is a serious duty which should be taken into consideration, for it is always easier to prevent a disease than to cure one.

This book has been written to try to impress upon those persons with good intentions but a want of knowledge, the overwhelming importance of realising this evil, and of taking steps to avert it ; for once the injurious influences are known and understood, the person is half way towards avoiding them. There is also a certain hereditary predisposition towards curvature of the spine which is universally recognised, and children whose mothers have curvature of the spinal column in most cases develop the same curve, and this hereditary tendency will often run through the whole family. The children are not born with the curvature, for the children of advanced cripples are born perfectly normal ; but afterwards fall victims to the sad fate of their parents. This hereditary predisposition favours the origin of the *skoliose*—or side curve. A predisposition towards the *skoliose* is, however, not only hereditary, but it is also inherent in individual constitutions. Thus of

two children both brought up under the same conditions, and exposed to the same harmful influences, one will develop the skoliose, and the other not.

We should not err then in assuming that this predisposition, be it hereditary, or inherent, only develops when the concerned individual has earlier succumbed to harmful influences, which in another without this tendency would have produced no bad result.

Children, on account of hereditary tendencies, general weakness, poverty of blood, scrofula, or protracted illness, are particularly inclined to spinal troubles, and it is therefore necessary to bestow upon them the most assiduous care. The skoliose or side curvature is caused by the spinal column habitually supporting an unequally proportioned weight; almost at every moment children find opportunities of wrongly burdening their spine. Parents and teachers fail to realise the importance of observing and correcting children in their bad habits. Thus when standing for any length of time, it is a very usual thing to stand on one leg only, laying the whole weight of the body on this leg with a fully extended knee, the other knee on the contrary being bent, and that leg only serving as a prop to keep the body upright without bearing its proper share of weight. In consequence, the bent leg being the shorter of the two, the pelvis falls obliquely over to this side, and

thus induces a side bend of the spinal column, and of necessity a compensatory bend to the opposite side. This is clearly shown in (Fig. 2). The same effect is produced by standing with one leg in front of the other, by which the stretch of the pelvis of the forward foot is greater than the stretch of the backward foot, and the leg is shortened by the unconscious bend of the knee, thus causing the pelvis to sink to the side of the forward foot. This position is met with in girls much more often than in boys, because the pelvis of the female is broader than that of the male; it begins to increase about the tenth year, thereby pressing the hip joints further apart. If the child were to stand with its feet together, the upper part of the thigh would have to converge to the knees, in order to make it possible for the under part to meet, the legs forming more or less of an X; and it is to improve upon this uncomfortable position that the child puts one foot in front of the other. Therefore it is always best to accustom her to stand with her feet a little apart; two or three centimetres are quite enough to ensure the proper balance, and not enough to appear ungraceful. It is also a bad habit to sit with one leg crossed over the other, as this causes the pelvis to assume an oblique position, and the spine to be curved to one side.

The skoliose curve is very frequently caused by the

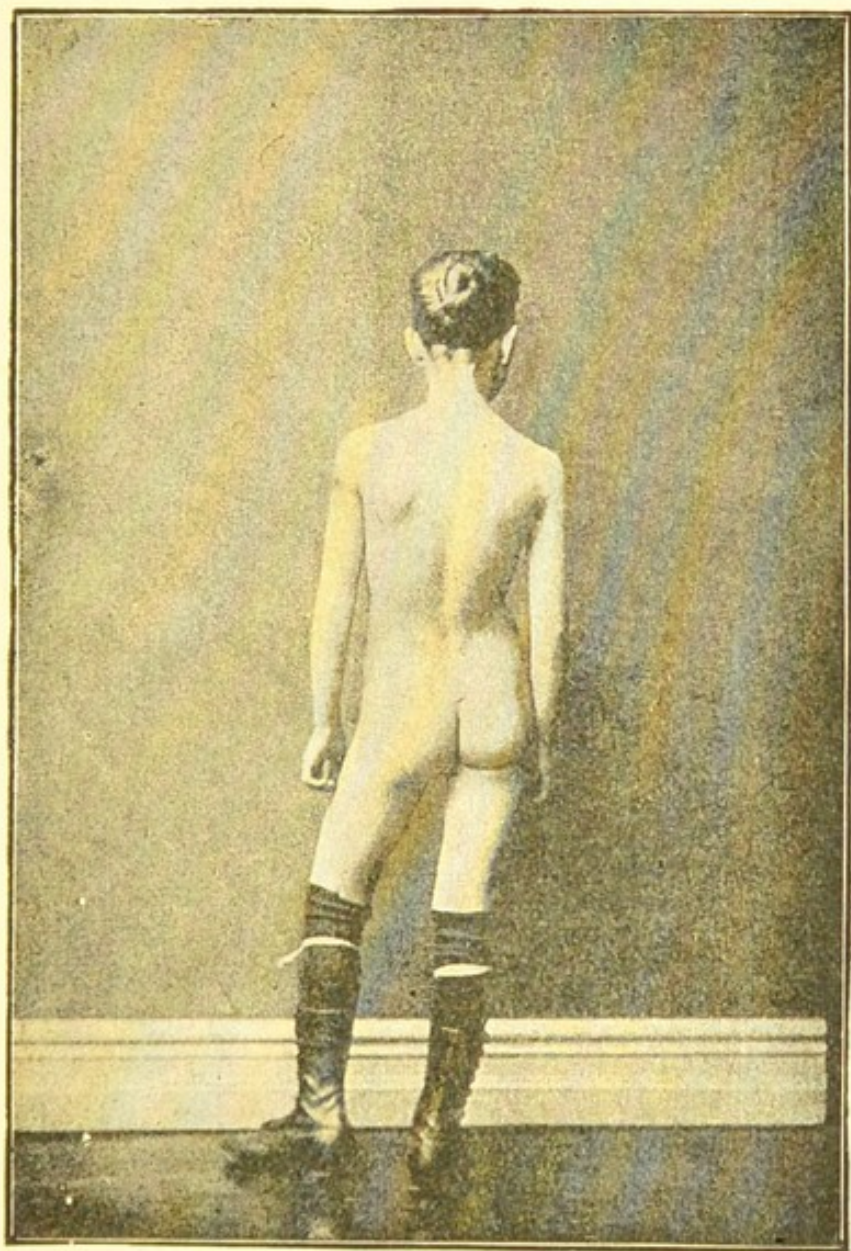


Fig. 2.

habitual carrying of weights upon one side. It does not require much explanation to show that if a child carry a weight of from 5 to 10 pounds of books in one hand or under one arm, the corresponding shoulder will be dragged down, and necessarily the spinal column will make a curve in the opposite direction (*see* Fig. 3). It is advisable that children should only be allowed to carry their school books in knapsacks strapped on to the back, each side of which should be equally weighted. Under the best conditions these knapsacks are the least of the two evils, but when unevenly weighted they are highly injurious. We will not discuss whether it is absolutely necessary for children to carry the number and weight of books to and from school which is required of them ; but this much may be said ; if so many books are necessary, the school administration should adopt some method by which the heavier ones need only be used at the school, and lighter and less voluminous books be used for the lessons which must be done at home. For if the State compels the child to go to school, and to undergo the constant risk of developing curvature of the spine, by carrying backwards and forwards this burden of books, universal education must be considered as at least a doubtful blessing. By this carrying of heavy weights on the back, the centre of gravity is moved from its normal position, and the pelvis also assumes a steeper



Fig. 3.

inclination, thus the back becomes abnormal and therefore diseased (*see* Fig. 4).

These positions, however, only occasionally cause serious curvature of the spinal column, for by far the greater number must be traced back to the position in which children are taught to write. To give all readers an opportunity of clearly understanding this evil, as well as the means of preventing it, we will discuss this point fully. Were we only to say how a child should sit and write, it would be little better than giving the opinion that every one who knew a number of prescriptions by heart is a physician.

A child is taught to write in the following position: she is seated on a chair or bench with a table placed in front of her, on which lies a copy-book with lines drawn horizontally across it. On these lines she must write in a sloping hand—the principal upward strokes running to the right, and the downward ones to the left—the table being more or less inclined, but in many cases perfectly flat. The child, in order to see clearly, must bend her head over till the frontal plane of the head—that is the thinking plane, which lies behind the forehead—is as nearly as possible parallel with the table. Now in most schools the tables are quite flat, or so little inclined that, in order to see well, the head must be very much bent over. Then, were the child's hand to be guided from line to line, the movement would be seen to be somewhat



Fig. 4.

like that of the pendulum of a clock, and as it is necessary that the point of junction of the pendulum with the clock should be exactly in the middle of the space to be traversed, so the elbow-joint should be exactly in the middle of the copy-book, allowing the hand to move freely. It is quite impossible if the copy-book lie straight in front of the child for her to write from the extreme end of one line to the extreme end of another without pushing the book either to the right or the left; for the central point, which should be the elbow-joint, is the middle of her chest, and therefore the arm has not free scope. In pushing the book from side to side, the probability is that it will rise either to the right or left, and the child's head be bent to the side corresponding with the hand—for, in order to see properly the straight line drawn through, both eyes must run nearly parallel with the copy-book line. This position, however, is uncomfortable, and very soon tires the neck muscles. To remedy this, the child holds her head straight, but pushes the whole of her body over to the one side, that is to say, as far over as her neighbour will allow her, for in schools the children are seated close together. Therefore the legs could only follow the body to a certain point, and would then have to take a slanting turn in the opposite direction, not to monopolise her neighbour's place. The spine thus makes a turn to the right or left, while the legs and pelvis remain un-

changed. We have just seen that the spinal column has a forward curve at the loins, and a backward curve at the chest; what, then, becomes of these? Assuming that the child has pushed her copy-book to the left, which most often occurs, and the lines ascend to the right, the right arm then rests upon the table, the right shoulder being raised, and the whole spinal column with its normal curves being pushed to the right (*see* Fig. 5). The chest curve must now adjust itself to a curve to the right, and the loin curve to a curve to the left.

The child follows all these movements instinctively from a pure adaptability to circumstances. We do many things unconsciously from the same feeling. For instance, when getting into bed on a cold winter's night, an involuntary impulse induces one to roll oneself into a ball, with arms and legs close to the body. Few people, however, know why this is the best way to get warm quickly; the reason being that the body thus holds its own heat, only allowing as much to disperse as it is capable of reproducing. The child in the same way induces this side curvature of the spine unconsciously, and from a pure adaptability to circumstances. If it only remained in this position for some hours once in a lifetime, it would do little harm; but when the child thus spends several hours of every day, during a period of many years (the years of the body's greatest development and its

greatest plasticity), it is not to be wondered if by degrees this crooked position becomes habitual, and the child does not again return to her normal upright bearing. Her doom is then sealed, for in a short time she will not be able to sit in a normal sitting position, and if the spine have developed a side curve, it will not only prevent her from sitting straight, but also from standing and walking straight. The vertebræ of the spinal column will have already adapted themselves in their growth to their new position, and the muscles will have already stiffened them into this side curve. Those muscles which are situated upon the convex side of the curve will have shortened themselves, whilst those on the concave side will have become lengthened. After this state has lasted for any length of time, a complete change will have taken place in the muscles, and in the ligaments which keep the spinal column in its place. Then neither the child herself nor outside influence will have the power to bring her again to a normal carriage. Sad cases such as this offer an almost unconquerable resistance to the most competent and energetic treatment. To them the bitter fate has been allotted of going through life as cripples. Yet how often do we hear it said : " That naughty child will not hold herself upright ; it is pure carelessness ! " and similar remarks ? Whereas an investigation might show that the carelessness was an organic defect.



Fig 5.

When the first signs of distortion appear (such as one shoulder drooping, and one hip coming more forward than the other, unevenness of the outline of the body, etc.), it is then high time to place the child under an expert orthopædist to be treated, for already curvature of the spinal column has begun.

CHAPTER IV.

HOW CAN THE DEPORTMENT AND DEVELOPMENT OF CHILDREN BE SUPERVISED?

IN the first instance let us consider how, through suitable methods, a curvature of the spine may be prevented.

As it is of the greatest importance that it should be discovered at its very earliest stage, children should be examined in the following manner at least once a month, either by their parents or the family physician:—The child stands naked opposite a window, her back to the light, her face turned away. The parent or physician places himself between the child and the window, in order to see clearly, and waits a few minutes, for the activity of the muscles will correct any little curvature at first, but when the tired stage has come, the following points are carefully observed. (*See Fig. 6.*) Whether the ear tips are level, or whether one is higher than the other, which would indicate that the head was not straightly placed on the body. Then the two contours of the neck must be observed, and the lines which form the neck and shoulders. These must be

exactly equal. Two fingers are then laid on the nape of the neck close to the two sides of the spinal column, and this must be followed down the back with a fairly hard pressure, which will leave two parallel red lines, and these should be exactly perpendicular.

The shoulder blades must then be observed to notice whether they are equal in height, equi-distant from the spine, and whether one or both lie close to the ribs or stand out from them like wings. The triangles of the figure are then considered. These should be formed on either side by the contour of the thoracic wall of the hip and the downward hanging arm. These two triangles must be exact, for the smallest difference is of bad import. Then both sides of the upper edge of the innominate bone are felt, reaching downwards till a blunt point is arrived at, and this marks the termination of the spinal column, and notice must be taken that both points are level.

The child then turns round, and her knee joints are observed. They should be exactly level. She then turns back, crosses her arms over her breast and leans forward, and the parent or physician steps close up to her, and bends her head down till her eyes are on a level with her back. The back is now examined from the neck to the pelvis to notice whether any difference exists in the halves of it.

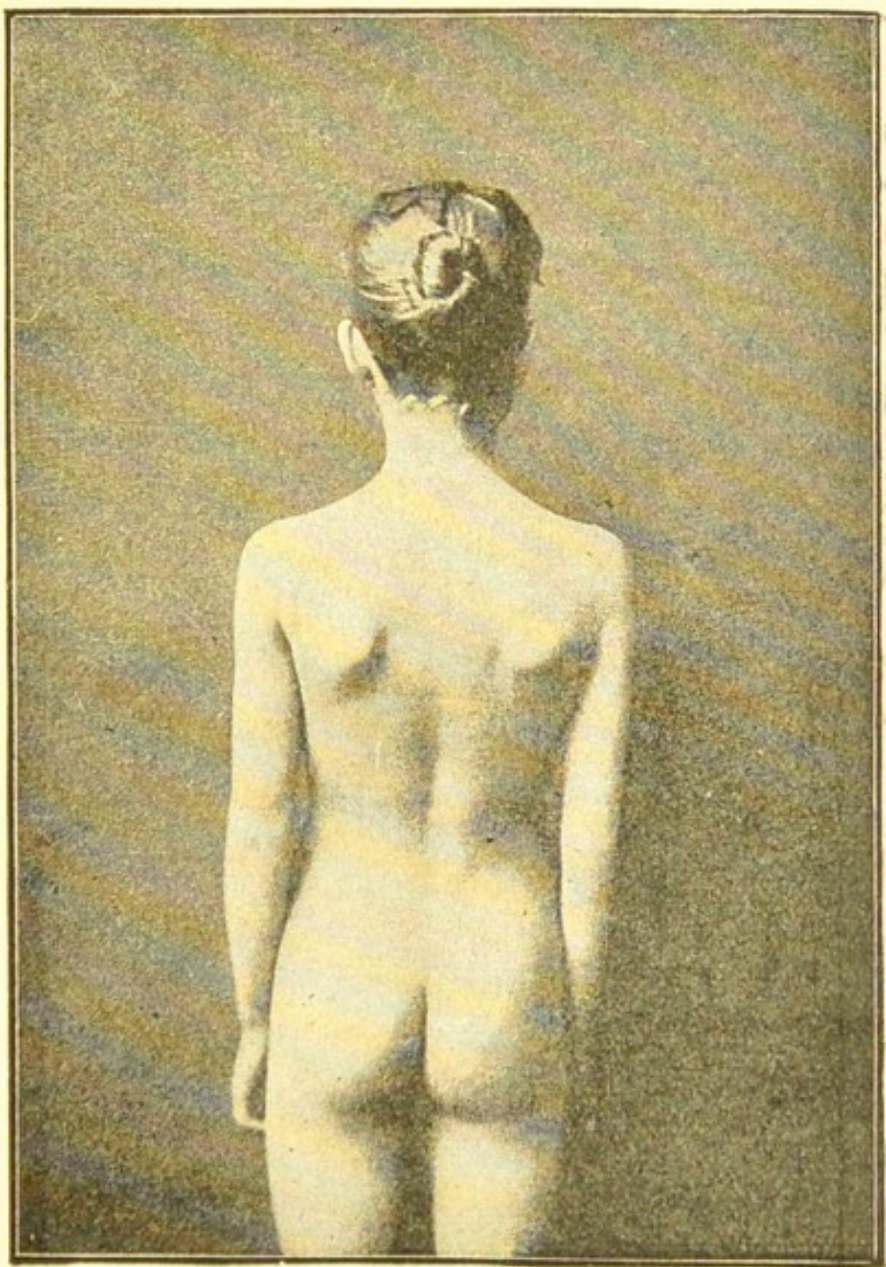


Fig. 6.

After this procedure has been gone through a few times, the person gets quite expert, and the eye by practice learns to see and discern. The whole examination need only last five minutes, and conscientious parents will devote these five minutes once every month to each of their children. By this exact and careful comparison of the halves of the body, the very smallest deviation from the normal will at once be noticed, and when this is the case there is danger in delay, and only immediate help can be successful.

CHAPTER V.

HOW CAN CURVATURE OR AWKWARD DEPORTMENT BE PREVENTED?

IN order to glance through the whole mass of circumstances which occur in a child's early life, and to show how to guard against a faulty or crooked bearing, this chapter will be divided under two heads or categories. Part I. will show how from the first day of a child's life it may be treated so as to develop powerfully its whole organism, and thus be able to successfully combat injurious influences. Part II. will deal with the influences of every-day life : those which may lead to awkward deportment ; how to counteract and minimise the evil when it has once appeared, and to completely remove it in its earliest stage.

FIRST PART.

GENERAL MASS OF CIRCUMSTANCES.

AS soon as a child is born and clothed it must be placed in a cot which is long enough to allow of its little legs being fully stretched out. Padded baskets

are most injurious, causing the infant from the first day of its life to lie with a curved spine. As soon as the navel-string has fallen off and the wound completely healed, all swaddling clothes must be abandoned, for these contract the chest and do not permit an ordinary deep breath to be taken. The full development of the thorax is of the greatest importance in the building up of the organism, and for the strong development of the lungs and thorax, crying does more than anything else. It is a great mistake to try every means to stop a child from crying, because crying is as much a necessity to a child as speaking is to a grown-up person. Children often cry when anticipating the greatest pleasure.

The child should lie upon a moderately pliable bed, the spinal column being always fully stretched, and the pillow and the mattress should be stuffed with horse hair or India fibre. It is a good thing, however, to allow a feather pillow as long as the cranium is soft and the bones not completely ossified ; but as soon as a general formation of the bones of the head has taken place and the great Fontanelle (the Life in ordinary parlance) is closed, the child should be given a wedge-shaped pillow stuffed with horse hair. For covering, use a feather quilt, and in winter two blankets or quilted coverlets. Feather beds should on no account be used, for they weaken the body, and prevent a normal outstretched position

of the back. A daily bath should be given, the temperature 28° Réaumur for the first two months, up to the fourth month $27\frac{1}{2}^{\circ}$, from the fourth to sixth month 27° , from then to the first year 26° , 25° up to the second year, and after that 24° .¹ After the child is six months old its back should be treated with cold massage. When taken out of the bath it is wrapped in a bath towel, leaving only the face free, and the whole body, especially the back, is well massaged. From nine months to one year, when the skin is not so tender, the back can be rubbed with a weak cold mixture of French brandy and water. After the fourth month, to make the bath more invigorating, an infusion of field cummin, sweet flag, and camomile may be used, producing an aromatic bath. From the sixth to seventh month Strassfurt salt may be used, beginning with half a pound to a bath, and increasing gradually till (when the child has reached its second year) three pounds may go to a bath. During the first three months of a child's life, before being put to bed, its whole body should be washed with warm water, and afterwards with cold.

A child should always be kept in a lying position till it first makes an attempt to raise itself upright. It should then be supported by a cushion in a position which is almost recumbent.

¹ To convert Réaumur into Fahrenheit, multiply by 9, divide by 4, and add 32.

Great care must be taken when carrying it in a sitting position, as the general method of carrying is very easily productive of harm (*see* Fig. 7). Usually the nurse carries the child upon the left arm, to have the right free for other things. Moreover, she holds the left under arm upon which



Fig. 7.

the child sits in an obtuse angle, quite close to her body. The child's pelvis is thus placed in a slanting position, and to make use of its right hand, which lies close to the maid's chest, it must make a bend in its spinal column. These two points show how easily

a serious side curvature of the spine might set in at a very early age. Children should seldom be carried in a sitting posture, but when that is done, the arm should be constantly changed, so that, if by a careless method the spine should take a side curve, the constant changing from arm to arm will, at least, minimise the mischief and prevent a curvature of a lasting nature from arising.

Further, the nurse should not allow the infant to lean against her breast, but should try to keep the under arm as free as possible, and pay particular attention that the arm upon which she carries the child is bent at a right angle at the elbow joint. Thus it will sit upon a horizontal support, and the pelvis will not need to be in a sloping position. This method of carrying is more difficult than the customary one, and taxes a nurse's strength more.

The widely spread habit amongst the overcrowded poor, of allowing children to carry babies about, is specially injurious, for both baby and its young nurse run a serious risk of becoming crooked for life.

When a child can sit upright, it should be accustomed to sit in a baby's chair, care being taken that the chair has a sloping back, for, when tired and wanting to lean back, the child cannot do so with any comfort upon a straight back.

Parents are particularly proud when their babies

begin to walk and run about early, and they take great pains to enable them to accomplish this achievement, quite forgetting that it may be a source of great harm to their little ones. As we have already shown, the normal curves of the spinal column develop themselves from the moment the child stands upright and begins walking and running. If the bones and muscles then are not strong enough, the normal curves may form themselves abnormally and cause a malformation of the spinal column. Besides, at such an early age the legs are not strong enough to support the weight of the body, and cross legs or bandy legs easily develop. Again, one leg may be shorter than the other, the consequence of which is that the pelvis becomes inclined to the side of the shorter leg. One hip will thus be higher than its fellow, causing a corresponding curve of the spine.

When, then, is the proper time to allow a child to stand and walk? No strict rules can be laid down, for so much depends upon the individual development. Generally speaking, up to the first year no attempt is made to stand or walk. The child itself should always make the first attempt to sit upright. But if up to the eighteenth month no attempt has been made on its part, it is safe to assume that there is some reason for the want of enterprise, and medical advice should be sought. "Rickets" is the general cause, which is known as

the "English disease." A thoroughly suitable diet should be given, for it is quite clear that a well-nourished child will be able to offer a much greater resistance to harmful influences than a badly nourished one. It would take me too long and too far from my point to enter into this subject, so I leave my reader to get his information elsewhere. To derive the full benefit from advice, and to be entirely successful in the avoidance of even a slight deformity, it is necessary to comply strictly with hygienic and dietetic rules.

When a child is three years old, it may be sent to a kindergarten or play school; but it should be ascertained that the children are either allowed to play and learn in the open air, or in large and well-ventilated rooms.

Words cannot sufficiently condemn the practice of compelling poor little wretches to sit in badly ventilated and badly lighted rooms, stooping over fine needlework, or plaiting paper into elaborate designs, and thereby spoiling not only their good deportment but their eyesight also.

When their work is brought home, looking neat and pretty, ignorant and infatuated parents consider it a sign of a considerable talent which is slumbering in their offspring. At this age, children should only play; they could be taught games by which their bodies may be freely developed, and a game might

be chosen requiring a certain amount of skill, which will develop their minds, certainly to the extent which plaiting paper does. Games are to be recommended not only for little children but also for bigger ones, and it is to be deeply deplored that the opinion has become current that open-air games are only for little children, and are not consistent with a good education.

In this respect, practical English people show us a good example. With them the man and the child, the nobleman and the artisan, amuse themselves in their leisure hours with outdoor games, for instance cricket and football and tennis; and almost every individual shows a predilection towards some particular sport—be it rowing, sailing, riding, cricket, or tennis.

In large towns, almost insurmountable obstacles stand between the great mass of people and outdoor games. To facilitate and encourage these games, authorities should come forward with a helping hand, and it must be acknowledged that here and there efforts in this direction are being made, though not always with success; rich and poor, great and small, should interest themselves in this subject; for it is by outdoor exercise that Nature satisfies many of her wants.

Children by this means have an opportunity for counteracting the bad effects of sitting in closely con-

finer school-rooms, and the spirit of many harmful passions would be diverted and led into a rational and health-giving recreation.

Great dangers threaten a child's spine during her school days, owing to the unsuitable sitting accommodation which is provided, and to the position in which children are taught to write.

School benches are quite unsuitable for their purpose, both in size and form. This improper arrangement, however, is beginning to be realised by schoolmasters and schoolmistresses, some of whom have already introduced well-constructed benches. Nevertheless, there are great obstacles against the universal introduction of these benches, which arise partly from the fact that some have not the intelligence and the good sense to appreciate their value, whilst others have not the necessary capital to expend in their purchase.

It is not of much use to provide for children sitting upright at school, if they are to be permitted to sit as they like when at home doing their school preparations.

Many expensive school tables have been devised, whose chief use seems to be to occupy as much room as possible.

We now put forward a method by which the child of the poor man, equally with that of the rich, may

be able to do his school exercises at home without in any way impairing his health.

A rational seat, be it for school or home, should fulfil the following conditions:—It should be as high from the ground as the child's legs are long; allowing the soles of the feet (and not only the tips of the toes) to rest upon the ground.

It must be as broad as the length of the thighs, allowing from the popliteal space to the tuber ischii to rest upon the seat. The back must reach to the shoulders and be slightly sloped to allow of the whole back to rest against it. The governess, upon æsthetic grounds, may exclaim against this leaning back. My endeavour is to ward off the unæsthetic bad consequences which a want of a back support may oblige me to discover. A child, or even a grown-up person, is absolutely not able to sit for hours together with a fully extended spinal column. The muscles get tired, and the whole of the upper part of the body sinks. If there be only a perpendicular back to a child's chair or bench, try as she may, she cannot get a real rest for the back, the nearest approach to it being when she pushes herself along the seat till the body leans against the back of the seat, or bends forward with the chest or arms, and leaning upon the table. In both cases the absolutely necessary rest for the back muscular system is only partially obtained; for only one line of the chest or of the back is supported, and

it is necessary that the back in its full extension should be rested. After a time these positions become uncomfortable, and the child gives them up, and lets the body sink till the back becomes quite curved; and she sits habitually in this position. It would be far better to allow her to sit in a comfortable arm-chair with a sloping back.

School benches should always have sloping backs, and, if possible, arched backs; that is to say, the under portion of the back of the seat should consist of an arch which would about fit the normal lumbar curve, thus resting the spinal column and the whole of the upper part of the body. The writing-table must be our next consideration. This should be high enough to allow of the child's elbow and the edge of the table being level. With the other arm she should feel that this is so. Thus the forearm can be used without stooping, and the shoulders need not be raised. The table and the bench will not be two perpendicular planes exactly under each other, which will be clearly shown by dropping a plumb-line from the edge of the desk to the ground. This will cut a little behind the forward edge of the seat. The seat must be pushed under the table far enough to allow of the extreme edge of the desk touching lightly the child's chest, when leaning back, but not in any way interfering with the breathing. The plane of the desk must be nearly parallel with the frontal

plane of the face. Thus, in order to bend the head only very slightly forward, the writing-desk must be as sloping as it is possible to be without the ink running back in the pen—probably a slope of from fifteen to seventeen degrees. Even now the whole difficulty is not encompassed; for to avoid the necessity of the head being constantly turned, the copy-book must be exactly straight; that is, its edge parallel with the edge of the desk. In this position it would be quite impossible to write in the customary sloping hand; which exacts that the fundamental strokes should run from right above to left below. Therefore, to complete our innovations, we now ask that children should be taught an upright handwriting.

The advantages of the upright hand over the sloping are gradually being realised by a large number of school instructors, and it is only to be regretted that this knowledge had not dawned earlier upon them.

The position of the table with reference to the light would depend upon the time spent in writing. It is necessary that the light should either come from the left or from a skylight. Then the child will not be obliged to sit crookedly to keep the shade off her copy-book. In reading or attending to a lesson, children should be seated, but in the position already described. Attempts to introduce this into schools have hitherto been frustrated, owing to teachers in-

sisting that when reading or answering a question the child must be standing; and seated in this position it would be impossible to stand up on the instant. There are three ways, however, which would harmonise with hygienic conditions, and the demands of teachers. (1) That every two children should have a bench, thus being able to step forward at once when called upon. (2) That every desk be fitted with a flap or sliding arrangement, which would make it possible for the child to stand up at the bench. (3) That the seat should be so constructed that it could be let down or pushed back with ease, also enabling the child to stand up at the bench.

Of these three ways, No. 2 is the most suitable, for by it a writing-table with a negative distance can be changed into one with a positive distance for reading or attending to a lesson. Already these school benches and desks are made by a variety of makers, any of which are improvements on their predecessors on the old system.

It is to be hoped that the time is not far distant when this very important hygienic question will receive its proper share of consideration from the authorities, and that the physician will be allowed a word in the school management. When this result is attained, the school may be a place for the physical and intellectual development of the young. Until this time we must content ourselves with complying

with hygienic conditions for home work, and this can be done in the following simple way, and with small expenditure (*see* Fig. 8).



Fig. 8.

Take a square table, and place it so that the light from the window falls from the left. In the evening, the lamp should hang immediately above it. The seat should be a so-called Vienna chair with a slop-

ing back, which, if not made of cane, might be covered with a firmly fixed cushion. Under the table there should be a little platform, which could be made by any carpenter, and should be just high enough to allow the child's elbows, when writing, to be on a level with the edge of the table. And there should be a footstool of some kind for the soles of the feet to rest on.

Upon the table is placed the writing-desk, made of three boards, with an inclination of 17° (*see* Fig. 8).

When the child is seated, her chair is pushed under the table, so that the table's edge may lightly touch the waist. This simple method produces an ideal writing-table. For reading, the table and the chair can be parted a little. Should the child still show a tendency to stoop, two straps with clasps might be attached to the cushion at the back of the chair, going round the shoulders, and keeping her in an upright position. If any difficulty is experienced in seeing, it will show that the eyes are not normal, and an oculist should be consulted.

What length of time should a child devote to home preparation? There should be no home preparation. She goes to school to learn, and her spare time should be recreation. It is admitted by professional men that the better the teacher the less the home preparation, and *vice versa*.

To be just, however, one must admit that with the

greatest ability, it is not possible to teach a large number of pupils without giving a great deal of home preparation. No teacher should have more than 20 pupils at the same time ; a fact which, if observed, would occasion a large increase of the teaching staff of most schools. Further, the studies should be so simplified as only to teach what is worth knowing, putting all that is unnecessary on one side. In girls' schools elaborate embroidery and needlework are universally taught. It must be allowed that for the future housewife a knowledge of needlework is necessary, yet much of the good done must be undone, when the girl sacrifices her upright carriage for the sake of an elegant piece of work. Indeed, it is sad to see these poor creatures, hot and tired after their lessons, shut up in a stuffy room, cowering over their needlework instead of taking exercise in the open air. If this needlework be absolutely necessary, it should be done (weather permitting) outside, in a garden belonging to the school ; and whilst employed in it the children should be given suitable chairs or benches to sit on, and so diminish the risk of spinal curvature. When the child is fortunate enough to have finished her school hours, her needlework, and her home preparation, she has probably arrived at her piano practice hour. In many cases the poor little victim of modern education is dragged to the piano, even if she have no musical talent, nor any pleasure in

music ; and the playing is too often a burden rather than a joy. Even this is not all—for the rest of the day is then spent in a sitting position, without a rest for the back or a support for the feet. It is a proof of the great, one might almost say undeserved, goodness of Nature, that all children are not crooked or deformed, and that so many are spared. It would be wrong, however, to suppose that music should not be cultivated. For a thorough education it is absolutely indispensable. When the study of music runs parallel with games or gymnastic exercise it is beneficial, but alone it contributes to the enervation of the body. Unfortunately, in the present day, the enjoyment derived from bodily exercise has been quite superseded by that derived from music. It is, therefore, not to be wondered at, that neurasthenia and hysteria should be the order of the day, especially amongst the wealthy classes.

Music, on one hand, has a tiring and intellectually relaxing influence, whilst on the other it has an almost superhuman invigorating power. When soldiers have lain down after a long march, so tired as to be hardly able to put one foot in front of the other, and suddenly the regimental band has struck up an inspiring march, the tired soldiers jump up as if electrified, their legs and bodies no longer feeling fatigue.

The music for the young should be of a kind that

induces strength and animation, not that which weakens and enfeebles.

A kind nature has given us a healthful and beautiful music—the voice. Singing not only contributes indirectly to our health, in as much as it refreshes and invigorates, but it forms directly an excellent gymnastic exercise for the lungs. An ordinary breath is quite incomplete and insufficient (especially in sitting), for it only extends the thorax sufficiently to take in the exact amount of air which is absolutely necessary. Parts of the lungs—the apices—are thus shut out from the current of air, and when dust, or the worst enemy of mankind, the tubercle bacilli, succeed in gaining entrance to the lungs, they remain undisturbed. An exhaustive breath now would dislodge and completely expel them from the lungs. Quite a slight cold on the lungs can produce suitable conditions under which the tubercular bacilla could begin its terrible work of destruction.

Children should be taught to take deep breaths, whereby the current of air penetrates to the apices of the lungs, thus keeping them in some measure free from dust and bacilli. These deep respirations are best produced by singing. It may seem remarkable to many to say that singing produces a good carriage, and yet it is so. Already the fact that it extends the lungs has been insisted on. With the lungs, the thorax and both sides of the body are ex-

tended to their utmost limit. The chest is equally developed, enabling a powerful resistance to be offered to any tendency to side curvature of the spinal column.

An important factor in the prevention of bad deportment in children (especially girls) is their clothing. The much disputed corset must now come under discussion. Physicians mostly condemn it, yet unjustly, for the corset is not to be condemned, but only the unreasonable use of it.

The following instructions will enable anyone to make a reasonable use of the corset. From a child's first year her clothes should be hooked on, or she might wear a so-called English bodice, which is of advantage in protecting and supporting the weak upper part of the body. At the fifth year this bodice is exchanged for one of a firm material, such as drill, etc. Boys having more strongly developed bones and muscles, leave the bodice off at this age. From eight to ten years, the girl wears a corset with quite pliable whalebones let in ; whilst at the age of puberty, between twelve and fifteen, the usual corset is worn, the mammary glands now developing more quickly. The bones of the corset should always be made of good whalebone, never of steel. The last and most important condition of the corset is, that it should never be laced so tightly as to prevent the lungs being inflated to the utmost limit, and the breathing

should never be interfered with. Under these conditions the corset is to be recommended ; but as a means of obtaining the smallest possible waist, it is a source of the greatest injury.

Further, the corset should be made to fit the person, and not bought ready-made. The clothes should be fastened outside, preferably buttoned on to it, for the strings tied underneath the corsets make deep indentures in the skin, pressing through into the ribs, liver, etc., and thus a displacement of the various organs might be brought about.

Boots and shoes are also of great importance in hygienic considerations. The feet should be able to tread comfortably in them, without any tired feeling being caused by the unsuitable make of the boot. This cannot be the case with the modern high heel, which is placed near the middle of the sole of the foot. The heel of the boot should be under the heel of the foot ; it should be moderately wide, and not too high.

The head-covering is also an hygienic consideration. It should be light, and worn exactly on the middle of the head ; for if the hat be heavier on the one side than on the other, the head will incline to the heavier side, and will thus be in a position to favour a curvature of the cervical part of the spinal column.

The question of school books must next come

under discussion. A child in going to school should carry a knapsack strapped across her back. The books in the knapsack being equally balanced. The general custom amongst boys is to carry their books under one arm, and amongst girls it is at present fashionable to have a fancy pocket, which is carried over the arm. Therefore the knapsack is the least of the two evils ; but all the same it is an evil, owing to the fact already alluded to, that parents and teachers are not sufficiently careful on the one hand—to see that the children only take the necessary number of books to school for the days work, and on the other—that the books are bound in single volumes, and in soft cloth covers. Teachers when spoken to on this point complain that children carry their whole stock of books, of copy-books, and even a number of filled-up copy-books daily, backwards and forwards, for fear of forgetting some book necessary for their day's lessons.

It might be a good plan if, from time to time, governesses were to empty the scholars satchels—reprimanding and punishing those who brought more books with them than they needed. Careful attention to this point is absolutely necessary to check after mischief, which otherwise might arise.

SECOND PART.

SPECIAL EXERCISES FOR DEPARTMENT AT IMPORTANT PERIODS OF DEVELOPMENT.

So far our subject has been to guard a child from harmful habits. It will now be to counteract and render comparatively harmless certain injurious influences, which actually exist, and which we are not in a position to remove. It is in our power, however, to clothe a child suitably, to make her write at home upon a suitable table; and on the whole, to counteract the combination of harmful influences of a school life. At the same time, school authorities should be compelled to comply with the strictest hygienic demands, and if these are neglected it is desirable that people should have their children educated at home.

The principal causes of bad carriage are, as we have already seen—(1) Children are made to sit for an unnaturally long time; (2) the writing posture is faulty both as regards the position of the hand and arm, and of the construction of the benches used.

Parents are comparatively powerless to prevent these two evils. Does it not show an entire misconception of the case, when teachers are heard perpetually telling their pupils to sit upright on benches on which they can only sit crookedly? Similarly, parents

are heard reprimanding children for not holding themselves straight when walking. Now the child may have a defective development, in which case it would not be in her power to walk erect, and having once become accustomed to a crooked bearing, she considers that she is upright, when in reality she is leaning to one side, and every reprimand to walk straight only increases her crookedness. In order to completely amend harmful influences it is necessary—(1) That all the joints, and especially those of the vertebral column, have their normal mobility, so that the faulty position assumed by the child for writing should not become habitual; (2) that the mass of muscles, especially those of the back, should be so strengthened that even if the vertebral column should have a slight side curvature, the body would be always brought back to its normal upright bearing.

MOBILISATION OF THE JOINTS.

In order that the joints, and especially those of the vertebral column, should suffer no loss of their normal mobility, they should be exercised daily, and to this exercise, at least, an hour every day should be devoted. The simple active gymnastic exercises suffice for this, whilst for the strengthening of the muscles, resistance gymnastics must be used. We cannot describe all the gymnastic exercises, and shall there-

fore confine ourselves to these which should, under all circumstances, be used daily to preserve the mobility of the vertebral column.

GROUP I.

EXERCISES FOR FREEDOM.

THE child stands in the first or fundamental position, namely: An upright bearing, heels touching each other, feet forming a right angle, stomach drawn in, chest pressed out, shoulders drawn back, head upright, eyes looking straight ahead, arms bent at elbow joints, hands firmly supported on hips, thumbs lying backwards, fingers forwards.

1. Body bent backwards and forwards.

The body is bent forwards as far as possible, the knees pressed together. Then straightened, and bent backwards as far as the keeping of equilibrium will permit. The forward movement is then repeated, the whole exercise being done very slowly, and repeated from five to ten times. This will apply to all the following exercises.

2. Body bent sideways to right and left, and body rocked.

The body is inclined first to the right and then to

the left, almost assuming a horizontal position without turning.

3. Body turned right or left.

Whilst the legs remain unchanged the body is turned to the right, till the face looks exactly right ; to the left till the face looks exactly left, and so on.

4. Body wheeled right and left.

The body is bent forward, without a pause it is passed slowly to the right, backwards, and, finally, to the left in the bent position. Without being raised upright the body returns to the forward bent position to recommence the exercise, which is then begun on the left side.

5. Dipping exercise.

This is executed in three movements :—

1st Movement.—The feet are placed sideways in the spread position, the arms stretched upwards till the finger tips touch.

2nd Movement.—The body is bent forward till it is nearly horizontal.

3rd Movement.—The head and arms are raised upwards, till the back forms a bow.

These positions must be held for some time, thus well stretching the knees.

The child at first will feel a pain in the knees and the nape of the neck, but with frequent use will soon pass away. This being always a difficult exercise the child may in the beginning be supported by plac-

ing one hand on her back near the shoulder blades, and with the other holding her uplifted hands and pressing them upwards. To get back from the latter position, there are three movements :—



Fig. 9.

1st. Arms and head return to the horizontal position.

2nd. The body is stretched.

3rd. The feet are placed at right angles to each other, the arms being lowered.

To repeat the exercise, the feet can remain spread and the arms stretched upwards.

6. Shoulders raised and lowered.

(a) Together.

(b) Alternately.

The child stands in the first position, the hands supported on the hips. The shoulders are then raised as high as possible (without, however, pushing the head forward), and then covered. Or, alternately, one shoulder is raised, and while sinking the other one is raised, and so forth.

7. Shoulders drawn backwards.

The shoulders are drawn backwards as far as possible—brought back to their starting position, and then drawn back again. The beginner can be helped in this exercise by holding the two shoulders from above and drawing them backwards, whilst with the thumbs the spine is supported.

8. Head wheeled right and left.

The head is now turned in the same way as the body was (without, however, moving the latter) to the right and the left. This exercise is performed very slowly, and is not repeated many times in succession, for children easily get giddy from doing it, and it is best attempted when seated on a stool.

9. Head turned right and left.

The head now makes a turn to the right on its own axis till the nose is over the right shoulder, and to the left till the nose is over the left shoulder, and so on.

GROUP II.

EXERCISES WITH THE STICK.

FOR these exercises a rounded stick is used. It is made of a light wood, and is three feet long and an inch and a half thick.

1. Stick carried backwards.

The child holds the stick with both hands, the backs turned outwards, the distance between the hands being about double the breadth of the body. This exercise is performed in three movements:—

1st. The stick is raised till the arms are horizontal.

2nd. The stick is raised till it is held exactly over the head.

3rd. The arms are carried backwards till the stick lies against the back of the body, the arms being stretched, and the stick held horizontally. In the same way, the stick is brought back to its starting position, also in three moves.

2. Knees bent and stretched, making use of stick.

The stick is placed against the back, resting in the bend of the arms, and the hands are placed slightly above the hips (Fig. 10).

This exercise has three movements :—

1st. The heels are raised till the child is standing on his toes, his heels touching each other.

2nd. The knees are bent outwards as far as possible, the child almost sitting on the heels. The knee is



Fig. 10.

then stretched and the heel is sunk. Care should be taken that the hands are not loosened ; the stick is in consequence, drawn firmly into the bend of the back, and the child maintains as much as possible an upright position of the spinal column in order to keep his or her balance.

3. Slow steps with use of stick (Figs. 11 and 12).

The child holds the hands and the stick in the same position as in the preceding exercise. The exercise must be performed very precisely, or it will fail in



Fig. 11.

its purpose, which is to produce a good form of walking. It has two movements:—The child is in the first position with closed feet.

1st Movement.—The left leg is quickly stretched

out and held there, the toes pointing downwards and outwards, the body remaining perfectly motionless, and the position is kept till the child stands safely and without moving.



Fig. 12.

2nd Movement.—The left foot is placed on the ground, and the right is raised until only the toe touches the ground, both legs being stretched. This position is also held till the child feels herself abso-

lutely safe. The right leg is then stretched out again, and so on.

The effect of this exercise is, that the child finds her proper balance in order to keep her equilibrium, and moreover the body must be more or less in a symmetrical position; that is to say, the spinal column must be more or less normally placed. To increase the good effect of this exercise, some small object, such as a pin-cushion, may be placed on the child's head, with instructions to keep it on during the exercise. By this means is produced a good elastic walk, which is an absolute necessity for a good carriage.

The following exercise is for the same purpose:—

4. The continued run, using stick.

The stick is held in the same way as in the preceding exercises, only the hands, instead of being laid flat, are clenched and stretched forward. The run is continued on the toes, and quite short steps are taken, about a third or a fourth of the usual step. This is done in quick time, not less than two steps being taken in a second. The body is bent slightly forward, and the knees are very slightly bent. This run must be continued only as long as the breath comes quietly and normally, and must be stopped as soon as the child breathes audibly, or according to the usual expression, "gets out of breath."

GROUP III.

DUMB-BELL EXERCISES.

IT is a very common mistake in dumb-bell exercises to make use of too heavy dumb-bells, the consequence being that more harm than good is done. Children under six years should use dumb-bells weighing one pound, from six to ten years two pounds, and over ten years from three to four pounds weight. This is, of course, open to modification, for delicate and weakly children must have lighter dumb-bells.

1. Body bent forward and stretched, using dumb-bells.

The legs are spread, and the arms are stretched forwards, the body is bent very slowly forward till the dumb-bells touch the ground. The body is then slowly raised again, the arms and legs remaining stretched.

2. Dumb-bells swung right and left with turn of body.

The child stands in the first position, the feet closed. The arms with dumb-bells are then swung to the right, the body at the same time making a turn on its own axis; the arms are then swung to the left, the body making the same turn, and so on, the arms keeping a horizontal position as the result of the swinging power.

3. Body bent right and left, using dumb-bells.

The legs are spread, and the hands with dumb-bells are stretched outwards. The right knee is then bent, and the body leaned slightly to the right, the face and body looking that way. This bend is continued till the dumb-bells touch the ground. The body is then straightened, and the exercise repeated to the left.

4. Arms thrust right and left, using dumb-bells.

To execute this exercise the left arm rests on the head, the left hand touching the right ear. It is performed in two movements.

1st Movement.—The right arm holding the dumb-bell is bent till it is on a level with the hip, only a little behind it. The dumb-bell is then thrust to the left backwards and upwards. The left thrust is slightly different, and is done in the following manner:—

5. Arms and legs thrust to the left, using dumb-bells (Fig. 13).

This exercise is done with only one dumb-bell, and in two movements. If done to the right, the dumb-bell is held in the right hand, whilst the left is resting on the hips. The right arm is bent and drawn downwards to the chest, the dumb-bell resting on the right shoulder. The left leg is raised from the ground, stretched to its fullest extent from the knee joint, the thigh and the body. The right leg, which supports the body, is then bent from the knee joint.

2nd Movement.—This is a powerful thrust of the right arm to the right upwards ; and of the right leg to the left downwards, without, however, touching the ground, the right leg being stretched in the



Fig. 13.

same way. These three exercises are done in equal time, as quickly as possible and with an energetic thrust. The exercise is repeated to the left.

6. Arms with dumb-bells swung right and left,

forwards and backwards (Fig. 14). For this only one dumb-bell is used. If the exercise is going to be done with the right arm, the left arm is raised upwards—walking in this position to a side of the wall

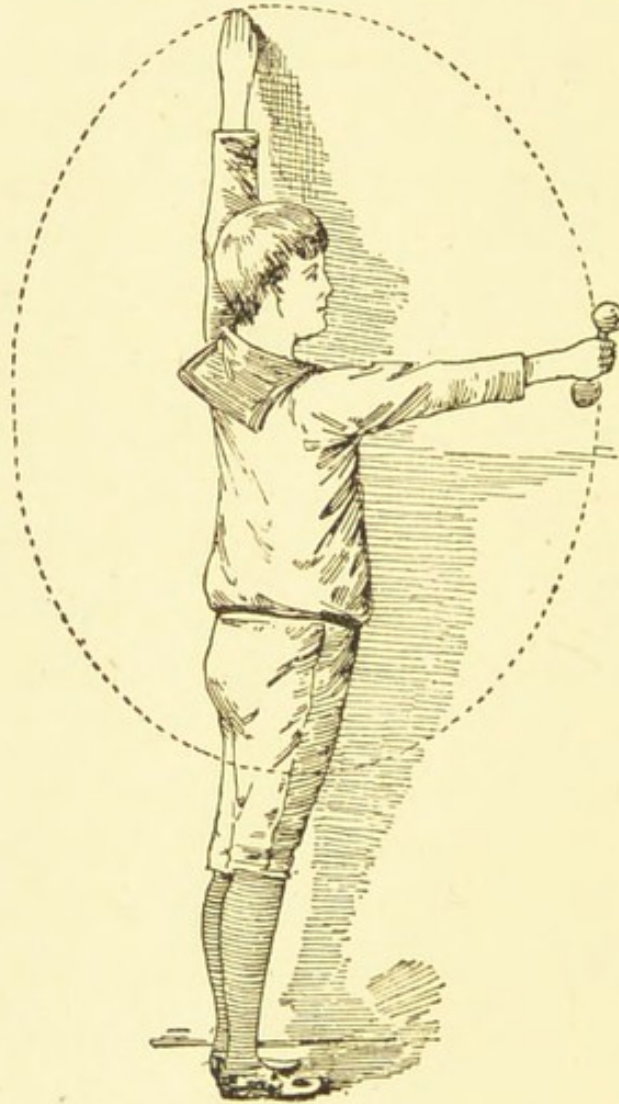


Fig. 14.

against which the left arm is firmly pressed, the feet are closed and stand close to the wall, then with the dumb-bell and the right arm the largest possible circle is described, forwards and backwards. The same movement is repeated with the left arm.

GROUP IV.

EXERCISES WITH GYMNASTIC APPARATUS.

THIS group contains exercises which are done with such simple apparatus as are to be found in nearly every nursery, namely a couple of rings, a swing, and a ladder.

EXERCISES ON RINGS.

The rings are fastened firmly to the ceiling with straps, or ropes.

1st Exercise (Fig. 15).—The rings are buckled up till they reach the child's shoulders. He is then placed exactly under them, takes a ring in each hand, lets himself fall slowly backwards till the arms are stretched and the back forms a convex bow, after which he pulls himself up, and slides forward till the arms are again stretched and the body forms a convex bow. The feet are not moved, but remain on the same spot, so that the legs are stretched during the whole time, and the bend takes place principally in the joints of the vertebral column.

2nd Exercise.—The rings are buckled till they can only be reached on tip-toe. The child takes a firm hold of the rings, pushes himself off with the tips of his toes, and swings. The feet being closed and

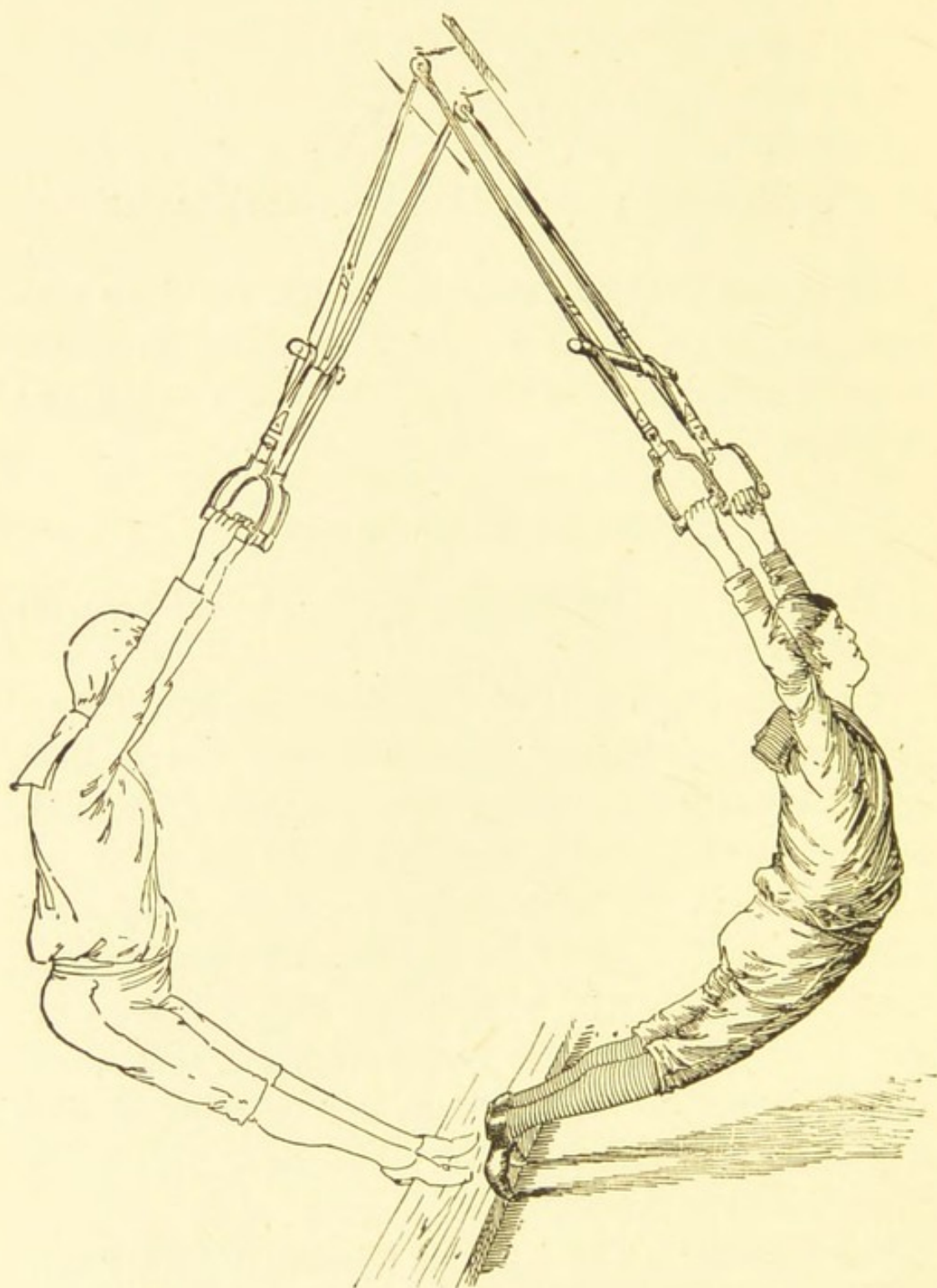


Fig. 15.

stretched out for the forward movement, whilst for the backward they are drawn up and thrown backwards to give a greater impetus to the backward swing, the child swings forward to the point where his feet touch the ground, and with the tips of his toes makes two or three quick steps in order to get up a good swing. When this is attained the pushing off is discontinued, for the movements of the legs will keep up the motion.

This exercise may be modified by using a suspended belt instead of the rings; this belt goes round the body from the breast to the back, thus suspending the child by his arms, the hands lying flat upon the breast. The above exercise is then repeated.

EXERCISES ON THE UPRIGHT LADDER.

1st Exercise.—The child steps on to the ladder with the back turned towards it, stretches her arms upwards and takes hold of the highest step which she can reach, draws herself up, her body extended, till her arms reach the higher step. After a pause, the hands are again reached up to a higher step, the body also drawn up and this is continued till the top step is reached, when the downward movement is commenced. This is done by reaching downwards with the arms, while the body fully extended is slid

downwards till the feet have gained the next step. In the middle there is a halt, and two further exercises are then done. The body will hang loosely on the hands, not supported by the feet; the legs stretched and closed are slowly raised till they are horizontal, forming a right angle with the body; they are then slowly lowered. This is repeated several times.

For the next exercise, as for the preceding one, the body is suspended freely from one step, and by a side swing is made to hang from right to left, the legs remaining stretched and closed (*see* Fig. 16). If this group of exercises should prove too fatiguing it goes without saying, that each exercise may be done separately or two together. The child stands on the first step of the ladder, her back turned towards it, whilst with her hands she holds the two sides firmly, about the height of the hips. She then lets herself fall slowly forward, her arms and legs extended, her head thrown back, and her body forming a convex bow, after which the body is drawn up again on to the ladder. Some one should always be close to the child during this exercise, to be ready to catch her under the arms if her hands slipped, or to bend her head back in case of necessity.

3rd Exercise.—The child, her right foot upon the lowest step of the ladder, her right hand holding the step which is level with her hips, suspends her body

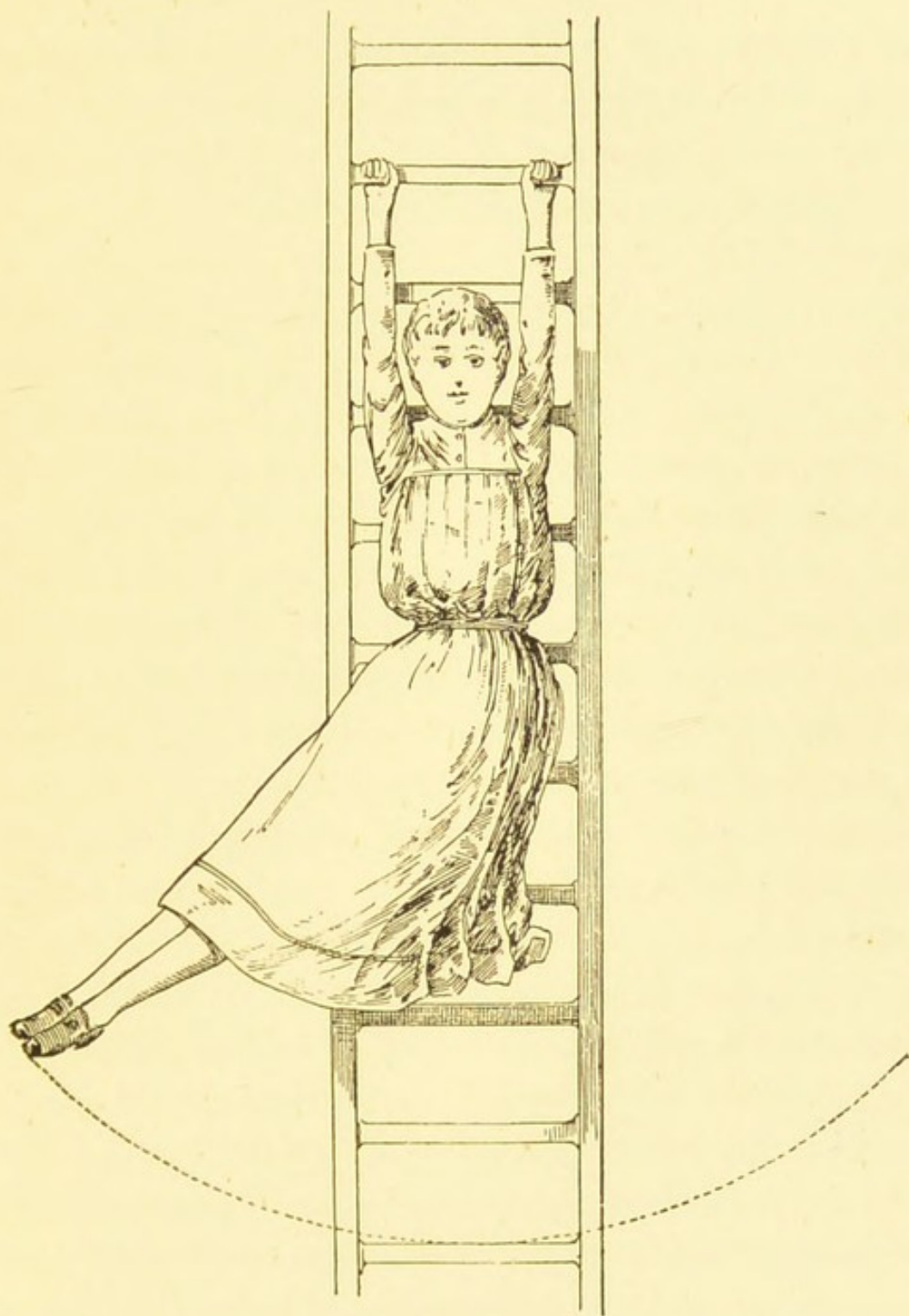


Fig. 16.

by her right arm, extending the left leg and arm sideways till the right arm is fully outstretched. The body is then drawn up again on the ladder, and the exercise is repeated to the left.

EXERCISES ON THE OBLIQUE LADDER.

1st Exercise.—The child, standing under the oblique ladder, makes a jump in the air, and aims at the highest rung she can reach. Should she miss it, a second person lifts her, and she then hangs quietly almost as long as her hands will hold her; but it should never be longer than from two to three minutes, during which time the head is bent backwards several times as far as possible.

2nd Exercise.—The child, standing under the oblique ladder, makes a spring and catches hold of both sides, then swings her body with closed and extended legs. When the body swings to the right, she catches a higher step with her right hand, and when to the left a step lower with the left hand. At the end of the ladder the sides are seized again. This is done several times in succession. These exercises have been chosen out of a number as the easiest, the most practicable, and therefore the best. The much-used swing between the door-posts is not to be recommended, for it leads to all kinds of pranks, which do no good and often much harm.

STRENGTHENING OF THE MUSCULAR SYSTEM.

The above-mentioned exercises render the spinal column mobile, and the joints of the body pliable. They also influence in an indirect, healthy manner the breathing, the circulation of the blood, and the digestion.

The following exercises have for their special purpose the strengthening of the muscles of the back ; that mass of muscles which play such an important part in deportment. Though the preceding exercises have a distinctly beneficial effect in the strengthening of these back muscles, yet it is not sufficient, for resistance gymnastics are needed to produce a firm and symmetrical development of the muscular system of the back. Space will not permit of entering fully into the question of generalities and individualities of resistance gymnastics ; therefore the reader is referred to my work—"Die Widerstands Gymnastik für Schule und Haus" (Resistance Gymnastics for School and Home) ; Leipzig : Verlag L. L. Hirschfeld—where this is shortly but fully treated. Of the exercises there mentioned, those of the back are to be especially used. A few of the most important exercises for the strengthening of the back now follow.

1st Exercise.—The child is seated on a table, her

back exactly on a line with the end of it. Her hands are placed upon her hips. A second person holds her legs firmly with one hand and arm, the other is free to support the child's body, which is allowed to sink slowly downwards till it hangs perpendicularly ;

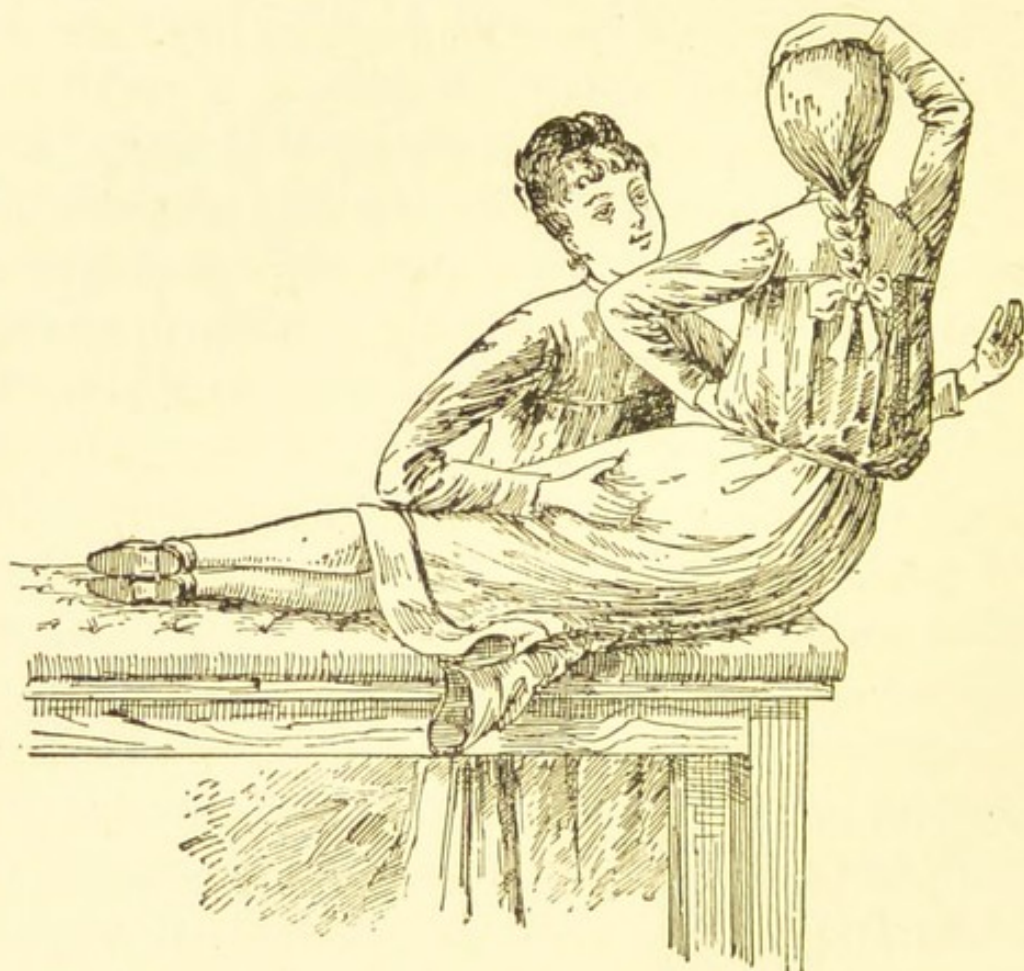


Fig. 17.

it is then slowly raised upright, when there is a short pause, and the exercise is repeated. The second person holds her hand under the child's back without touching it, in order to be ready to raise her upright

should her strength suddenly give way, rendering her unable to raise herself.

2nd Exercise.—The child rests on the table with the legs and pelvis, her face turned downwards ; thus the upper part of the body is suspended in the air. The second person holds the legs firmly with one hand, whilst with the other she is ready, as in the preceding exercise, to catch or support the child's body. The body is then bent downwards till it hangs perpendicularly, when it is again raised ; not only to the horizontal, but as far as possible upwards, till the back forms a concave bow. This position is held for a few minutes, and then the exercise is begun afresh.

3rd Exercise.—The child rests on the table, her body suspended in the air, so that first only the left leg rests on the table, and then only the right. The second person is then in readiness as in the preceding exercises. The child then bends the body till it hangs perpendicularly, then raises it till it is again perpendicular, which position she holds as long as possible, and then begins the exercise anew. When this has been done a few times on the left side, the child turns over and does it on the right.

4th Exercise.—The same position is held as in the two preceding exercises, the body is then turned right and left, in the manner already described in the exercises for improving the mobility of the body.

5th Exercise.—The position of the preceding exer-

cises is held, and a right and left turn of the body on its own axis is then made.

For all these exercises the child must have support and help at first, her strength not being sufficient to execute them independently. Later they must be done without support, and later still with resistance.

By the resistance both strength and independence are gained, which would not come merely by the execution of the exercises. A second person, however, is needed ; but if not available, the child's legs may be firmly strapped to the table. The resistance is then offered, for which purpose the child's shoulders are taken hold of, and the following manner of procedure is observed. The assistant works against the child in such a way, that it will be with the greatest effort that the latter succeeds in accomplishing the exercise. Thus the body acquires the desired mobility, for along with the labour of the exercise, the body must be kept in its position. Naturally the resistance is begun very carefully, and gradually inducing the child to exert, but not to strain herself.

It is astonishing to see how the strength increases from day to day by the use of these exercises, and it is especially noticeable in the back muscles.

At first there may be a struggle against these exercises, the child being afraid of falling when bending the body downwards ; but once that fear is overcome, a real pleasure will be felt in them.

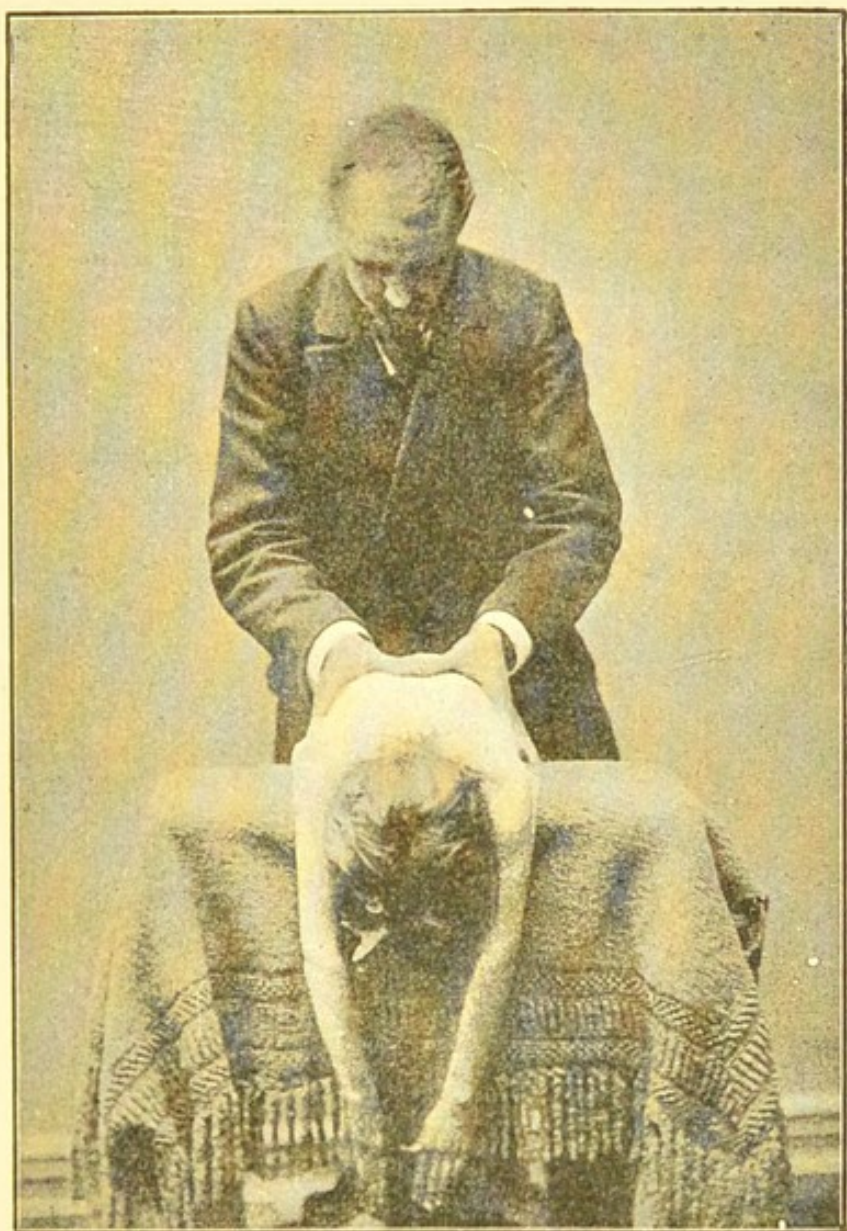


Fig. 18.

Swimming is a bodily exercise which cannot be too highly recommended, for besides the good done by the necessary muscular exercise, the cold water has an invigorating influence which should not be overlooked. Cold water braces up the body, and gives it a power of resistance. Where swimming is not to be had, it should be substituted by cold friction and douching.

THE MASSAGE OF THE BACK MUSCULAR SYSTEM.

In order to induce a powerful development of the muscles of the back, it is desirable that they should be brought under the most favourable conditions, both as regards nutrition and assimilation. These are brought about by strong massage of the back with brandy, having a little common salt added. There are a long series of manipulations known under the name of massage.

Though few parents would give time or trouble to use massage on their children's backs daily, there may be many who would do it once a week, and for their benefit the method of procedure is given.

The child, undressed to the hips, is laid over a small cushioned table, her feet either resting on the ground, or on a foot-stool, the upper part of the body lying flat on the table, the hands hanging down on either side.

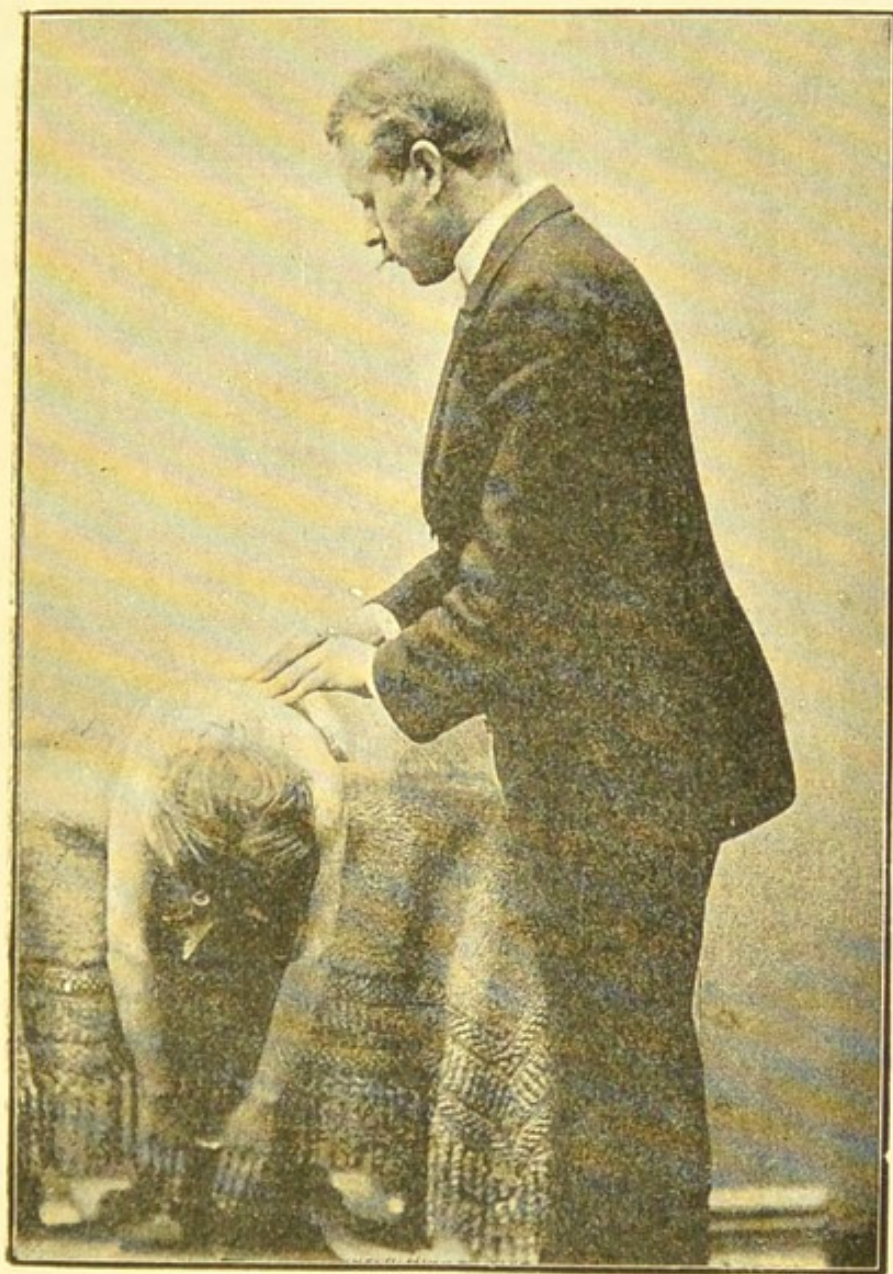


Fig. 19.

The masseur stands behind the child, places his hands (which have been previously rubbed with vaseline or lanoline) upon her back about the height of the hips, both thumbs touching the vertebral column, the closed fingers lying on the hips, and spanning the whole breadth of the back. The hands are glided gently up the back, the pressure gradually increasing till it near the nape of the neck. The fingers are then drawn up to the thumbs, and whilst the latter are kept in their position on the nape of the neck, the former are glided forwards over the shoulders. The thumbs and fingers of each hand are then laid together, and thus both hands are passed closely down the spinal column. Before, however, the bottom of the spine is reached the fingers are again separated from the thumbs, and passed on to the hips in the original position of the hands. This is repeated from ten to twenty times, and is called the *Effleurage* manipulation (Fig. 18). The second manipulation, called *Pétrissage*, consists in kneading the whole length of the back muscles. For this the masseur stands on one side. The finger-tips are placed obliquely and at right angles, first on one side of the spine and then on the other, thus gradually traversing the whole course of the back muscles backwards and forwards advancing from the hips to the nape of the neck. Both hands participate equally in this movement, and are always moving in an opposite direction. When



Fig. 20.

this movement has been done several times on one side, it is then done on the other. The excursions of the finger-tips should not amount to more than eight to ten centimetres (Fig. 19). The third manipulation is Friction, and is performed in two strips of from eight to ten centimetres wide on either side of the spinal column. The masseur standing behind the child places the tips of the fingers of the right hand obliquely on the child's back, the left hand being placed flat behind it. The right hand then describes spiral circles, and continuing them upwards, whilst the left hand simply passes up behind the right without any side movement, thus the hands traverse from hips to shoulders (Fig. 20). The fourth and last manipulation is the so-called *Tapottement*, or beating movement. For this movement you use the edges of the little fingers, or of the hands slightly arched. The strokes are not given with a stiff arm, but quite freely from the wrist joint, thus being strong without giving pain. The movement is then proceeded with on either side of the spinal column, leaving the spinal column itself free upwards and downwards. The strokes are quickly given with alternate hands. This movement has an extremely beneficial effect upon the back muscular system. In conclusion, the first movement, *Effleurage*, is repeated. It is quite sufficient to use massage two or three times a week, but it must on no account be done oftener than once a day (Fig. 21).



Fig. 21.

CHAPTER VI.

CONCLUSION.

IN conclusion, two of the favourite amusements of youth will be briefly discussed, namely—dancing and skating.

Dancing, as a bodily exercise, not only benefits the health, but also induces a graceful and good bearing, and is, therefore, to be recommended within certain limits.

Compare the dancing of the Grecian youth with that of the present day. Their clothing was light and free; their ballrooms the open air, and their music the simple tones of the flute.

Our present-day youth dance in over-heated rooms, in an atmosphere of dust, under a glare of artificial light, and to the notes of a noisy band; their garments tightly laced, and their bodies in close contact. Formerly, dancing was an æsthetic gymnastic education; at the present day, it is a health and nerve-destroying pleasure, which robs the system of refreshing sleep.

It would be a praiseworthy enterprise if instructors

of dancing would introduce the simple dancing in rings, which was practised in the classical past.

At Breslau, the experiment has been tried, and with success. In this manner, dancing and gymnastics are combined. The professor of the establishment referred to, in a pamphlet published recently, expresses the following strange sentiment:—

“That as intellectual development is more accessible to the rich man than the poor, in bodily development there should also be a difference between the classes. Ignoring the social aspect of this question, it would be well to consider whether these dancing and gymnastic exercises would not have a beneficial effect, if they replaced many superfluous and quite unnecessary subjects which form part of a school education. As this happy result is at present in the far distant future, parents would do well to limit their children’s dancing to quadrilles, minuettes, and other square dances, round dances being never allowed. A particular warning must be given against children’s balls, for these may lead to unsuspected harm, especially amongst the younger ones.”

Skating, in moderation, and with prudence, must receive unlimited commendation.

In order to balance the body on the narrow and vacillating iron of the skate, it must be held perfectly upright; and, moreover, vanity will induce the child or person to thus show themselves to the best advan-

tage. In skating, the breath is taken deeply and quietly ; in short, it combines all the necessary conditions for a healthy muscular system and a good carriage.

Rowing, too, combines these advantages ; but as this is a sport for adults or older children, it does not come within the domain of this little book, which deals only with young children.

We have now come to the end of our observations, which are written for the benefit of those persons with good intentions and a want of knowledge, to whom are intrusted the great responsibility—the bringing up of children—be they their own or other people's.

To be the sign-post is my earnest endeavour ; and if many would follow the path indicated, great would be our children's good, and the good of mankind. Then would the reward be ample for the trouble taken !

THE END.

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