An essay on the prevention & rational treatment of lateral spinal curvature.

THE PREVENTION
AND
TREATMENT OF LATERAL SPINAL CURVATURE
BY
DR. ROTH

AN ESSAY ON THE

PREVENTION & RATIONAL TREATMENT

OF

LATERAL

SPINAL CURVATURE,

With Numerous Illustrations,

BY

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The professional man engaged in the rational treatment of spinal deformities must have a special knowledge of the pedagogical and medical branches of Ling's system of movements. It is a mistake to believe that the perusal of some short pamphlets (which are very useful as advertisements of the existence of a rational treatment), or the witnessing of some practical demonstrations, or the learning of a special prescription used in some cases, can enable a medical man to carry on the rational treatment of similar cases. Just as the oculist, aurist, or any other specialist, those engaged in the rational treatment of deformities must devote a certain amount of time and work to the special study of this so much neglected branch of surgery. It is this neglect on the part of the profession which is the cause that so many patients are the victims of rubbers, bone-setters, electricians, orthopædic instrument makers, drill sergeants, dancing mistresses, and professors of calisthenics and gymnastics, who all profess to cure spinal deformities.

INTRODUCTION.

THE prevailing ignorance of scientific physical education among teachers, and a similar ignorance among professional men, regarding the prevention of lateral curvature and arrest of the progress of premonitory complaints, are the principal causes of the very large number of scoliotic patients. This large number will not only continue, but increase, so long as scientific physical education is not an obligatory study in *all* training colleges, and so long as the professors, lecturers, and teachers of surgery and medicine ignore the *rational* treatment of curable spinal curvatures; the teachers are consequently unable to teach their pupils, who, after having passed their examination and taken their degrees, are usually at a loss in treating similar complaints. Amongst several thousand cases of lateral curvatures met with during the last thirty-five years, I have had many cases that could neither be cured nor even relieved, but who continued to wear spinal supports, and to be victims of orthopædic instrument makers, who had persuaded them not to return to the very medical man through whose advice they had first been sent.

The belief by the public in names and "handles" to names is carried to such an extent, that if a surgeon has made himself conspicuous by some special operation, he is supposed to have as comprehensive a knowledge in all other branches of surgery. When I tell parents consulting me about a daughter, suffering, for instance, from incurable and

neglected spinal curvature, that they have been waiting too long, and that medical advice has been sought too late, the usual answer is, "I beg your pardon, I have not neglected my child; I consulted Sir Somebody This, or Mr. That (the name of an eminent surgeon or physician being always given) who told me not to be so anxious—that my daughter was to lie down for so many hours a day." Not observing any improvement, after a few months another eminent surgeon was consulted, who advised the contrary, viz., that the patient should be a great deal in the open air, take exercise, climb trees, and have some dancing lessons. Several months passed, the slight curvature had considerably increased, and a third well-known medical man was consulted, who said, "She will grow out of it," at the same time advising the girl to go to a teacher of gymnastics, or calisthenics. There she had to undergo the exercises just like the others, but more with one arm than with the other. Sometimes her general health improved, sometimes it was worse, but the lateral curvature still increased; one shoulder projected much more, one hip appeared much larger. Another six months, a year, or even longer time, elapses before the mother again applies—always to an eminent or well-known surgeon. The latter immediately orders the usual spinal instrument, with crutches under the armpits, with vertical steels, placed on either side of the spine; there is often an additional plate at the top, to press in the projecting shoulder blade, and another on the opposite side, to press in the deformed ribs. But this is not all. Besides this instrument—considered by the élite of the profession to be the panacea for all cases of lateral and other spinal curvatures—a rubber is recommended. This individual is to assist the cure by pressing in and rubbing away the projecting parts by any method he or she pleases. The eminent medical man has evidently not studied the therapeutic

effects of the various manipulations commonly and falsely called "rubbing," or "massage," and therefore cannot give special directions, and every rubber has her or his own way of treatment. The mother is, of course, delighted at seeing her daughter apparently straight while encased in the above machine, or in a padded corset, with vertical steel bands surrounding the whole body, looking so much better, and believes she will be cured. The patient thus continues for months or years encased, and her trunk immovable; the general state of health is necessarily impaired by want of exercise, by the incapability of deep breathing, and the pains increase in the spine and shoulders. When, on the patient being stripped, one recognises the numerous bruises and sores, caused by the crutches under the arm-pits, by the vertical steels on both sides of the spine, or by the plates—one on the shoulders and the other on the ribs—and sees that no movements of the trunk, either of turning or of bending, can be made, it can well be imagined how sad it must be to tell the parents that the case is incurable. And this is proved to them by the immovability of the doubly-curved spine, by the extreme deformity of the ribs, and by the impossibility of replacing the shoulders, pushed out by the incurably deformed and projecting ribs.

Please to consider the unhappy patient, and the anxious state of the parents, who have in vain consulted the eminent authorities, and spent a good deal of money, especially if they have had to do with orthopædic surgeons, who are mostly advocates of spinal supports, which must be screwed up every week, and an operation for which a fee has necessarily to be paid. According to my experience, I find that not a few of the eminent men who have the merit of having specially studied certain diseases, or have made themselves well known by their skilful operations, are often also eminent in their igno-

rance of the rational treatment of a curable lateral curvature.

I believe that the highest aim of medicine is the *prevention* of diseases; and when this cannot be accomplished, that the patients should be relieved or cured by hygienic means alone, but not by medicines and surgical appliances so long as the hygienic means suffice to attain this end.

Having acted, I may say not unsuccessfully, on this principle for forty-four years, I wish to induce my younger professional brethren to act in a similar way, although they may find it very difficult to give up the prejudices with which they have been imbued during their studies, when the majority of them have had no opportunity of observing the beneficial influence and curative effects of air, water, exercise, and of dietetic and hygienic regimen in general, when properly used and carefully adapted to the individual cases. Many medical students, having worked very hard in order to pass a good theoretical examination, and having obtained their degree (without a previous practical instruction in the preventive treatment of some chronic complaints which have never been admitted to the wards of the hospital), are in the beginning of their practice, very much puzzled what to do when their advice and assistance are required in complaints they have never seen.

Spinal curvatures belong to those complaints which are not admitted to general hospitals, yet require special attention for their treatment; although not every practitioner can make them a subject of peculiar study, he should at least be acquainted with the causes and the mode of the artificial production of these deformities, that he may, in a number of cases, either prevent them entirely, or at least arrest their further progress at the beginning. He should have some notion of the only rational treatment adopted by those who have paid more attention to the subject.

These few remarks must serve as an apology for the reprint of some incomplete papers, written several years ago under the pressure of professional engagements for a medical quarterly, with the hope of inducing young practitioners to pay some attention to the prevention and treatment of deformities by hygienic means in general, but especially by prophylactic and rational medical gymnastics.

There are still many, even among my elder colleagues, who have never heard of the great progress which has been made during the past forty years in the scientific application of curative movements and medical gymnastics. There is a large field open for many young medical men willing to devote their special attention to a branch of medical knowledge, the importance of which is daily increasing, although it has been hitherto appreciated in this country only by a small number of unprejudiced practitioners, whom I feel it a duty to thank for the disinterested mode in which they have, during the past thirty-four years, placed many of their patients, and members of their own families, under my treatment, and who have thus given me an opportunity of proving practically the truth of the views I advocate regarding the prevention and cure of many chronic ailments, especially of spinal curvatures by hygienic means and rational medical gymnastics.

Although I have in the last chapter given an outline of the so-called Roth-treatment of lateral and other spinal curvatures, I feel it my duty to point out to my younger colleagues who wish to conscientiously carry out my treatment that they should not imagine that the practical part is so very easy. It is therefore advisable that after having read the various papers contained in this little book, that they should carefully study—(I.) Ling's *free* exercises (exercises carried on without any gymnastic apparatus) and to practise them before a long looking

glass, so as to be able to watch themselves during the various movements. (II.) To study ONE of the three manuals of the movement-cure, one in *German*, by Dr. Newmann; another in *English*, by myself; and a third by Professor Dr. Hartelius in Swedish—these are the only three manuals hitherto published. It is desirable to go through *every* movement and passive manipulation contained in them. (III.) If possible to take a *practical* course of instruction under a *medical* practitioner engaged in the movement-cure. I myself had no opportunity of learning the practise of the movements for the reason that the *only* person in London who, in 1849 and 1850, could have taught me, refused to do so, either for money or good words; and considering that no manual was at that time published, I had great difficulties in obtaining the necessary practical knowledge. It has been thought well to mention this for the encouragement of those of my colleagues who, with perseverance, will be far better enabled to obtain the practical knowledge on account of their now having the advantage of one of the manuals. (IV.) To those who have the necessary means and sufficient time at their disposal, no better advice can be given than to go to Stockholm, where they can pursue their practical studies with the greatest advantage at the Royal Central Institution, under Professor Dr. Hartelius, at the head of the medical department. This gentleman, to whom I continue to remain indebted for his cordial reception and professional communications during my visit to Stockholm, with the greatest liberality, and merely in the interest of propagating Ling's rational system of gymnastics, has for months given special private theoretical and practical instruction in the treatment to my son, R. E. Roth, M.R.C.S., since settled in Sydney, where he contributes to the propagation of the blessings due to the genius of Ling.

For the information of such practitioners as wish to have

only some idea of Ling's system, it may be well to mention, that about twenty-four years ago, an illustrated pamphlet was published by myself, under the title, "*A Short Sketch of the Movement-cure.*"

My treatment of lateral curvature is *original* and quite different from any other previously practised; many years of careful observations in a large number of cases have enabled me to fix on the leading points mentioned, page 116-121. I hope that my endeavours of making known the results of my treatment and experience, will contribute to the diminution of the prevailing medical ignorance, and of the large number of incurable deformities, and also prevent the public from being victimised by the various unprofessional curvature-curers, who will not be resorted to when the profession recognises the importance of this branch of surgery.

M. ROTH.

48, Wimpole Street,
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ON CURVATURE OF THE SPINE, &c., &c.

1. DEFINITION.

ANY unnatural state, or irregularity of the shape or form is called deformity;—(the following remarks do not refer to such irregular forms as are produced by swelling, and diseases of glands and soft parts which may occur anywhere in the body)—the term *deformity* is here restricted to the abnormal forms of the joints in general;—deformities of the spine usually affect simultaneously several intervertebral joints, and thus one or more curves are produced; hence deformities of the spine are usually called spinal curvatures.

2. MODE OF DEVELOPMENT OF DEFORMITIES.

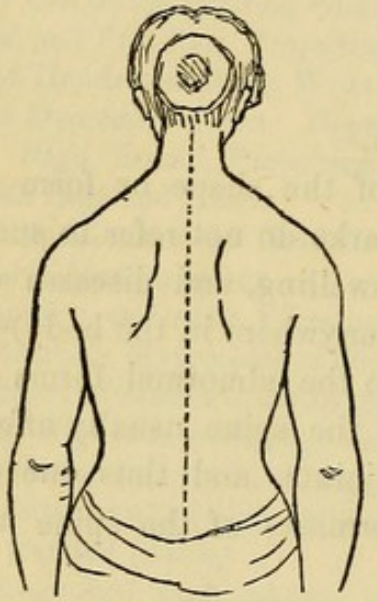
The process of the development of deformities of the limbs is analogous to that of the spine; without an actual disease a single joint changes its form, as the bones (which constitute the joint) approach each other on one side of the joint while a proportionate removal of these bones takes place on the opposite side; thus when two vertebræ forming a joint approach each other on one side, and if a similar process takes place in several contiguous joints of the spine, a curve is produced with the convexity on that side where the vertebræ are removed from each other, while the concavity of the curve is on the side where the vertebræ approach each other.

3. VARIETIES OF CURVATURES.

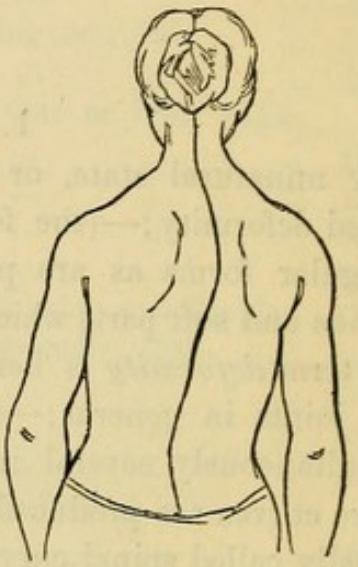
Lateral Curvature.

When we look at the back of a healthy person in an erect position the spine shows a straight line as in *fig.* 1; suppose

that two or more dorsal vertebræ are permanently (not momentarily as in a physiological flexion of the spine) removed from each other on the right side, they must approach each other on the other side, and form a curve as seen in *fig.* 2,

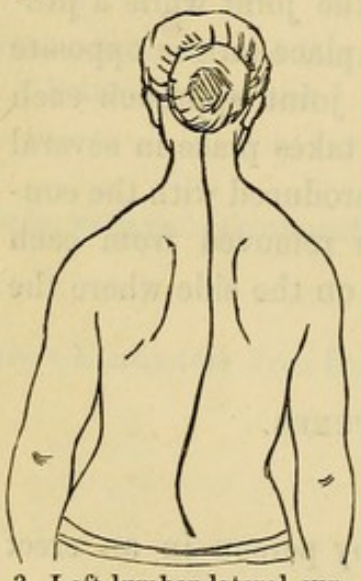


1. Healthy spine.



2. Right dorsal lateral curve.

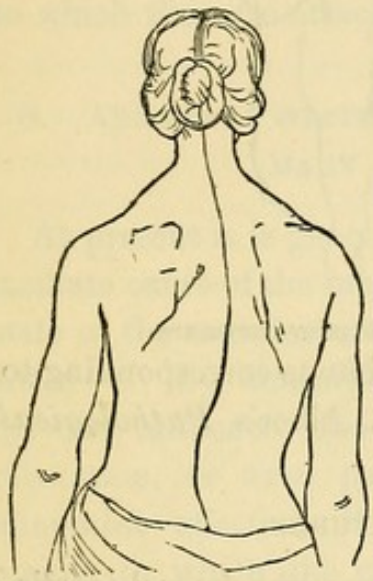
which represents a primary lateral curvature usually called right dorsal curvature; a similar curve in the lumbar vertebræ which are diverging from each other on the left side as seen in *fig.* 3, forms a primary *left* lumbar lateral curvature; the distinction of "right or left" applies to the convex side of the curve; both are *lateral*, because the deviation of the spine from the straight line is either to one or the other side, and the curves illustrated by *figs.* 2 and 3 are *primary* to distinguish them from the secondary or compensating curve, which takes place later and is then a necessary consequence to the first.



3. Left lumbar lateral curvature.

4. SECONDARY OR COMPENSATORY CURVATURE.

An upper or dorsal lateral curvature does not, and cannot, remain for a long time stationary without being compensated by a second curve in the lumbar vertebræ; the convexity of the secondary curve is always on the side opposite to the convexity of the upper dorsal curve, in order to keep up the balance of the body, and hence the secondary curve is called compensatory or compensating curve; if the lumbar curve is the first (primary curve) the compensation takes place in the upper (dorsal) vertebræ. The compensating curve is usually co-existent with a twist of the spine, around one or more parts of its longitudinal axis. In *fig.* 4 a secondary dorsal curve is seen.

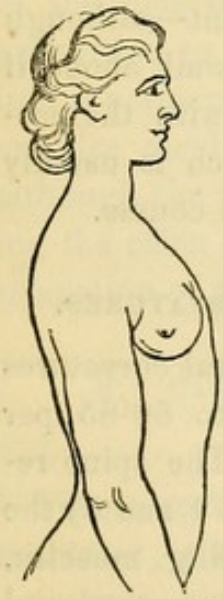


4. Secondary or compensatory curvature.

5. ANTERIOR AND POSTERIOR CURVATURE.

Fig. 5 represents the lateral view of the normal and erect spine; with the natural curve of the cervical vertebræ and the convexity forwards; the second (dorsal) curve forms with its convexity the outline of the back, the third (lumbar) curve with the convexity forwards form what is called the small of the back, and the lowest or fourth curve with the convexity backwards is in the lowest part of the spine, and extends over the chine bone (os sacrum).

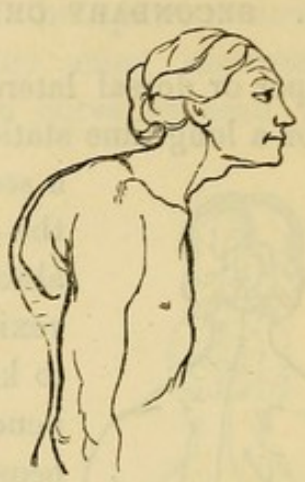
If any of the four normal curves just named is increased or diminished in its natural extent, either an anterior or posterior curve is formed, and the vertebræ are removed from each other either forwards or backwards, when the convexity of any of the curves increases.



5. Lateral section of healthy spine.

Fig. 6 and 7 show the prominent characters of an anterior

6. Anterior curvature.



7. Posterior curvature.

and posterior curvature; (sketches of skeletons corresponding to these figures are to be found in Prof. Alber's *Pathological Anatomy*).

6. COMPLICATED CURVATURES.

The three elementary forms of curvatures—the lateral (scoliosis), the anterior (lordosis), and the posterior (kyphosis), can be and are combined in numerous ways; while one form predominates, the two others can be present to a higher or smaller degree; not only one but several secondary curves can co-exist which are also named *tertiary;* they contribute to preserve the equilibrium of the body, and often enable the patient—although affected with the most complicated curvature—to walk about, if bad and injudicious treatment does not interfere with the process of forming secondary or tertiary curves, which is usually going on when nature is permitted to have its own course.

7. DEVELOPMENT OF MUSCULAR LATERAL CURVATURES.

The mode of development of the *muscular* lateral curvatures which form the great majority, (as they amount to 80-85 per cent.) of all lateral curvatures, is the following: The spine requires, in order to be kept erect, (as shown in *figs.* 1 and 5) the perfect antagonistic equilibrium of the surrounding muscles, otherwise (as it is very flexible, especially in its cervical and lumbar part), it cannot afford a firm basis to the head and the organs of the trunk which are attached to it, nor will it be able

to serve as a point of support to the various movements of the trunk and limbs. All the influences which disturb the muscular equilibrium, necessarily change the regular form of the spine, which deviates always in the direction of those muscles which, by their prolonged or permanent contraction, cause the vertebræ to which they are attached to approach each other.

8. ABNORMAL STATE OF THE MUSCLES, IS THE CAUSE OF MANY LATERAL CURVATURES.

At present it is generally admitted that the principal and immediate cause of the majority of lateral curvatures is an abnormal state of the muscles attached to the spine; this state is proved either—I. By diminished, increased, or any other irregular nervous influence, the effect of which is either contraction, relaxation, or even paralysis of the muscles; or II. By an idiopathic affection of the muscles caused by all those complaints to which the cellular, muscular, tendinous and other tissues which enter into their composition are subject.

Drs. Neumann, Eulenburg, Schreber, and many other continental authors on this subject, having considerable experience in the treatment of deformities, assert that, whatever the primary cause may have been, the disturbed antagonistic function of the muscles produces first a temporary deviation, which in proportion to the time of its duration is soon or late changed into a permanent deformity, which, as long as the shortened muscles yield to external influences, can be still remedied; although the will of the patient is not sufficient for counteracting the effect of the muscles shortened, in consequence of the relaxation of their antagonists being also permanent.

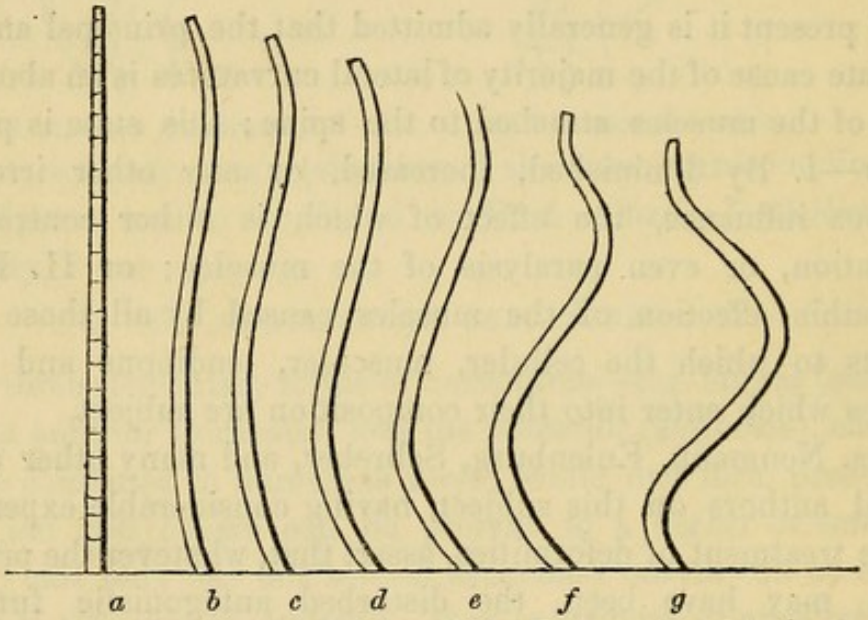
9. CAUSES OF OTHER (NOT MUSCULAR) LATERAL CURVATURES.

Fifteen to 20 per cent. only of all lateral curvatures are not muscular; their causes are diseases of the vertebræ, cartilages, ligaments, synovial membranes, empyema, retarded development of a limb by paralysis, any complaint producing contraction of a lower extremity, (as for instance hip disease, rheumatic

inflammation of the knee or hip joint), mechanical injuries, rickets, tuberculosis, scrofula, and other constitutional diseases.

10. DESCRIPTION OF THE MOST FREQUENT LATERAL CURVATURE KNOWN AS SCOLIOSIS HABITUALIS.

Either the primary dorsal or primary lumbar curvature, see *fig.* 2 and 3, forms the first stage of lateral curvature, and a secondary curve is also possible before the curvature has entered into its second stage. The lines in *fig.* 8 show the theoretical



8. Scheme of gradual development of lateral curvature and diminution of the height of the spine.

scheme of gradual transition of the lateral deviation from its beginning to the highest degree of deformity: *a* is the straight and normal line of the spine as seen in the dorsal aspect of the erect body (see *fig.* 1); *b* and *c* represent the very beginning and a more advanced right lateral curvature in its first stage; *d* and *e* are two outlines of scoliosis in the second stage, and *f* and *g* two forms in the third stage. When these six outlines are compared with each other we observe that the elongated (a segment of an ellipse) form of *b* and *c* is slightly changed in *d* and *e* into an intermediate to the more round one (segment of a circle) of *f* and *g*, which appear transversely somewhat compressed.

The intermediate lines showing the transition from one stage to the other can be considerably increased, as many authors divide the development of scoliosis into five and even six stages;

I have limited the number of curves to two for each stage, as the division into three stages is merely a theoretical one, although useful for practical purposes, especially for the prognosis; the transition of the elongated into the rounded line may be considered as the end of the first and beginning of the second stage; it is not so easy to fix the limits between the end of the second and beginning of the third stage; these two stages rarely exist without being complicated with a slight anterior or posterior curve, and never without a twist which extends over one or more of the vertebræ.

11. FIRST STAGE OF MUSCULAR LATERAL CURVATURE.

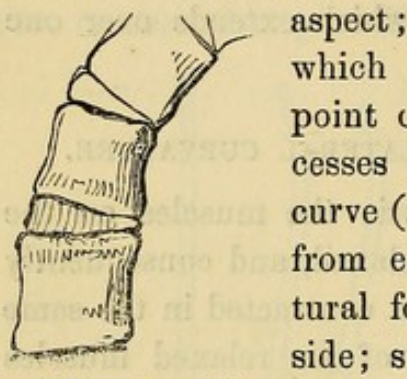
In the first stage of muscular scoliosis the muscles on the convex part of the curve are slightly relaxed, and consequently their antagonists on the concave side contracted in the same proportion; the patient makes less use of his relaxed muscles during his daily occupations, but is still able to place his spine for a short time in the natural position, if his will is more intensely directed to the retention of the erect position; as it is impossible to keep up for a long time the energetic influence of the will, necessary for the contraction of the relaxed parts, the patient soon falls back into the curved position; the intervertebral cartilages are more compressed on the concave side, the ligaments and muscles on this side begin to shorten; if the patient is constitutionally weak or attacked by another complaint, especially of an acute character, or his general health and strength fail, or he is obliged to remain in positions favouring the development of the curve, which is either a primary dorsal, or primary lumbar, the secondary and compensating curve must very soon be developed, otherwise the patient inclining very much to one side would lose his balance.

The formation of the secondary compensating curve being always combined with a twist of the spine round its vertical axis, the bodies of the vertebræ are turned in the opposite direction to their spinal processes, which during the examination form the visible and tangible outline of the curve; the head is slightly bent forwards, and also slightly turned to the side of the convexity of the upper curve.

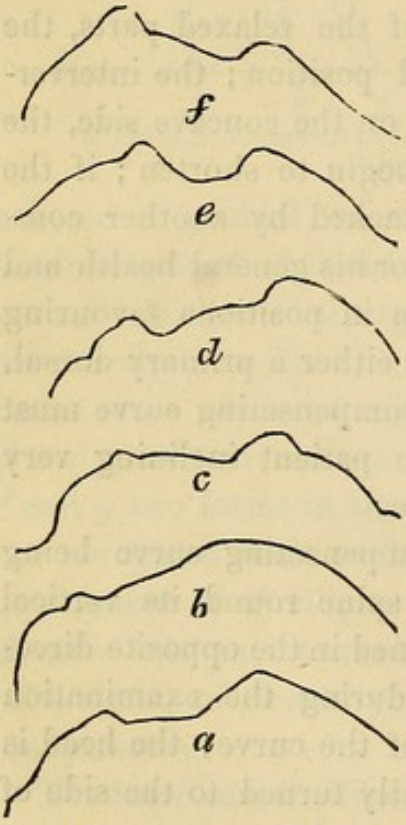
12. SECOND STAGE OF LATERAL CURVATURE.

In this stage the compression of the intervertebral cartilages on the concave side is still more marked, and they assume the form of a wedge. On the concave side the height of the bodies of the vertebræ participating in the curve is only diminished when the cartilage has been absorbed to such an extent that the bodies of the vertebræ touch each other

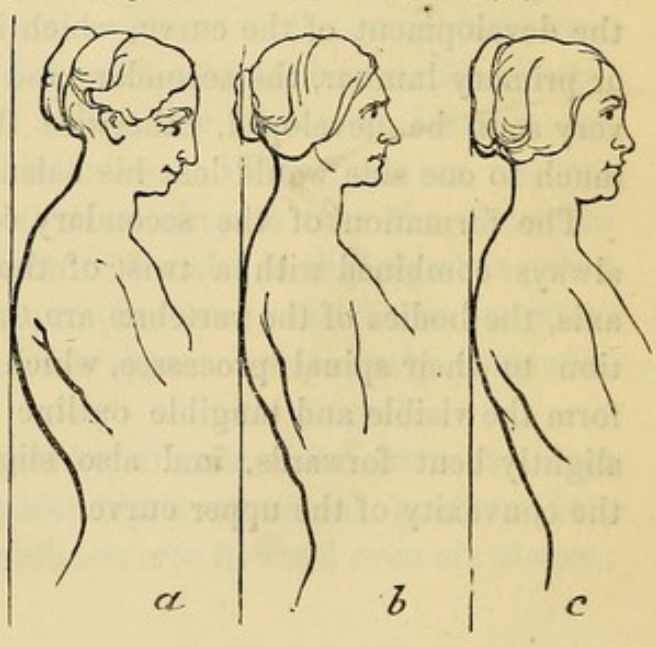
Fig. 9 represents a part of a curved spine in its anterior aspect; the cartilages have the wedge form, which is most distinctly seen at the deepest point of the concavity; the transversal processes and ribs on the convex side of the curve (in its second stage) are more distant from each other; the ribs change their natural form and protrude the shoulder on this side; such protrusion and unequal positions of the shoulders are seen in *fig.* 10, which represents transversal sections of the back across the shoulders, which I have carefully taken by applying a strap of lead on the surface of the body and cutting the form on paste-board—the artist (Mr. Böhm) has with great exactitude copied the lines from my paste-board forms; the tranversal sections are marked with letters corresponding to the longitudinal outlines of *(figs.* 11

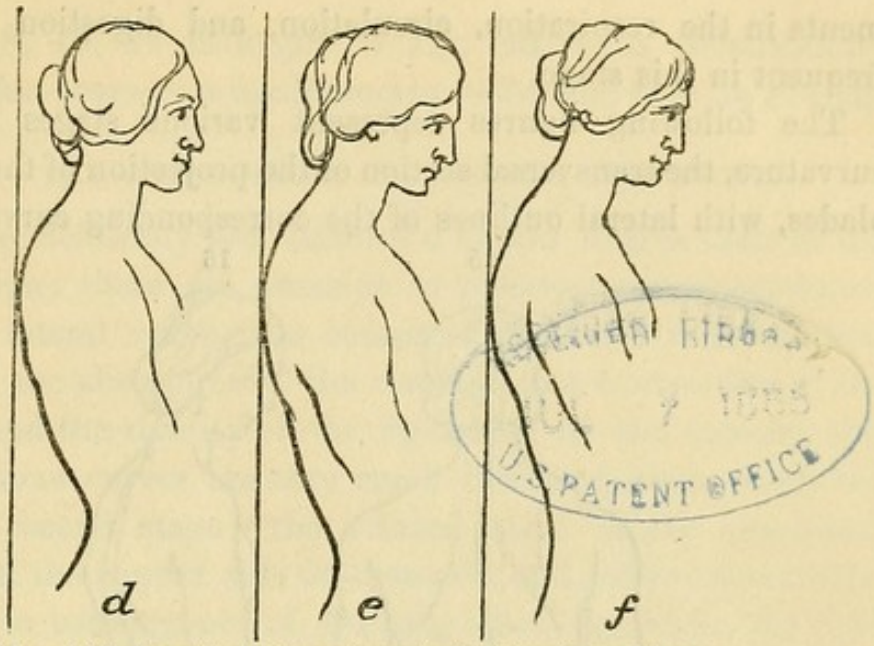


9. Wedge-shaped intervertebral cartilages.



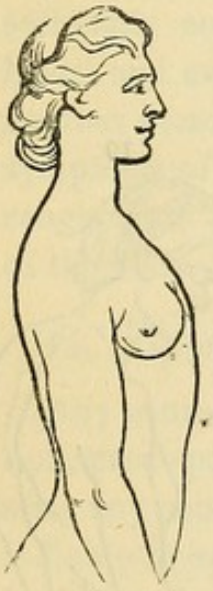
10. Transversal sections of six lateral curvitures.





11 and 12. Longitudinal section of six lateral curvatures.

and 12) scoliotic persons under my treatment. As the eyes of some of my readers might not be sufficiently practised in observing the differences of the various lines, I have added the longitudinal and transversal outline, *fig.* 13 and 14, of the normal body, and a vertical line is traced behind each of the irregular forms; the position of the head, the distance of the cervical and lumbar curves from the perpendicular, the length of the dorsal curve must be compared with each other in the six irregular as well as in the normal form. Another mode of observing the differences is by throwing the lateral shadow of an upright person on the wall—to trace its outline, and afterwards to place the same person in positions which are similar in their outlines to those I have taken from patients.



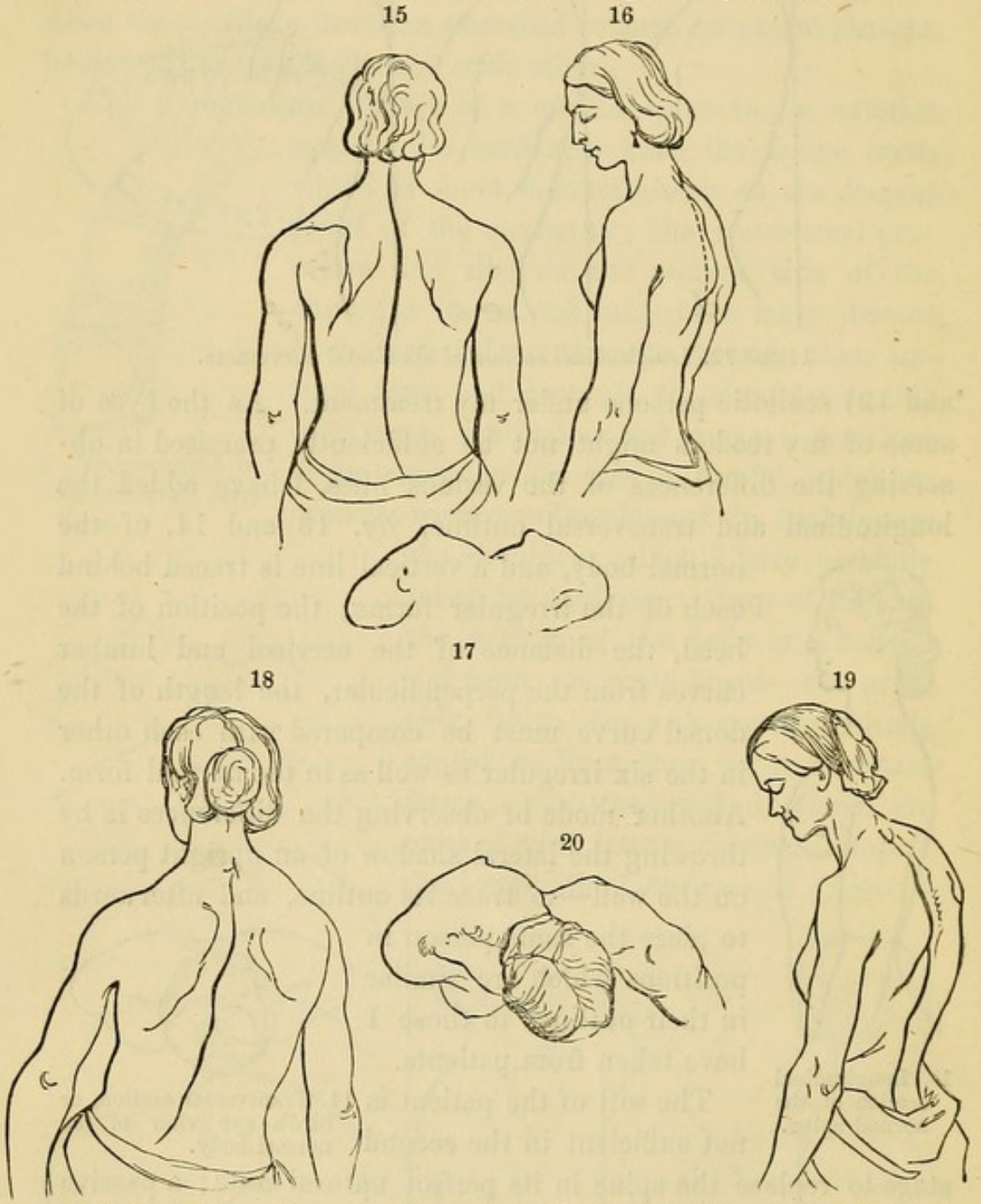
13. Longitudinal section of the normal spine.

14. Transversal section, or bird's-eye view of the normal body.

The will of the patient is not sufficient in the second stage to replace the spine in its perfect natural state; a passive elongation of the spine by external aid is possible in many cases; but not in those with prevalent rigidity of the ligaments and muscles when the joints of the curved part of the spine appear almost ankylosed. Deficient general health, great languor, and feeling of heaviness all over the body, neuralgic pains, impedi-

ments in the respiration, circulation, and digestion are more frequent in this stage.

The following figures represent various stages of lateral curvature, the transversal section of the projection of the shoulder blades, with lateral outlines of the corresponding curves.



15, 16, 17, 18, 19 and 20. Lateral curvatures in the beginning and end of second stage, with posterior aspect, lateral and bird's-eye view.

Figs. 15, 16, 17, is a girl of 15 years, fair, of nervous constitution; the curvature came on for several years without any known disease; a particular awkwardness only was observed while walking.

Figs. 18, 19, 20 is a girl of 18; strumous constitution; engaged for years as a needlewoman.—See the note on sewing.

13. THE THIRD STAGE OF LATERAL CURVATURE.

Here the deformity has attained a higher degree than in the second stage; there are anterior or posterior curves combined with the lateral curve, the compression of the intervertebral cartilages, the absorption of the vertebræ, the contraction of the muscles, and the rigidity of the ligaments on the concave side of the various curves are very much increased when compared with the second stage; the relaxed state of the emaciated muscles on the convex side is increased, and the muscles almost paralysed in consequence of the long inactivity, while the ligaments of the convex side are also elongated; the longitudinal and the oblique transversal diameters of the cavity of the chest are considerably diminished by the deformities of the ribs, and the shortening of the longitudinal axis of the spine; the functions of the respiratory organs are impeded, and feeling of oppression, asthmatic sensation, shortness of breath, palpitation of the heart, and even incapability of walking without the assistance of another person, in consequence of the entire loss of balance, are symptoms of the third stage, besides many other functional derangements and painful sensations in the head and other parts of the body.

14. CAUSES PREDISPOSING TO SPINAL DEFORMITIES.

Any cause which has a weakening influence on the constitution, predisposes to spinal curvatures. This is the reason why after any acute disease the body (especially during its growth) is liable to a deviation of the spine, which is only temporary if health and strength are soon recovered, but which remains permanent either when the convalescence is prolonged, or when the patient indulges in positions which increase one of the natural curves of the spine, or during which the spine is bent in a lateral direction.

In large cities spinal curvatures are more frequent than in the country, amongst the wealthy more than among the working classes, if these are not overworked, and provided with sufficient and good food; amongst civilised nations more frequent

than among uncivilised tribes. Humboldt, when speaking of the Chaymas,* says, " I have never seen any individual with a natural deformity amongst the many thousands of Caraibs, Munysios, Indians, Mexicans and Peruvians whom we have observed during five years."

Lymphatic, strumous, rickety, scrophulous, chlorotic and anæmic individuals, are more liable to spinal curvatures than others.

15. OPINIONS OF MEDICAL AUTHORS ON THE PREDISPOSING CAUSES OF SPINAL DEFORMITIES.

Some authors, as Sabatier and Bouvier, assume that the normal position and the pulsations of the aorta, predispose to scoliosis habitualis. This hypothesis has been ably refuted by Eulenburg. Others think that the spine in its normal state is slightly curved, and that a convexity to the right in the upper dorsal vertebræ is constant ; but exact measures of the healthy body at various stages have proved the fallacy of the assertion. Curvatures are considered by some writers as the necessary consequence of the natural tendency of using the right hand most frequently. Others believe that abnormal positions, which retain the spine for a long time in curved positions, are the principal predisposing cause of these deformities. Disease of the intervertebral cartilages (Delpech) ; a relaxed state of the ligaments, and changes of the structure of the vertebræ and intervertebral cartilages (Adams) ; a dyscrasia producing softening of the vertebræ (Lorinser) ; a paralytic affection, peculiar to the left musculus serratus anticus major (Stromayer) ; derangement of muscular equilibrium (Hard—Shaw—Lachaise) ; a peculiar affection of the nervous system (Blasius) ; disease of the left lung at an early age, and absorption of empyema (Riecke) ; affections of the heart and liver (Bühring); are named by Eulenburg as the most frequent predisposing causes of lateral curvature.

16. A WEAK CONSTITUTION IS THE PRINCIPAL PREDISPOSING CAUSE.

According to my experience during the last eleven years, when I began to pay particular attention to this class of dis-

* *Voyages en Regions Equinoctiales.*

cases, and having examined or treated more than six hundred cases of lateral curvature, the *predisposing cause* is in the majority of cases a *weak constitution.* This is either congenital as in children of old fathers, or of tuberculous, anæmic, and scrofulous mothers, (which is less frequent,) or produced by acute or chronic disease, by bad assimilation, by want of proper food or by overfeeding, by neglect of attention to the most simple hygienic influences, by anæmia or chlorosis, by bodily or mental overexertion during the period of growth, mechanical injuries, &c. I admit that many occasional causes, if acting for a long time on the healthy body, can also produce curvatures, but this effect will be always very slow, while the same injurious influence will soon produce its effect on a weak constitution.

17. IDIOPATHIC CAUSES

Are all complaints of the component parts of the spine, of the spinal chord and its membranes. The vertebræ, the cartilages and intervertebral cartilages, ligaments and muscles, with the various synovial and other membranes, can be congested or inflamed either spontaneously or by mechanical injury. Some of the parts mentioned are sometimes diseased by gout, rheumatism, or other complaints.

18. EXTERNAL (OCCASIONAL) CAUSES.

Among the external causes which promote the development of spinal curvatures in weakly constituted persons, are bad positions while lying, standing, and sitting, and during various occupations, as sewing, writing, drawing, reading, playing the piano and harp, riding on horseback, and many trades, &c. Thus, occupations during which our shoulder blades and arms are raised will tend to develop the primary dorsal vertebræ; while standing on one leg, crossing the legs, sitting on one side of the seat, leaning on one hip, &c., will help the development of the primary lumbar curvature. To this class of causes belong also tight dresses, stays, corsets, and bodices with steel, whalebone, or wooden busks, injuries and diseases of the limbs, hip disease, and paralytic affections of the lower extremities, especially when accompanied with retarded growth of the limb.

19. SOME EXTERNAL CAUSES DURING INFANCY AND CHILDHOOD.

Want of exercise in the open air, restraint of the activity and vivacity of children, too much and uninterrupted sitting, especially on forms without backs, during the period of growth, tight dresses, low dresses fastened across and over the arms, tight lacing, neglect of the beginning of slight lateral inclination of the spine, muscular debility, bad positions; the carrying of infants always on one and the same arm; taking hold of infants and children always on the same arm; always advancing with the same leg while walking up stairs; the use of one arm only when little children play at ball, when they pull their little carts and toys, &c.;—are mentioned by Schreber and Ulrich as occasional causes of curvatures.

20. EXTERNAL CAUSES INJURING GIRLS BEYOND THE AGE OF CHILDHOOD.

a. Tight lacing.

As long as the notion prevails that a waist similar to that of a wasp or of an hour glass, is beautiful; so long as it is considered graceful to have a smaller circumference round the waist than round the head; so long as the phrase, "her waist is so small you might span her with your hands," is thought to be a praise when uttered by ignorant men; so long as mothers and governesses find fault with their daughters and pupils when they are plump and not tightly laced, or well compressed by a tight dress; and as long as medical men do not object to their wives and daughters crippling themselves by stays; we shall always find a predisposition to curvatures; because ignorant and vain women will undergo any amount of uneasiness for the sake of vanity and the opinion of others.

Although apparently incredible, I heard lately of a young lady going to bed tightly laced, in order to have a smaller waist than her sisters, who did not suspect and could not find out the cause of their sister's deformity, which was called beauty, until the painful symptoms following this injurious practice brought to light the cause of the small waist.

A very renowned teacher of singing has several times sent adult female pupils to me for examination, because notwithstanding an apparently nice figure, they could not breathe deep (inhale) freely. The lateral expansion of the chest during inspiration was entirely deficient, especially in the lower part of the chest. In several of these cases the cause was vertebral curvature with compression of the lower ribs and perfect relaxation of the muscles of the back, produced by tight lacing and leaning with the anterior part of the chest on the busk ; the body was merely mechanically kept up by the stays.

b. Ignorance of Mothers and Governesses.

21. Want of elementary knowledge of the structure and functions of the respiratory organs on the part of mothers, governesses, and adult girls, is the most frequent cause of our girls being permitted artificially to deform themselves. Deformed young mothers propagate the seeds of an hereditary weakness to their children ; such mothers must suffer during the periods of pregnancy and confinement more than others, and afterwards being unable to nurse their own babies, additional evils must frequently ensue. By the want of mother's milk and the infant's bad assimilation, scrofula, rickets, and other diseases are produced ; or if a wet-nurse is engaged, she must give up the nursing of her own babe, which practice, as is proved in many cases, is followed by the death of her own infant.

c. Positions which are not Lady-like.

Many mothers and governesses do not permit the young ladies to lean while sitting, and make them sit only on the front part of the chair. The girls are soon tired, and notwithstanding their leaning forwards on the busk, they involuntarily sink either towards one or the other hip, which favors very much the development of lumbar curvatures. At other times young ladies are not permitted to stand with their feet a few inches apart, or to sit with their knees slightly (removed) from each other, because this is considered by the prude governess, or the lady-superintendent of the finishing educational institute, or by the mother, "*not lady-like*," to which

expression every body must bow, and the consequence is that a habit of standing on one leg, generally the right one, is artificially provoked,—a position which predisposes to primary lumbar curvatures—or the knees or legs are constantly crossed while sitting, or the feet are twisted round the legs of the chair, or other unnatural positions are chosen.

Professor Richter mentions a case of lumbar curvature artificially produced, merely by long continued crossing of the legs during writing, which a strong and healthy girl did daily for several hours.

d. Mental Over-exertion.

22. As girls or young ladies must not look too robust, or have a rosy and healthy appearance, which do not give what people call a lady-like appearance, they are soon rendered pale, languid and thin by too much reading, and the want of proper exercise in the open air as well as at home. The governesses or the lady-superintendents of educational institutions are not alone to be blamed for injuring many of their pupils by working them so hard from the early morning to the late evening. The parents must also share the blame for insisting upon their daughters being constantly mentally engaged without any or scarcely any interruption ; as the time for meals, and half an hour or an hour's daily obligatory lady-like walk (or what might be more appropriately called creeping along) in the open air in pairs, and once a week a lesson in dancing or deportment, can scarcely be called an interruption sufficient for counteracting the mental overstraining which exhausts all nervous powers.

e. Sad Effect of too much Brain-work and want of exercise.

23. I remember a case of a young lady who was sent to me by Dr. Madden for examination at a time when she was slightly curved, and when there was still reasonable hope for a cure. She was placed in an institution founded for the purpose of giving what is called a first rate education at a considerably reduced rate; the founder is a benevolent man, but probably entirely ignorant of the most elementary sanitary knowledge, as is proved by the following mode of education and management pursued in that institution, the rules of which prevented this young lady

from continuing the treatment which was begun during the holidays. This girl continued to remain a year longer in that institution, when she was again sent to me ; but the mode of life in that establishment, and the constant mental labour which necessarily must undermine the health of many young girls, changed her to such an extent, that the previously plump girl was perfectly emaciated, her health and strength entirely lost, and the slight curve was changed into a complication of lateral, anterior and posterior curves, which had advanced to such a degree, that notwithstanding the care of kind friends, (with whom she lived after leaving the institution,) I could not hold out any hope for a cure, and all that could be expected under the most favourable circumstances, was only a slight improvement of the spinal deformity.

f. Forcing or Hot-house production of Diseases and Deformities during Education.

24. The following extract gives an idea of what I call "hot-house production" of spinal curvatures and other diseases which is going on during the education of our girls at home under the eye of their parents, as well as in many educational establishments. The paper was written in answer to my inquiries regarding the mode of life in that educational institution, in which the patient whose case I have named in the preceding paragraph was placed. By publishing this extract, I hope to induce my professional brethren not only to pay more attention to some of the most prolific causes of chronic ailments and deformities, but that they will also enlighten parents, governesses and tutors on the disastrous consequences of the very prevalent and injurious modes of education, where all pains and trouble are taken for the development of the mental faculties of the pupils, while a simultaneous crippling of the body is involuntarily but systematically pursued.

25. THE RULES AND REGULATIONS OF AN EDUCATIONAL INSTITUTION.

(Extracted from the Report of the Patient whose case is mentioned in Section 23.)

"There are study classes, each having its own governess, and

also clothes classes, under the care of certain ladies. The French and German languages were the only foreign ones taught; the former was obliged to be learnt by *all* the pupils, the latter was considered as an extra part of the education. Music was learnt by nearly all the pupils, and drawing by about forty pupils. Those who were past fifteen, were, if they wished it, allowed to learn singing, which was taught by a lady, and practised between lessons with the governesses. Harmony lessons were given to a few pupils once or twice a week for two hours; one of which was given to each of the two divisions into which the pupils were divided. Those who did not learn dancing were obliged to have two hours drill in the week, which was with chest-expanders, and other exercises, without the fun or dancing part.'

"In the summer, and generally in the winter also, we rose at six o'clock, when a bell rang which awoke all the house, and the governesses set over the different dormitories, went round them to see that all the sleepers were up. *Perfect silence,* however, was obliged to be kept by all. At five minutes to seven a bell was rung, at the sound of which all had to leave their rooms, and by seven o'clock all were obliged to be seated at their clothes' classes—still quite *silent*—when they were examined by their governesses to see if they were properly dressed.

"At a quarter past seven another bell gave notice that breakfast was ready; and directly it left off ringing, the classes were called out one after the other to go to the dining-room. *But not a word was allowed to be spoken all the time.* There were six long narrow tables which stretched from side to side of the room, and three governesses had their settled places at each. At the end of breakfast, books were sent up to the head governess from different teachers, containing all the breaches of rules committed by the pupils individually the previous day. This was the most disagreeable thing in the Institution—as all the governesses as well as the pupils were present. After all this business was over, we rose from table and went quite *silent* into the school-room, one by one, for prayers. As soon as all were seated a bell rang, and the governess who read the "reports" at breakfast came in to read prayers. There was a nice organ

which was played, and we sang a hymn before reading. After prayers the classes were called separately to go to their proper places in the room for a half hour's Scripture class, when we repeated what we had learnt the day before, and, if there was time, read a chapter of some special book in the Bible, which was being studied by all the classes for the half year examination.

"At half-past eight we generally rose from the class and were allowed to do what we liked till ten minutes to nine. The first and second classes if they even had time to talk then, though lessons which we had not had time to finish had then to be hastily and therefore imperfectly done, were obliged to talk French or German, as English might only be spoken by them a few minutes after dinner.

"At ten minutes to nine another bell rang, at which *perfect silence* was resumed; the room was prepared by the monitresses (the girls in every class take turns by the week to keep the rooms in right order, and attend to the wants of the class), and at the sound of the nine o'clock bell all those who were not seated in their proper class places had their names put down, for "not in place in time;" for which, after the report was read next day, they lost a certain number of conduct marks. A bell was rung every half hour for the music pupils to know when to leave off practising or to go to it or music lessons, as some of them practise for an hour, and others for an half hour at a time. Every hour all the classes change lessons.

"Generally from 12 to 10 minutes to one they either go out, drill, go to dancing, knitting, or some other lesson, and as some teachers were kind enough to give their lessons half-price, there was no wonder our staying in to go to them. Besides we liked it, for if we did go out, we either taught each other some lesson, or else had to talk French. Our walks were sometimes on the downs, now and then on the beach in very hot weather. After August we bathed each about three times in a fortnight, if we liked it; and the rest of the year it was arranged that we should each have a tepid bath once a week, the first and second classes in the morning, getting and emptying the water ourselves, and the little ones had warm baths at night.

"At ten minutes to one the bell called for *silence* and a return to lessons, generally either preparation for the next day's lessons or to practise.

"At ten minutes to two, still quite *silent*, all went into dinner. The food was quite good, except sometimes little or no salt in the bread or sour bread; but 'accidents will occur in the best regulated families;'—well, after dinner all of us went to wash our hands, &c., during which time (about five or ten minutes), all the school, *if* they could spare the time, might talk English; at ten minutes to three the bell again sounded for us generally to go out from three o'clock to ten minutes to four; when again in perfect *silence*, we went to lessons till a six o'clock tea.

"This was just like breakfast, only without horrid reports After it, still *silent*, we all went again to another hour's lessons, generally preparation or practice, except the sixth or seventh classes, who had the first half hour for play if they had been good.

"At half-past seven a bell rang when all went to the dining-room, to talk freely their *own* tongue for about ten minutes, unless they had, as was often the case, a number of lessons for the next day not done, or perhaps they took that time to console or encourage each other.

"At the next bell *silence* again followed, and in five or less minutes, all were there or marked for not being so seated for Scripture preparation, which was only for a quarter of an hour; when another bell sounded, and all rose and stood till the superintendent lady came into prayers, which was singing, reading, and praying.

"Then all the girls went quite *silently* to bed, and were reported if not in bed by nine. Those who wished often learnt their Scripture then, for which a quarter of an hour had proved but a short time for the task. On Wednesday evenings those of us who learnt harmony, stayed up till nine to prepare it for the lesson. So ended the days.

"Now for some of the rules, for which reports were sent in if broken by the pupils.

"*Silence* when we rise till breakfast.

"*Silence* when in the passage.
„ at ten minutes to nine till dinner, except the hour on the Cliff.
„ at dinner.
„ from ten minutes to three till out of the house.
„ „ four till 6 o'clock.
„ at tea and after till half-past seven.
„ from the end of prayers to six next day.

"Rise directly the bell rings. Make our own beds—as soon as out of them—but leave the top clothes turned down so as to air the mattress, &c. Walk one by one in the passages. Never go up stairs in the day-time. Never drink water or anything in the day or night, except at meals. Never write to friends, only home, and that once a week. All letters to and from pupils read by the superintendent. Always to be in place in time. Keep lockers, drawers, and cupboards tidy. Every Saturday we heard our weekly marks for studies, music, and conduct, and received our weekly pocket-money; those whose parents wished them to have any sum. Keep the account of our own washing, and mend our clothes every Saturday. Brush our hair a quarter of an hour every night before we got into bed, and show it to our clothes governess twice a week. One of those times we called our Saturday's dessert, because it followed immediately after dinner, and that day we had no pudding. Never run in the passages. See friends, with *carte-blanche* of the founder of the Institution, once a month, for two hours. Go out with guardians and parents, if not too often, at any time. If too ill to study, go to the *sick-room*. Never ask for medicine without leave of the superintendent lady. On Sunday first and second class to church. Write the sermons from memory in an hour's time. At the end of every half year we had a fortnight's examination—generally two in a day. Only Scripture repetition, poetry, articles of religion, collects, and German poetry were verbal examinations. Everything else was done by writing. From two to four hours were given for the respective studies, during which time we had all to sit perfectly still, silent, and

steady. If any of us had answered our questions before the time was over, we had to sit still, silent, and steady, just the same. We were all seated at fixed places, no two of any class being allowed to sit together. The examination time was the most exciting, partly from the fear of trying to get higher places, and also from its being so near the time for 'Going *Home!*'

"Some of the rules I forgot to name were—'Never to leave the room we were in without permission. Always to shut the pianos after us, and never to go into the music rooms without leave. Always to bring pen wipers and aprons to writing class. When we came down in the morning to bring down all we required for the day. Never to lend books or any goods without leave. Never to help each other in any lessons or exercises.' Every month, when our weekly letters went home, monthly reports were sent to our parents or guardians, which told our place in the class, and what improvement we had made in our previous studies. This was really the only outward notice we had for getting on, as no prizes were given for anything. The studies named in the reports were as follows:—

"No. of Class, 1st.:—Place in Class, 4.

Health.—Good.	Writing.—Takes pains.
Conduct.—Satisfactory.	Deportment.—Attentive.
Scripture Studies.—	Harmony.—Satisfactory.
English Studies.—	Music.—Satisfactory.
French Studies.—	Singing.—Satisfactory.
German.—Improved.	Drawing.—Takes pains.

"This is, of course, a make up report—just as an example of one. Happy the girl who gets it.

"When new pupils came, if considered young, they were put under the care of some elder pupil, who had to teach them in the morning, make their beds, and mend their clothes for them. These girls were called *mothers*. As they had to be dressed quite as soon as we, they were allowed to rise before the bell rang, but nobody else was allowed to do so. But if the mothers

attended properly to their children, they were given fifty marks more to their conduct at the end of the half year.

"The governesses had monthly half holidays—on Wednesdays —when they went where they liked, and did what they liked. Wednesdays were always called our half-holidays; but they consisted of one hour on the Cliff, one hour writing letters—when not a word might be spoken—one hour preparation for the next day's lessons; tea: during which we might talk English (but the noise was too much for the superintendent lady) who consequently had tea in her own room, and an hour afterwards, when those who had not to practise or study might do what they liked—*if* they had time to spare.

"Our holidays were from June 1st in summer to August 4th; and from December 22nd at Christmas for about three weeks. Then at Easter, we had Easter Sunday, Monday, and Tuesday; half holiday on the superintendent lady's birthday, and a whole holiday sometimes on Michaelmas day.

"The rules might only be broken with leave of the superintendent, for some *good* reason.

"Of course the number of pupils caused the rules to be much stricter, and they did not seem half so strict to keep as to read and talk of."

The Cramming System is very general.

26. I have given a long extract of the plan pursued in one educational Institution, but while inquiring into the causes of chronic diseases and spinal curvatures, I find that in many private Institutions—in so called finishing schools for young ladies—a similar cramming and training system is pursued, at the request of the parents, as the superintendents justly say; very little or no attention is paid to regular and obligatory exercise in the open air; no systematic physical training is carried on and no instruction given in the elementary knowledge of preserving health. The patient who at my request gave me the particulars of her case, had not the slightest idea that the mode of life carried on for one year in the educational Institution was the cause of her very complicated and almost incurable spinal curvature. Having

made an abstract of her report, I find that the daily *mental*, work, including music lasted .... 10 hours

Time for meals	2 „
Time for dressing, washing, and mending clothes	1 „ 30 min.
Time for *speaking English*	0 „ 50 „
	15 hours.

I leave it to others to make remarks on the *silent system* which is considered a great punishment for criminals in our prisons, but is certainly not a very cheering influence for young girls whose brains have been overworked. Since this was written I have examined another girl placed in the same institution, whose spine is considerably curved; and as circumstances do not permit her being removed, there is not the slightest doubt that she will be very soon crippled, while mentally benefiting through the instrumentality of the philanthropic founder of the institution. Being an orphan her friends take care of her—they wish to train her for a governess—but how can she be able to fulfil conscientiously the heavy duties which will be imposed upon her if she is already crippled during her apprenticeship?

The Injuries, produced by Cramming the Girls, are not sufficiently known.

27. As long as parents and guardians are ignorant of the injurious and lasting effects of cramming their daughters and wards, whom they desire at the age of 16 or 18 to be possessed of all the accomplishments required by the present fashion, even those very few lady-superintendents of educational establishments and governesses who know the value of good health and a sound body, are obliged to give way to their ignorant employers, because the young lady is either placed in another institution or the governess is changed.

Mothers, Governesses, and Schoolmistresses should be taught how to preserve the health of those who are placed under their care.

28. Being convinced that the prevention of many chronic diseases and spinal deformities among the working and other classes does not depend upon medical men only, but especially

upon school-masters and school-mistresses; and as the ignorance of the latter regarding the elements of hygiene and physical training is very general, I formed last year with the aid of the Ladies' Sanitary Association, a class of school-mistresses and pupil-teachers, connected with several poor infant and children's schools. They were instructed in a popular way in all matters concerning their own health as well as the health of the children placed under their care. The notes on "pupil-teachers' work" were written, in answer to my enquiries, by one of the more intelligent of the class, and will easily explain why so many school-mistresses and teachers lose their health and suffer from spinal curvatures.

To show how deep rooted the desire of a small waist and the belief in its beauty is, I may mention that towards the end of the course one fourth of the girls were still tightly laced in stays with strong whalebone busks, after I had taken the trouble of repeatedly showing and explaining to them particularly on the skeleton, on one of Dr. Auseaux's anatomical figures of the human body, which can be taken to pieces, and by diagrams, how injurious the effects of the compression of the chest and diminution of its size, and of the constant involuntary leaning on the busk are on the functions of respiration and circulation, &c. One of my female assistants had also trained these girls for weeks in the educational and hygienic part of Ling's exercises. These girls were aware that they are prevented from moving freely their body and limbs while tightly laced, and they could not plead ignorance; they were told that they commit a great fault by voluntarily and artificially crippling themselves, and thus making themselves incapable of attending to the moral and physical well-being of those placed under their care, and all this was in vain. How can we then expect that other school-mistresses and pupil-teachers who have not any knowledge of physiology and rational physical training should attend to the health of their pupils, and to the prevention of many complaints, as far as this depends upon them.

29. PUPIL-TEACHER'S WORK.

(*Extract from the report of a School-mistress.*)

"Meet at 7 A.M.; listen to lesson given by the mistress, or reproduce those previously prepared till 8·45. Then arrange school-room; open school; recommence at 9; teach till 12; close; meet again at 1·30; teach till 4; close.

"Pupil-teachers' home work will require two hours study each evening. Lessons given to the children will require about four or five hours on Saturday. The rest of that day being often occupied in regaining the time lost through inability to study sufficiently during the week. On Sunday all attend the school, and take the children to church both morning and afternoon.

"It need scarcely be added, that from fifteen to twenty minutes must necessarily elapse between the dismissal of the children and that of the teachers.

"The subjects of instruction include—scripture, arithmetic, school management, grammar, domestic economy, geography, history, and a considerable amount of general information, to enable them to give lessons to the advanced classes.

"In winter the teachers meet at 8 A.M., and remain to 4 or 5 P.M.

"Age of pupil-teacher.—Thirteen years is the lowest age at which a pupil teacher can be apprenticed; sixteen the highest; the period of service is five years.

"No information on health, dress, food, air, exercise, and other matters concerning the preservation of health is given; a knowledge of the contents of a small book on Domestic Economy—almost silent on the means of preserving health — is deemed sufficient for this subject. I have attempted to impart such information as has been gained by contact with sickness, my own ill health, and by reading.

"No exercise is obligatory.

"The dress of pupil teachers is managed by their friends: three out of four wear stays. Nearly all wear high heels.

"Pupil-teachers sit very little while the children are in school; when they do, in nearly every instance on a seat *without a back.* Their work necessitates much bending forward,

both of the body and head; there is also a great tendency to raise the shoulders.

"Pupil teachers' health in these schools very imperfect. Very rarely indeed all can work at once. Suffer from extreme weariness, an aching sensation in the chest, and continual headaches."

We find here also about ten hours' obligatory daily mental work, and the pupil-teachers who wish to get a good certificate add one or two hours more daily in crowded and badly ventilated school-rooms; they are easily predisposed to many complaints, amongs which spinal curvatures are not the least numerous.

30. OCCASIONAL CAUSES OF CURVATURES IN YOUNG MEN.

Young (especially military) men are sometimes foolish enough to make their appearance with a small waist; tight belts laced or buckled across the lower part of the chest and across the loins, substitutes for the stays of girls. As young men lead a more active life, and have open air exercise, this counteracts partly the bad effects of the belt on the strong, but does not prevent the weak from acquiring a predisposition to lumbar curves. Too much drilling, and carrying the rifle always on one side, has caused pain and increased a slight lumbar lateral curve in a young man over zealous in his exertions as a volunteer; the predisposition was due to a mechanical injury in boyhood. It happens often that carrying a burden for a long time and always on the same side increases lateral curves in the adult in the same manner as in weak nursery girls, who carry young children always on the left arm.* Reading in a stooping position for hours daily during the last few months before their examination, also considerably increases slight curvatures in young men.

31. THE PREDOMINANT USE OF THE RIGHT ARM ERRONEOUSLY CONSIDERED AS A CAUSE OF RIGHT LATERAL CURVATURE.

"The predominant use of the right arm is frequently accused of being the principal cause of the right (dorsal) lateral curvature, that is, where the convex side of the curve is on the right side

* See note on nursing children, § 75, and on standing Fig. of volunteer, § 71.

of the dorsal vertebræ. Although this hypothesis is not entirely false, it has contributed to preserve one of the traditional errors which prevail regarding the explanation of the pathological progress of scoliosis; it is an error to believe that by using the right arm the muscles on the right side of the dorsal vertebræ are more prominently brought into action, and that the dorsal vertebræ are pulled from the mesial line to the right; it is an error to suppose that the strong (actively contracted) muscles are on the convex side, and the weak (relaxed) muscles on the concave side of the curve. This error is still more propagated by the false opinion that the prominence on the right convex side of the curve is thick and hypertrophied muscular substance.*

"Although the predominant activity of the right arm may contribute to the greater frequency of right scoliosis, it is a fact that by carrying a weight with the right arm, or by using it in any other way, the spine is bent to the left to prevent the body from being pulled by the weight to the right; the flexion of the spine to the left is caused by the contraction of the muscles situated on the left side of the spine while their antagonists on the right are extended and almost inactive. Mechanical and physiological laws prove that the weak (relaxed) muscles must be on the right (convex) side of scoliosis habitualis recta, which fact is also confirmed by pathological anatomy, as the muscles on the convex side in post mortem examinations are found extended, pale, thin, and atrophic, while those on the concave side of the curvature are (corrugated) folded together, contracted, well coloured, and their nutrition normal.

"A similar pathological process also takes place in the primary (left) lumbar curvature." (Eulenburg.)

32. AGE AT WHICH CURVATURE OCCURS.

According to my observations, the majority of lateral curvatures begin between the seventh and sixteenth year. Although

* This error is the cause that even at present the routine practitioners treat the parts on the convex side of the curve with fatty inunctions, and the supposed weak parts on the concave side with aromatic spirits and energetic exercises of the left arm.

many of the patients come much later under treatment, the complaint can be traced to the age I have mentioned; under the age of seven, and even in the first year, kyphosis occurs as a symptom of rickets or of tubercular destruction of the vertebræ. The following table is copied from Eulenburg's statistics of 304 cases of scoliosis, classed according to age:

Age.	Cases.	Per Cent.
1 year.	2	0·66.
2 to 3	3	1.00.
3 „ 4	8	2·66.
4 „ 5	5	1·66.
5 „ 6	8	2·66.
6 „ 7	71	23·66.
7 „ 10	159	53·00.
10 „ 14	38	12·66.
14 „ 20	7	2·33.
20 „ 30	3	1·00.

33. NEGLECT OF TREATMENT AND INJURIOUS TREATMENT.

The belief that spinal curvatures in the first stage can improve without special attention and treatment is erroneous. I have but too frequently occasion to observe the bad and frequently irreparable consequences of such a mistake on the part of medical men, by which parents are encouraged to neglect the treatment of this complaint at a time when still perfectly curable. Not only general practitioners, but eminent surgeons and physicians considered to be at the head of the profession, believe it too insignificant to pay much attention to a slight degree of lateral curvature; they take scarcely the trouble of examining minutely these cases; and look at them only superficially while the patients are placed in a stooping position, and if the spinal processes do not much project in this position, a favourable opinion is given, and the patient advised either to do nothing, or, as a celebrated surgeon is in the habit of saying to the mothers of girls affected with an incipient lateral curve, "let your daughters hang on the door,"—which advice is accompanied either by a prescription of

aperient pills, or of a mixture containing iron or bark, and not the slightest notice is taken of the patient's habits, mode of life, etc.

34. TREATMENT BY MECHANICAL SUPPORTS.

Some medical men are satisfied to mark with ink every spinal process, while the patient's spine is considerably bent forward, and to look at the direction of these black spots while the patient is erect; if the line is not very crooked, not much notice is taken of the curve, which is left to nature for improvement, although it gets generally worse, when another medical man, vulgarly called a spinal doctor, is consulted, whose invariable practice is to order for the patient a mechanical support, more or less expensive according to the circumstances of the patient; this support consists of a steel band fastened on the hips, which band serves as a point of support for two crutches placed under the arm pits, while moveable steel plates are fixed to the verticals of the crutch to press upon the projecting ribs or shoulder blades. If the crutches raise the shoulders they scarcely diminish the weight of the superincumbent spine upon the curve; if the steel plates press hard on the projecting ribs or shoulders (which projections are only the effects of the disease), these parts are partly absorbed, and the double object for which the support and pressure is prescribed is *not* obtained, but more injuries added to those already present. (See § 66.)

35. SAD EFFECTS OF THE TREATMENT BY VIOLENT PRESSURE.

Other spinal doctors condemn their patients to a *constant* horizontal position, with daily friction and *pressure* of the projecting part; this pressure is done very violently, and the following is an extract from the letter of a patient treated in this way, addressed to her friend, who gave me this letter: "My wretched bones were pressed on Tuesday for the first time, and though he only pressed with his hand for about three minutes, the effect no one would believe; all the strength I had has gone, almost; a general sensation of dislocation pervades the system, and exhaustion unto fainting if I remain on the

couch. I feel now sure that I am not anything like strong enough to bear this. Say nothing about this, nor by letter, I implore you, as I feel I must give up. I feel as though I had been thrown off my horse on to a mass of flints backwards, when I am carried from the bed to the sofa. I say nought. Pray the Lord for me that I may be led to do, in submission to his own will, that which he alone approves. I cannot endure this, for the exhaustion is oppressive, that is evident."

This patient, although very soon removed to the seaside, wanted many months for the recovery of that amount of strength which she had before undergoing this, as it is called, mild treatment, because its advocates compare it with the following.

36. TREATMENT OF CURVATURES BY MECHANICALLY STRETCHING THE BODY IN ORTHOPÆDIC MACHINES.

The patient lies horizontally on an orthopædic bed, in order to be stretched for hours by the most ingeniously contrived machines, pulleys and screws, etc. In other cases, the stretching is performed with the help of machines while the patient is sitting or lying on an inclined board, or standing, or walking in a circle; in all these positions the patient's head is pulled with the help of a collar surrounding the neck and throat in the direction of the longitudinal axis of the body; sometimes an apparatus under one or both shoulders, to help the elongation of the spine, is combined with the collar. Those who wish to know more of this injurious mode of treatment, I must refer to the works of French and English orthopædic practitioners, and to those orthopædic institutions in which these means are used.

Other medical men, without any knowledge of the complaint, call a slight curve a trick, a bad habit, want of attention to a right position, laziness, etc., which confirms the parents in their opinion that there is nothing the matter with their daughters, and the aid of the drill-sergeant and the dancing mistress, etc., are again put in requisition, till another spinal doctor recommends the lying on the prone couch, and the patient is recommended to practise the most violent exercises with the arms. There are special private and public institutions devoted to the treatment of

spinal deformities, upon the erroneous principle of violent pressure of projecting parts, and of violent extension of the spine, where medical men can convince themselves of the truth of my statement.

37. THE LECTURERS OF OUR MEDICAL SCHOOLS ARE RESPONSIBLE FOR THE IGNORANCE OF YOUNG PRACTITIONERS.

The professors and teachers in our medical schools are responsible for the ignorance of the majority of young medical men regarding the diagnosis and treatment of spinal curvature, a complaint which, although so frequent, is never admitted to the wards of a hospital; thus no opportunity is afforded for watching the slow but sure progress of these cases, and for studying their preventive and curative treatment. The few who pay some attention to these cases among the out-patients of orthopædic hospitals are taught to consider deformities and spinal curvatures merely as objects of mechanical treatment, but not as symptoms of many constitutional and other complaints. (See § 65.)

38. EXAMINATION OF THE CURVATURE.

Before proceeding to the inspection of the spine, it is desirable to ascertain whether there is any member of the family suffering from a spinal disease or curvature, or whether there is any constitutional taint in the family. All previous diseases must be ascertained, and the time at which the mother (who is generally the first), the patient, or anybody else have observed any alteration of form; any awkwardness of the gait or of other movements; any difference in the position during the usual occupation, as, for instance, an inclination of the head forward, or otherwise; a projection or higher position of the shoulder; a permanent inclination of the body in any direction, or constant standing upon one leg, or leaning with a hip towards a fixed object, placing one or both elbows on the hip, raising both shoulders while in the erect position, or any other abnormal actions or movements, which is frequently the necessary consequence of a weak spine. The dress betrays also the beginning of an abnormal position of the spine; low dresses

fall down more on one shoulder than from the other; the skirt appears longer on one side; the bodice or body of the dress is in folds on one side of the back; the shoes are frequently torn on the inside, corresponding to the place of the projecting ankles; one projecting ankle is often found in lateral curvature.

39. It is necessary to inquire whether any particular position or movement produces pain, whether a constant dull sensation of uneasiness and languor, sometimes amounting to pain, is present, and whether any mechanical injury, or an accident has not caused these sensations—rude romping amongst children; throwing stones on the spine; falling from a horse or down stairs; too great a strain while nursing sick people; too long protracted bodily labour; and shortsightedness in persons obliged during a long time to write, to engrave, or to do other work requiring close application of the eyes, and consequently, stooping position of the head, are a few of the numerous mechanical causes to which I have seen traced the origin of many curvatures.

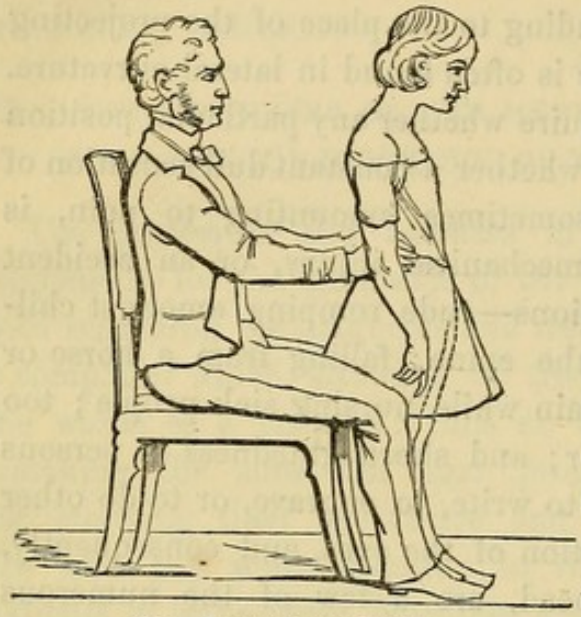
40. This preliminary enquiry enables the medical man to direct more attention to some parts of the spine, to bring this part of the spine in different positions, and to watch the various movements in regard to their effect upon this part.

A minute and detailed examination into all circumstances preceding the complaint, into the mode of life, habits, &c., is, in spinal curvatures, as important as in any other complicated chronic disease, where the pre-disposition is to be brought in connection with the occasional or external causes, which enable us to trace the beginning and greatest development of the curve, which is in many cases but the symptom of another complaint.

41. INSPECTION OF THE SPINE.

Whenever practicable, the spine should be examined while the patient stands upright. The examiner sits behind the patient, whose feet and legs are placed close to and touching each other at their *internal* sides; the legs are well stretched and the knees straight; the patient is undressed to the height of the edge of the hip-bones (a shawl or cloak can be fastened

round the neck and hangs loosely down the chest); the examiner places his feet along the external edge of the patient's feet, and fixes with his knees those of the patient, *fig.* 20*a*, or they are fixed by a second person kneeling before the patient, whose hips, which are often twisted, are placed in a straight line, and fixed therein; the object of this fixing is to give the patient a firm and straight basis, so that the slightest inclination, deviation, or twist of the spine can easily be observed; the patient leaves, at first, the upper part of the body (viz., that above the hips), in its usual position, without any effort to show his body more erect, or straight, than he is habitually; while thus placed, we must look whether the position of the head is normal, or whether it is bent or turned in any direction; the two outlines from the head along the lateral sides of the neck down to the passive and hanging arms, which are carefully compared with each other; the relative position of the shoulder-blades is to be watched with regard to their height, projection, and distance from the spine; the distance of the arms from the body on both sides, and the difference of the shape of the space between body and arms compared; the outlines of both sides of the thorax, of the posterior and lateral part of the ribs, and the transversal lines formed by the ribs, as well as the line of the spinal processes, and the muscles of the back must be inspected, not only while the patient remains passive, but also while he is doing various movements with the head, arms, and trunk, and still without special endeavour to stretch the spine.



20*a*. Inspection of spine.

Only when this part of the examination is finished the patient must be encouraged to stretch his body, and to elongate his spine when he goes again through the various simple movements.

The difference of the outlines on the two sides of the spine and body is very striking where only a slight deviation exists, and even the unpractised eye of an attentive observer will soon find it out.

42. SOME MOVEMENTS USEFUL FOR THE DIAGNOSIS OF CURVATURES.

The movements which are most useful for the examination are—I. A slow and alternate flexion of the head forwards and backwards, and from one side to the other; also a slow turning of the head to one side and then to the other, while the rest of the body remains immoveable.

II. Raising of the arms slowly to the height of the shoulders, first forwards, and afterwards on both sides of the body; also stretching the arms in a vertical direction to their full extent upwards and parallel to each other; some rotatory movements, during which the arms describe a curve, the basis of which is gradually increased in circumference; the head and body remain immoveable, while one or both arms are moved in the directions just named.

III. The patient bends the trunk slowly forwards, backwards, and sideways; he twists the body while in the vertical line from one side to the other; the examiner fixes the hips during the various trunk movements, so that the lumbar part of the spine should be brought into action. Sometimes it is desirable to resist the patient slightly while he is trying to execute a movement, in order to find the weak muscles or the irregularity of the form.*

43. INSPECTION OF SPINE CONTINUED.

This is not the place to enter into the details of the changes which are produced by these few movements in the various forms and stages of spinal curvature; my object is only to call the attention of the examiner to an easy mode of making a good

* These three groups are illustrated and fully described in *The Cure of Chronic Diseases by Movements*, and in the translation of Rothstein's *The Free Exercises, by Ling;* published by Groombridge & Sons.

diagnosis of the sometimes very complicated affections of the spine.

The head counterpoises the body, especially when the patient is passive; this is the reason that the head is bent forwards when the natural lumbar curve is diminished, and the lumbar vertebræ form a straight line instead of a curve; in lumbar curves, with the convexity to the left, the head bends slightly to the left; in kyphotic curves of the dorsal vertebræ, the head is slightly bent back, sometimes the chin higher than the back of the head, and the neck almost entirely hidden between the raised shoulders; the upper arms are frequently not only raised but also turned forwards and inwards; a cavity is formed under the clavicles on both sides of the upper and outer part of the chest; one humerus is found higher and also pushed more forward by increased action of the pectoral muscle of its side; this is also the cause of the inequality of the lateral lines from the ears down to the acromion, which is a circular segment on one side and more elliptic on the other; if an oblique line is drawn from one acromion to the hip on the opposite side, it is longer on one side than the other; each spinal process should be first slightly touched, and if not painful, either pressed harder or a percussion made; or if that cannot be borne, a slight longitudinal friction from the head downwards, with more or less pressure, is made along the spine. This manipulation several times repeated leaves for a short time a red mark along the spinal processes, which gives an exact outline of the position and form of the spine.

44. MODE OF TAKING THE OUTLINES OF CURVATURES.

If the mere inspection is not sufficient, a strip of lead, about half an inch wide, one-eighth of an inch in thickness, and of the length of the spine, can be placed and slightly pressed along the spine; the strip of lead thus takes the shape of the spine, which is cut out in pasteboard. The transversal outline, *fig.* 10, of the back across the shoulders is also taken in a similar way; and the outline of the spine in *figs.* 11 and 12, have been drawn from outlines taken in the manner just described, which, if I am not mistaken, was first used by

Ling. If casts, in plaster or gutta percha, are to be taken, I would advise my professional brethren to employ very skilful and practical workmen—the quicker such a cast or mould is taken the better it is—because it is difficult for the patient to remain for some time motionless; even deep breathing and speaking is often a cause of failure, as the position of the thorax and of the ribs is changed, and interferes with the solidification of the plaster.

45. Prognosis.

Every lateral curvature while in its first stage predisposes to the second and third stages, and is never cured without treatment; unfavourable circumstances acting injuriously upon the general health, bad positions kept up for a long time, acute and chronic disease, hasten (in females quicker than in males) the progress of the complaint.

The muscular lateral curvature in its first stage is always curable, if the suitable treatment is not delayed, and if the patients are able to do all that is required for their benefit; when the second stage is fully developed, the curvature can be very considerably improved, but rarely perfectly cured; while in the third stage the improvement of the form which can be obtained, shows itself more in the secondary and tertiary curves and the general health; the diminution of the painful symptoms which I have named as the consequences of the highest degree of deformity, is here the principal object of the treatment. The other (not muscular) lateral curvatures do not admit such a favourable prognosis.

In kyphotic curvatures, which frequently occur in rickety children in their first year up to the sixth, or in children of tuberculous parents, or in adults suffering from caries of the vertebræ, the prognosis is always bad, because tubercular infiltration takes place in the body of the vertebræ, and destroys it, or the want of osseous matter prevents in rickets the firmness and the right form of the vertebræ; caries destroys the body of one or more vertebræ; in all these cases the happiest termination is ankylosis of the vertebræ, and the deformity is the

least if the patient is kept in a horizontal position from the beginning of the complaint, and his diseased constitution improved by hygienic and medicinal means; unhappily in the majority of cases they are placed under treatment when the disease has made too great ravages, and a humpback produced; in such a case the treatment can, when most successful, but arrest the further progress of the deformity, and improve the position of those parts of the spine only which are above and below the diseased part.

46. LENGTH OF TIME REQUIRED FOR THE TREATMENT OF CURVATURES.

While naming approximately the periods of time required for the improvement or cure of a curvature, we must always take into account the constitutional strength and the most favourable circumstances. The following refers to the average of those cases in which the general power of reaction is still satisfactory.

In predisposition to lateral curvature, or where a slight inclination of the spine is observed in a lateral direction, three or four months of treatment are sufficient, but in order to prevent a relapse, constant attention must be paid to general health, and to the removal of all injurious influences; all the rules named in the preventive treatment must be attended to, especially during the period of growth, and the dangerous epoch of education.

Four to six months are wanted, in favourable cases, for the cure of beginning lateral curvature, and the same time for a considerable improvement of such a curve in its first stage, and while changing towards the second stage. In the second stage one or two years are wanted for obtaining the maximum of improvement or effecting a cure; but some improvement is already noticed after the first three months. In the third stage real and lasting improvement is scarcely to be expected under eighteen months or two years.

In kyphosis a similar period of time is required, if the general health is not impaired by the continuation of the constitutional

disease, and if no suppurative process prolongs the disease for many years.

47. THE AIM OF THE MEDICAL TREATMENT OF CURVATURES

is to prevent the development of the spinal curvature as soon as the predisposition to this complaint is observed; to cure it in its first stages, or at least to improve where the cure is beyond our power. Circumstances frequently prevent the patient from being placed at the right time under any, or a rational treatment, while neglect of the complaint, or its injudicious treatment continued, in hope of a recovery, for years, with much perseverance, increases the curvature to such an extent that neither a cure nor a considerable improvement of the deformity is to be expected. In these cases our object will be to arrest the further progress of the disease, and to relieve the painful symptoms it has caused.

Prevention is only possible when the causes of the threatening curvature can be removed, while a real cure, even after the removal of the causes, can be only effected when the deformity is not too far advanced.

48. THE PREVENTIVE TREATMENT

begins properly with a rational rearing of babies and infants, and a rational physical training of children, youths, and adolescents; it is essential to attend, from the first infancy during the various stages of growth, to a few elementary hygienic rules, which, because they appear very simple, are generally neglected, although they are the only real means for preventing many diseases.

49. FIRST RULE.—TO PROVIDE, DAY AND NIGHT, A CONSTANT SUPPLY OF FRESH AIR.

In nurseries, bedrooms, dormitories of public and private educational and other institutions, much is still to be desired respecting the sufficient supply of fresh air. Perforated glass or zinc plates are the best ventilators, and also those which are constantly open, and can never be entirely shut. I have visited lately the day-nursery of a metropolitan workhouse which, although abundantly supplied with ventilators in all parts, was

filled with such bad air that I could not remain there without immediately opening the window. You will, probably, think that the room was very crowded by its little inmates and their mothers; this was not the case, but all ventilators had been closed, and placed so high that they could not be opened, except the porter was called, who had to ascend a ladder before reaching the ventilators, which, under such circumstances, were scarcely, if ever, used. I could tell similar tales of many a nursery or dormitory in the houses of the rich. People are afraid of catching cold, but not of poisoning themselves with carbonic acid; they think that fresh air cannot enter the room without causing draughts, although these are easily prevented. My patients open the top-window about half an inch or an inch, and the window-curtains prevent the draughts.

50. SECOND RULE.—WASH AND RUB, DAILY, THE SKIN ALL OVER.

Bath-rooms are wanted in every house, but still more in all educational institutions, and wherever many persons live together. At present one bath per week is considered, in many homes and in very good educational institutions, the maximum of luxury required for cleanliness, and for preserving the regular functions of the skin; I am in the habit of prescribing, not only to children, but also to many adult patients suffering from chronic diseases, before they go to bed to be well washed with yellow soap, or another soap containing much soda or potash, which, under the form of a lather, is applied to the skin with a coarse flannel; every limb, and afterwards chest and back, are separately treated in this way and, when washed and dried, well rubbed either with a coarse flannel or glove. The patient, especially the weak, derives the full advantage of the manipulations if they are done by another person. The temperature of the water varies according to the power of reaction. The patient must feel, for some time after the washing, a general feeling of comfort and warmth. When warm water is used in the beginning, it should be changed only by degrees (every second day half a degree less warm) to tepid, and when required, to cold. In the morning a quick sponging,

with tepid or cold water, of the whole body precedes the general friction. Very weak patients are not washed all over at once, and are well covered after the washing to assist the production of warmth and comfort.

51. THIRD RULE.—ATTEND STRICTLY TO THE QUALITY AND QUANTITY OF FOOD.

The Food must be simple, and not too much seasoned or spiced. Hunger must induce to eat, but the appetite must not be artificially stimulated by bitter and similar substances. A mixture of animal and vegetable food is the best. Water and milk is the usual beverage; sometimes a glass of wine or beer is given, but I have never recourse to brandy or rum. The meals should be taken at regular hours, and the principal meal during the middle of the day, at 1 or 2 P.M. Three meals a day are sufficient; children under three years may have a fourth meal. Bad assimilation amongst the poor is often the consequence of scanty and bad food: while the rich suffer frequently from the same complaint by eating too often, too much, and too rich food. The different quality of food can be made use of as a means of counteracting some symptoms—thus, where the action of the bowels is sluggish and the digestion not deranged, brown unfermented bread and oatmeal porridge will be useful; mix wheatmeal (with all the bran it contains) with water and salt in the requisite proportion, have it well kneaded for five or ten minutes in order that a sufficient quantity of air may be taken up by the dough, and when well baked it forms a very savoury brown bread, containing all the gluten of the wheat, counteracting the predisposition to constipation, and it is much more liked than the white bread, and does not produce acidity or flatulency. The brown bread, according to Dr. Dauglish's process, is also good, but cannot be had always and everywhere. The white of an egg mixed either with milk alone or with the addition of a small quantity of cream, given to weak and rickety children three or four times a week is very useful. Every practitioner can and must prescribe such food as is most adapted to his patient's constitution and complaint.

52. FOURTH RULE.—ATTEND TO PROPER DRESS.

The materials of the dress must vary according to the season; it must be always sufficiently loose to permit the free use of the limbs and body, and not interfere with the full expansion of the chest and abdomen during a deep inspiration § 20. My female patients are not permitted to wear stays and corsets; the injurious effects of these have been mentioned. The bodies of their dresses and under-clothes must have large armholes; shoulder-straps or tapes across the shoulder, which are constantly falling down to the humerus, interfere with the free action of the arm, and oblige the wearer to use, and to raise frequently the shoulder-blades beyond their normal position. Petticoats should be attached to bodies, or fastened by broad and circular bands *across*, but *not above*, the hip-bones; these bands are of a circular cut, with the smaller circle at the top to prevent any transversal pressure across the abdomen. Too heavy dresses, pressing especially on the abdomen or hanging heavily on the shoulders, are injurious. Garters which are usually tight interfere with the circulation, produce swelling in legs and feet, also varicose veins; it is better to fasten the stockings by loops attached to a circular waistband. The soles of the shoes should be as large as the sole of the foot when the entire weight of the body is pressing upon it, and it is in this position that the measure of the outline of the sole should be taken; while the measure of the arch of the foot is taken while no weight is pressing upon it, as, for instance, in the sitting position.*

53. Many persons suffering from lateral curvature have one or both ankles relaxed, and mostly projecting inwards; besides the special manipulations and exercises selected, according to the case, for strengthening this joint, I recommend a soft pad of

* Patterns of good dresses for children and adults are to be obtained at the Ladies' Sanitary Association's office, 14A, Princes Street, Cavendish Square, London; and those interested about how a good shoe should be made, will find the details in Professor Meyer's little pamphlet, *Why the Shoe Pinches* (which can also be obtained at the office); and in Dowie's book, *The Foot and its Covering*, which contains Camper's treatise, *The Best Form of Shoe.*

cotton or horsehair, covered with silk or chamois-leather, corresponding to the shape of the hollow of the foot, the sole of the shoe having a thinner and moveable middle-piece adapts itself to the shape of the foot, and as the pad raises slightly the middle part and internal edge of the foot, the boot (which reaches above the ankles and is laced in front) assists the foot at every step, and brings it into a more normal position. I have elsewhere * mentioned the bad effects of high as well as of small heels.

Stockings with toes are preferable, because they would prevent the toes from bending, and thus diminishing the basis of the foot; while corn-cutters, chiropodists, and foot-doctors would be less wanted.

54. Boys and men should leave off tight hats, stocks (which produce headache and other disagreeable symptoms in the face and head), tight belts, and braces (the two last compare in their effects with shoulder-straps and corsets); trousers fastened by a half circular band in front, an elastic and strap on the sacrum, made on the same principle as the bands of petticoats, will answer all purposes without interfering with the digestion, by pressure on the stomach and abdomen.

55. FIFTH RULE.—AVOID BAD POSITIONS.

Avoid during the usual occupations of life, but especially during the period of education, such positions as contribute to the development of the predisposition to curvatures, or increase a beginning curvature. By looking on the engravings of the bad positions drawn from life, and which I have chosen because they are very frequently observed, it will be easily understood why they have such an injurious influence on weakly constituted persons, especially on growing girls—and why those who are suffering even from the slightest curve, must be constantly watched, that they may not choose these bad positions, which they do unconsciously and involuntarily.

* *Cure of Chronic Disease by Movements, on Dress, p.* 260.

56. SIXTH RULE.—ATTEND TO RATIONAL PHYSICAL TRAINING.

Train growing as well as adult persons by a rational mode of exercise, that the body and limbs may be under the control of the mind, and thus made useful for the purposes of life.

The preventative treatment is more required by girls than boys, especially by those delicate girls who have a hereditary predisposition to tubercular, chlorotic and anæmic diseases, and spinal curves. All practitioners having experience in the treatment of spinal curvatures, however they may differ regarding the treatment of curvatures, agree that besides the hygienic influences which contribute to the general improvement of health, *rational* exercise is the most suitable for the prevention of curvatures.

57. BOYS ARE LESS SUBJECT TO LATERAL CURVATURES THAN GIRLS.

The greater freedom permitted to boys during their education, their games and sports in the open air, the greater ease with which they can move in their dress, are considered to be the principal causes to which we must attribute the smaller number of lateral curvatures occurring amongst boys—the proportion being one boy to ten or twelve girls.

58. CURVATURES AND OTHER COMPLAINTS ARTIFICIALLY PRODUCED IN GIRLS.

The following extract from a Continental writer, on the mode of bringing up children, can justly be applied to this country, and will sufficiently explain how curvatures can be artificially reared :—

"We will not inquire how a child has been brought up to its sixth year with regard to food, clothing, dwelling, and exercise; but we will assume that it has been treated rationally, and is sent at that age as a healthy child to the public school. Now the childish play ceases, instead of the exercises and games which had been strengthening the body, the school is sub-

stituted in all its earnestness and rigour for six hours a day. School is not a place where labour is united with play, and application with pleasure, but one for labour and application only. When boys, however, return from school they are usually permitted to exercise themselves freely, and to find for themselves opportunities of making their bodies strong, flexible, and healthy; but this is not the case with girls, they must bear themselves from infancy with the strictest propriety, and their out-of-school hours are therefore employed in sitting occupations, such as reading, writing, and sewing. The only recreation permitted them is playing with toys, which neither rouses the mind nor exercises the body. As girls become older, the requirements of the school become greater; lessons to be done at home diminish their leisure time perhaps by two hours. If the girl is to be introduced into the world in her fourteenth year as a well-endowed young lady, she must begin at least in her tenth year to play the piano and to learn French. Thus the lessons are spread over two hours more, and the mind is daily occupied for ten hours, while nothing is done for the body.

"Can we, then, wonder that in the fair sex of the present day, especially in large towns, among the middle and higher classes, ailments of the muscular and nervous system, deficient development of the bones, and consequently curvatures of the spine, glandular and scrofulous diseases, green sickness, cardialgia, fainting fits, disorders of the sexual functions, etc., occur so frequently! No one who does not wilfully shut his eyes can fail to observe the evil of the prevailing fashion of female education.

59. IMPORTANCE OF RATIONAL GYMNASTICS.

"The only preventive and remedy for this unnatural and irrational state of things is to be found in the adoption of Rational Gymnastics. The only substitutes at present employed, and those at the best insufficient, often unfit, and in many cases even injurious, and at present confined in a great measure to the better classes, are dancing and the so-called calisthenic exercises, while those exercises which, under the

name of Free Exercises, form a part of Ling's system are entirely unknown. It is strange that many parents object to a Rational Gymnastic instruction, under pretence that it is contrary to propriety, while the same parents have not the slightest objection to send their daughters to dancing lessons, where familiar embracings with the other sex form a necessary part of the lesson, where they are taught to hold themselves in constrained unnatural positions, and where coquetry is practically taught. (*Böttcher.*)"*

60. These evils of our modern civilization—when parents believe that the finishing-stroke of their daughters' education must be given at the completion of their seventeenth or eighteenth year—can only be counteracted by suitable hygienic means, amongst which *rational* exercise is a very important one, as it aims at the harmonious development of the mental and bodily faculties, which can be obtained only by degrees, as the mind —by the influence of the will on the training of the body—is one of the agents in producing this harmony.

61. IMPORTANCE OF PHYSICAL TRAINING.

The following notes, taken from Mr. Chadwick's Biographical Notice of the late Horace Grant, confirm the importance of rational physical training:—

"Every one must have noticed the *great bodily* and *mental exercise* gone through by a *healthy* child, at perfect liberty to do what it likes; the innumerable objects observed, inquired into, and experimented on; the endless reasonings, imaginings, inventions; and the worlds of fancy into which his old materials are constantly being marshalled. Yet all this hard work is pleasure to the child,—it is play; but such play makes men. Shall we attempt (imperfectly at best) to continue the course thus indicated by nature, or shall we disregard the requirements

* *A Letter to the Rt. Hon. the Earl of Granville, Lord President of the Council of Education, &c., &c., on the Importance of Rational Gymnastics as a Branch of National Education, and as a means of Elementary Instruction; on the Advantages arising therefrom to the Industrious Classes, and the Effect upon the Public Health, the Fine Arts, Military Affairs, and the Diminution of the Poor's Rates.* By M. Roth, M.D. Groombridge & Sons, London.

of the complicated and delicate structure with which we are entrusted, and force down indigestible matter as if it were fit nourishment, exclaiming always, that nothing can be more pernicious than to overwork the mind or body of a child?' * * * * Mr. Grant fully comprehended, as expressed shortly in the passages hereinbefore cited, the necessity of keeping the physical training coincident with the mental exercises for mental development, and he has provided for exercises for the body, in his 'Exercises for the Senses of Young Children,' in the infantile stage. I know, from conversation with him, that his views extended to the whole educational course up to manhood, and would have comprised the health gymnastics, as developed by Ling in Sweden, and promoted by Dr. Schreber in Germany, but complete and systematised. As an example of the closeness of his observation, where he indicates, as a probable source of the disposition to mischief, and of the more unfavourable and troublesome of the characteristics of town boys—the irritation of body caused by the want of good air and active exercise—I may state that in some large public establishments exclusively occupied by children, where systematised exercise has been given to them in the form of the military or naval drill, or gymnastics, or labour in the fields, with half-time book instruction, those unfavourable manifestations have been entirely suppressed. Where, however, from ignorance, the drill has been discontinued, and the active bodily exercise has been greatly reduced, the troublesome mischief has invariably re-appeared, the premises and bedding materials have been injured, irrepressible disorder in the school-rooms and dormitories has arisen. But when the active bodily exercise, by the drill or otherwise, has been restored, and the suppressed energy which burst out in mischief has been allowed to have vent, the mischievousness has been invariably eradicated, and order and quiet sleep in the dormitories restored, and the work of the school performed satisfactorily. The bodily training necessary to sustain mental as well as bodily power, and to ward off disease and pain, and premature loss of power, will, however, lie with the physiologist and with the physician, who has to mitigate the evils of neglect,

and with the sanitary philosopher who specially studies the whole special means—mechanical, administrative, and other—of prevention."

The medical attendants in public and private schools, and the parents who send their children—especially girls—to boarding-schools, should inquire whether the few hygienic rules named above are strictly attended to, as far as they regard constant ventilation in dormitories and school-rooms, frequent bathing, and the positions in which the pupils are during their occupations; also, the time spent in the open air and the time passed while engaged in mental work should be strictly inquired into.

62. OVERSTRAINING OF THE MENTAL FACULTIES PRODUCES MANY DISEASES AND DEFORMITIES.

The bad results of mental overstraining are not sufficiently known to teachers and parents; and although I have named some of the bad effects on pupil-teachers and those who are trained as governesses, I wish to quote the opinion of an eminent physician on this subject, which is ably expressed in the following extract. I have only added or changed the few words in *italics.*

"In the affluent classes, wherever the hygiene of children or adolescence is neglected, or is ordered by the sovereign crotchets of some energetic parent, many maladies will creep in; and here I would raise my voice against that pernicious system of brain work, miscalled infantile education. It ignores, or is ignorant of, the laws both of the physical and functional development of this most important organ. It neglects the sequences under which its various faculties appear. It has little regard to the laws under which the senses educe the powers of the brain. It either crushes the imagination, so active in childhood, by a premature development of the reflective faculties; or it overwhelms a faculty which requires no stimulus, by a host of artificial expedients. Hence the greater development of early madness; hence the instances of disproportionate faculties, the wayward will, the unbalanced conduct, the physical

exhaustion and cramped development of the body, the result of the contention of inharmonious and disordered powers and passions. The chapter on the early training of childhood is yet to be written; and even were it at hand, I believe that the errors of the present system are so methodized and enrooted, so many prizes are offered for threading its paths, that few would listen to, and fewer practise its precepts. One of the most thoughtful minds of our time (Sir B. Brodie) in pointing out some of its vices, has all but preferred leaving the brain fallow, to storing it as it is now stored, in infancy and childhood."—(*Ferguson's Prefatory Essay to Gooch's Diseases of Women.* Sydenham Society.)

63. CASE OF BAD EFFECT OF EARLY MENTAL OVERWORK.

While writing these notes I have an opportunity of seeing a sad instance of the effects of such mental overstraining in a young man of twenty-one, who since his earliest childhood and during adolescence, was obliged to read and to say prayers very frequently during the day, to read and to think of religious and philosophical matters which were far beyond his comprehension. For years every effort was directed to the development of the brain with an entire neglect of the body; notwithstanding he has been lately for months living in the open air and taking horse exercise, he is suffering in a high degree from various nervous symptoms, fears, and bad spirits; has no idea of form, numbers and mathematical combinations; frequently complains of sickness and gastralgia; sometimes a ravenous appetite and at other times apepsia; his head stoops, the spine is laterally curved, the chest flat, the breathing only abdominal; he is inclined to make involuntarily grimaces, consisting in a particular sniffling movement of the face, with lifting the cheeks and mouth, the origin of which he explains thus: being obliged to say in his childhood short prayers, he soon got tired of them and used merely to mutter the prayers; he afterward said only "amen," and finally made only the movements of praying, and finishing with a repeated grimace for "amen." With his right fore finger he makes also involuntarily movements, which are the effect of having constantly made, concurrent

with the prayers, the sign of a short cross. When sitting he moves the body forwards and backwards, a movement I have frequently seen amongst the blind left without regular occupation or training. He corresponds perfectly to the picture drawn by Dr. Ferguson, and serves as a warning to those parents who are fond of the great and premature cleverness of their children, whom they overburden with ideas beyond their powers of comprehension.

I have notes of many other cases of curvatures and general derangement of health in consequence of early mental overstraining, and have just examined a young lady 23 years of age who suffers from headache, spinal irritation, slight curvature, beginning loss of sight, and general weakness; all these symptoms being principally ascribed to mental overexertion during the time of her education.

64. INJUDICIOUS EXERCISE, AND ITS BAD EFFECT.

For prophylactic purposes, the most useful *gymnastic* exercises—that is, such as are well executed with regard to quality, quantity, and intensity—are, in the first place, breathing exercises; next, those which develope the extensors of the spine and head, the muscles which enlarge the chest and retain the shoulder-blades in their place, and the exercises by which the limbs are simultaneously strengthened.*

The individual state of health and strength must be the standard according to which the quality, quantity, and intensity of the exercise must be regulated. Much mischief is done by a general and indiscriminate recommendation of exercise, by placing weak persons, and especially children and youths, in the same class with healthy and strong ones, who go through a series of educational or hygienic exercises suitable to the healthy, but extremely injurious to the weak and those predisposed to curvatures. These, although not able to move like the strong, try to imitate or rival them, and, by doing so, place themselves in abnormal positions, which produce unequal development, and, instead of improvement, an increase of the primary weak-

* See *Gymnastic Free Exercises of Ling*, published by Groombridge & Sons, 5, Paternoster-row.

ness. I could quote many instances of weak persons being sent to an ordinary gymnasium, where they have been obliged to go through a series of exercises similar to the drilling of healthy recruits, or where everybody, according to his fancy, takes hold either of dumb-bells, clubs, heavy weights, ropes, climbing-poles and masts, &c., and does what he likes; where the ambition is roused to lift the heaviest weight or to carry it the longest distance, to leap the highest, and in general to perform the most difficult, or most daring feats. That not the slightest notice is taken of the individual weakness in such a gymnasium is quite obvious. The practice of such rough exercises produces on persons who are not strong bad effects, which vary according to the individual predisposition to various complaints; and this abuse of gymnastics is the cause of the disrepute into which even the most cautious scientific application of medical gymnastics has fallen.

65. THE NEGLECT OF RATIONAL GYMNASTICS BY MEDICAL MEN IS THE PRINCIPAL CAUSE WHY THE PUBLIC APPLY TO EMPIRICS, ANATOMICAL MECHANICIANS AND ANATOMICAL CORSET MAKERS, TO DRILL SERGEANTS AND DANCING MISTRESSES, PROFESSORS OF CALISTHENICS, ORDINARY GYMNASTICS, AND TO RUBBERS AND QUACKS.

How can we expect a scientific use of this branch of the healing art as long as medical students leave their schools without the slightest knowledge of the existence of such a curative agent; as long as medical men believe it to be under their professional dignity to apply personally medical gymnastics for the prevention, relief, and cure of many chronic complaints; and as long as the teachers of medical schools ignore the importance of this subject.*

In consequence of this neglect on the part of medical men,

* It is mentioned in the *Medical Times and Gazette* of January, that at the University of Prague, one of the oldest in Germany, Drs. Spott and Bohn have been appointed as professors of the theory and practice of medical gymnastics: it would be too sanguine to hope that the English schools of medicine will imitate this good example.

drill sergeants, dancing mistresses, teachers of calisthenics and ordinary gymnastics are entrusted with the treatment of what people are in the habit of calling a high shoulder, a high hip, an awkward walk, a stoop, a bent back, etc.; of symptoms depending upon constitutional weakness and other morbid causes, the removal of which requires a deeper knowledge of the state of the healthy and diseased body, and which is certainly not to be found among the persons I have named, who indiscriminately direct their efforts only to the diminution of the visible and more prominent symptoms, without having the slightest notion that the mechanical pulling and pressing down of a high shoulder or high hip is frequently followed by a still higher degree of a twist or curve of the spine. If the persons just named do not succeed, as it happens in the majority of cases, recourse is had to a so-called anatomical corset maker, a mechanician whose epithet of *anatomical* impresses the public (generally very ignorant upon everything which concerns its health) with a particular awe, while the prevailing idea that the human body can, like a piece of wax, be moulded mechanically into any shape, induces many people to make use of the nicely polished spine redressers, steel supports, or of softly padded, silk-covered corsets, hiding under their pleasant exterior steel plates, steel busks, etc.

66. INJURIOUS EFFECTS OF MECHANICAL SUPPORTS.

All these mechanical contrivances have this in common, that they give immediately to the dressed young ladies a better *appearance,** that they *increase* the weakness and inactivity of those muscles which, instead of being strengthened, are still more weakened and relaxed: by degrees such an effect is produced, that many of the unhappy victims, after years of suffering, patiently passed in the vain hope of an ultimate recovery, are even unable to turn in bed without being cased in their anatomical corset, a name which is given in preference

* A sad advantage, but highly appreciated by the ignorant parents, who do not mind if their daughters suffer from any other complaint, but are particularly anxious that they should not *look* crooked or deformed.

to this torturing steel contrivance; or that they lose the power of balancing the body to such an extent, that they are unable to make a few paces without the assistance of another person. Such a painful picture is at this moment presented to me by a young lady 19 years old, who for six years has been treated in this way, and has named the anatomical mechanicians and the three orthopædic surgeons who have, during this long period, directed the treatment by machines, which require every week, once or twice, a screwing up, arranging or adjusting of their various parts, which operation is performed by the specialist, and rewarded by a fee. Under such circumstances, the pertinacity with which such treatment is advocated at the expense, although not in the interest of the patient, is easily understood, and also why its advocates oppose the only rational mode of treatment, which aims at the improvement of general health and the increase of power in the parts affected by simple hygienic and medical means.

Many family doctors are most innocently reproached by their patients that they—having no experience in the treatment of deformities—have sent them to those professional men who are the staunch advocates of such purely mechanical treatment. About two years ago the leading medical journals contained a large prospectus for the formation of a limited liability company, under the title of *The Spinal and General Orthopædic Association*, with a capital of £ 20,000, for the manufacture and loan of these orthopædic machines; the profits to be made at the expense of the unhappy patients were advertised as sufficient not only for a fair dividend to the shareholders, but also for paying fees to a staff of superintending, consulting, assistant and district surgeons, etc. None of the editors of those medical papers opposed such a scheme, which happily failed, otherwise it would have been as degrading to medical men as injurious to their deformed victims.

At present we see the advertisement of an anatomical mechanician who, being probably aware of the injuries produced by spinal apparatus, advocates the use of gymnastic exercises as practised abroad, in combination with the mechanical contrivances he manufactures; while another, who calls himself an

orthopædic, anatomical, and gymnastic machinist, advocates gymnastics at home, because he has no gymnasium connected with his manufacture of machines, and sells apparatus on which exercises are most rudely performed. This is another proof that any curative means neglected by medical men will and must necessarily fall into the hand of empirics.

67. PRACTICE OF RUBBERS.

If professional men would pay more attention to the pathogenesis, development and treatment of deformities, they would not complain of their patients placing themselves under, and sometimes being cured by, the treatment of rubbers, bone setters, synovia dispellers, and similar classes of persons, who promise to cure every complaint and deformity either by the application of pitch plasters, aromatic and other stimulating embrocations, or by rubbing the parts merely with oil and fat, which is sometimes done for three or four hours a day. The pitch plaster keeps up an equal temperature, and as it is first stuck on the lower part of the spine, and then pulled upwards all over the back and shoulders to the upper part of the chest, it sticks to all these parts as well as to both sides of the chest, and serves as an artificial support to some patients suffering from what they call a weak back; these plasters are very roughly and quickly torn down twice or three times a week, and the stimulating frictions applied for twenty to forty minutes before a new plaster is stuck on. A shrewd rubber, whom one of my colleagues calls the prince of rubbers, tells many of his ignorant patients that they suffer from softening of the brain, and that they must go to the madhouse if they discontinue his treatment. Such a patient, who was pronounced to have softening of the brain, was a short time ago under my treatment, suffered from sympathetic headaches, caused by a uterine complaint. I was also requested, a few weeks ago, to examine a child suffering from neuralgia, who was treated for more than a year with opiates of every kind, without the slightest relief; the crouching position during the long period of time, has produced a lumbar kyphosis. The rubber applied, as usual, his plaster, which produced when torn off such excruciating pains,

that the plastering treatment was discontinued. Dr. Madden has seen with me both these cases, which I mention because I believe it a duty to state such facts, as there are, unhappily, amongst the profession men who believe in the wonders of such quacks, patronize their proceedings, and thus help to maintain the ignorance and credulity of the public. By a coincidence of circumstances, or by some other chance, it happens that the same medical patrons are particularly recommended by the quacks to those patients who, not satisfied with the plastering and rubbing process only, wish also to have medical advice.

68. TREATMENT OF CURVATURES.

The common sense expressed in the following extract, written forty years ago, cannot be sufficiently repeated, as it takes a long time to eradicate prevalent errors of treatment :—

"When a lateral curvature of the spine has existed any considerable period, it is so commonly accompanied by a feeble and emaciated frame as to warrant the conclusion that some specific disease exists; which disease is the cause or consequence of the curvature * * * *

"But what is the disease that acts upon the system? what its nature and character? *Unless this is ascertained, and we know the source, we shall at best but palliate, not remove the evil.*

"Plans of cure have been proposed without a reference to the cause of the affection they profess to remedy. The eye is struck with the fact that the spine is bent, and *upon this fact, solitary and uncombined, plans of cure have been originated.* One proposes a well-contrived machine, to bear off the weight of the head from the part which has protruded. Another purposes to accomplish the same end by confinement to an horizontal posture for several successive months. A third recommends the carrying a weight upon the head, and, by the exertion thus occasioned, to compel the muscles to force back again the yielding parts to their natural position.

"As the plans of mechanicians these are certainly very precious and appropriate * * * * but it is evident that these *plans only relate to the spine as having been mechanically*

curved, and can have no relation to the cause of the affection. It is not treated as a medical subject, for every plan has for its object the restoration of the spine to its natural figure by mechanical means, and acts on the principle that that which is bent may, without regarding the cause, be forced back again.

"Suppose all that was intended accomplished, and that the vertebræ were again in their proper positions, by what means are they to be preserved there? The source and spring of the evil still exists; the cause of the curvature still continues to act; and when mechanical support is withdrawn, the curvature generally reappears.

"The attempt to cure, if it will bear the name, has had respect only to the preservation of the position. * * * * The sufferer having only the option of mechanical means, when these fail no resource remains; the symmetry and the health of the system must therefore every soon become the prey of the malady."*

Similar opinions were expressed also by John Shawe and William Ward forty years ago, but all in vain, the public and many medical men are still in favor of machine treatment.

69. THE AIM OF THE CURATIVE TREATMENT OF MUSCULAR LATERAL CURVATURE IS—

To improve the general health;

To restore the normal antagonism of the muscles of the spine; and

To arrest the further increase of the lateral curve; to improve or to restore the normal form of the spine.

I. In the majority of cases attention to the hygienic means, mentioned in the preventive treatment, is sufficient to improve the general health; in other cases, medicinal means, adapted to the individual cases, must be selected to obtain this object, also applications of water in its various forms—swimming, the Russian bath and sea-bathing—will be found useful in combination with other means.

* Dr. Jarrold, *Enquiry into the Causes of the Curvatures of the Spine.*

II. The normal muscular action is restored by movements acting especially on the relaxed muscles. The movements are put down in the form of a prescription,which the patient goes through either daily, or every other day, while assisted by the medical man himself or by one of his assistants trained for this purpose. Those who wish to know how to select the right movements for the *individual cases*, and how to apply them with regard to time, quantity, intensity, I must refer to the various publications on rational medical gymnastics or movement cure.* The study of this branch of medical science will convince them how the present empiric application of exercises, on the polymachion, on the portable gymnasium, or on similar mechanical contrivances, and the calisthenic treatment on continental and other principles, must prove very injurious in spinal curvatures, which require for their treatment, not merely mechanical or automatic exercises, but all the means suitable to counteract the causes which have impaired the general health.

III. In order to arrest the further increase of the curve, to improve it, or to restore the normal forms of the spine, the patient must avoid any position in which the spine is placed some time in an abnormal form—a reclined position as in *fig.* 46—or a lying position as in *fig.* 47, is very useful. These positions must not be kept for more than half-an-hour to one hour at a time; but the patients must at times during the day be placed in such comfortable positions, in which they do the breathing and other exercises adapted to their case. In the resting position they can read, write, or do any other work. Some of the bad positions which, during the period of education and during various occupations, are frequently observed, have been illustrated for this paper with the view of showing how bad the effects must be in delicate and weak persons.

The alternate use of rest and exercise, selected according to the state of the patient's health, strength, and curvature, is very efficacious, especially when the patient is made conscious of the usual positions in which he twists or bends his spine, or combines both these actions to make himself comfortable; he feels

* A list of them is to be found amongst the advertisements at the end.

constantly either twisted or crooked when placed in a right position, and as long as the patient does not think of the right position, but remains in those positions only in which he falsely believes himself to be straight, the progress of improvement is very slow; therefore, it is very important to convince the patient that he is not straight when he fancies himself to be so; the patient's will and energy must also be roused so that he himself may assist as far as it depends upon him to carry out the instructions given for his own good.

70. As I have no intention to enter into all the details of the curative treatment of the habitual lateral curvature, I will mention only the following:—

1. Lateral curvature should be treated as soon as observed.

2. Every day prolongs the time of treatment, and is frequently the cause that a previously curable case can only be improved.

3. Attention to the improvement of the general health and strength, by hygienic or medical means, must either precede or go hand in hand with the local treatment.

4. The local treatment can include not only passive manipulations and exercises, acting especially on the relaxed parts, but also applications of steam douches, cold or warm water showers and baths, compresses, and all other means which increase the strength of the weak parts. The influence of the patient's will on the relaxed muscles is essential.* To rely only on mechanical supports, corsets, machines, &c., is extremely injurious.

5. As long as improvement is going on the treatment should not be interrupted, otherwise the patient is exposed to the danger of a relapse.

6. It is not enough to improve only the appearance of the patient, but it is essential that his health and strength should be really restored, that he may be able to bear with impunity mental or bodily exertion of various kinds; his flabby relaxed muscles must be changed into firm and robust ones; the previous languor must have disappeared; in fact, he must not only look, but really be a healthy person, then only can the treatment be called successful.

* Dr. Kjölsted's treatment is based only on the energy of the will, and it is mentioned that he was very successful in many cases.

The following illustrations refer to § 55.

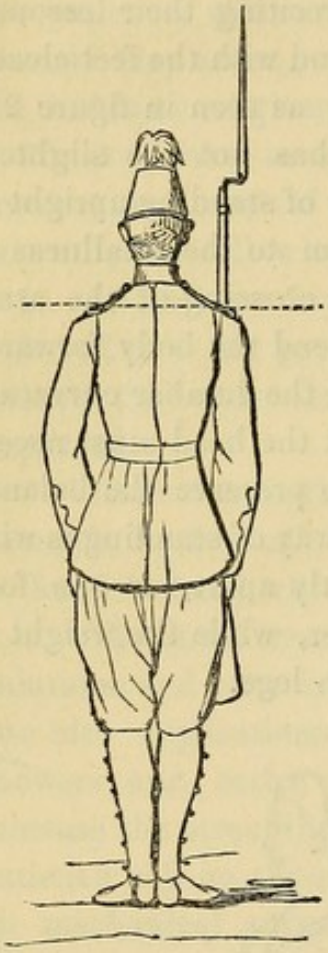
71. STANDING.

Little attention is paid in schools and educational establishments to the right mode of standing. In many schools it is a practice to make the children stand while reciting their lessons; they are obliged to stand with the feet closed and the arms crossed, as seen in figure 21. The school-mistress has not the slightest idea that the difficulty of standing upright is increased in proportion to the smallness of the basis, and that the crossing of the arms induces the child to bend the body forward, that the convexity of the lumbar curvature is backward, and that the head must necessarily bend forward to preserve the balance of body. The easiest way of standing is with the feet placed slightly apart, or one foot placed before the other, while the weight of the body rests on both legs.

21. Standing position of a girl in school.

22 and 23. Standing positions.

Fig. 23 shows the natural mode of standing of a girl whose chest is well developed, and whose dress does not interfere with the free use of the body and limbs; while *fig.* 22 shows the usual position of many girls whose chests have been for years compressed by tight stays and dresses, and who are and have been always leaning on the whalebone or steel busk of their stays; the chest is concave instead of being convex, the head stooping, and the spine weak. The artist has not drawn the fashionable crinoline, in order to show better the characteristic position which is very frequently to be met with.



24. Standing position of a volunteer whose spine is bent in its lumbar part.

Carrying the rifle for a long time on one side, was mentioned as one of the causes by which a very slight lumbar curvature was increased. *Fig.* 24 shows a volunteer who appears straight, but on a close inspection we observe the right shoulder higher than the left; further, the right elbow-joint is nearer to the body than the left, and the hollow space between arm and body on the right side is smaller than on the left. These differences are produced by the lumbar curve, which is increased by the weight of the rifle, which induces our volunteer to bend the lumbar part of his spine to the left.

72. SEWING.

Fig. 25 shows one of the many bad positions assumed during sewing, which have this in common, that the head stoops down to the work, while the body is crooked, the right leg crossed over the left, and the right foot twisted round the left calf; thus headaches, pains in the chest, bad digestion, and other abnormal complaints, and cramps of the legs are produced, besides the predisposition to various deformities of the spine and

ribs, &c., to which needlewomen and other persons engaged in sewing are subject. I may add that these bad effects are still more quickly produced in large establishments, where the needle-women have scarcely elbow room, and are heaped together either in underground rooms, or at the top of the house in rooms with ceilings, where the ventilation is very deficient, and the girls wishing to be smart, and rival one another in the smallness of their waists, are tightly laced, when they are frequently obliged to work for twelve, fourteen, or even eighteen hours, and kept awake by tea or coffee, while the small pay is only sufficient for very scanty meals.

Fig. 25.

Fig. 26 shows the right position, and that the back should lean on the chair, that the work should be near to the body, but not the head near the work; that the needle-women should have weight cushions on a table before them to attach their work, and the legs not crossed, which predisposes very much lumbar curvatures, while the use of a long thread must be avoided, because it causes a movement in the shoulder, which is raised, while the arm is stretched to its full length; the repetition of the movement, which amounts to several thousands per hour, causes also frequently pains in the spine and under the shoulder.

Fig. 26.

The introduction of sewing machines should be always advocated by medical men, because their general use will prevent

many diseases among the working class, the origin of which depends upon the bad position and the ten or eleven millions of movements of the right arm per annum, which an unhappy needle-woman makes, who works at an average of twelve hours, and six days per week, in one year, and generally confined in rooms with vitiated air.

A needlewoman makes in

1 minute	50	stitches,
1 hour....	3,000	,,
1 day (of 12 hours)	36,000	,,
1 week	216,000	,,
1 year	11,232,000	,,

Girls 10 to 12 years are apprenticed as needlewomen, and admitting that they work only a third or fourth part as much as an adult and practical woman, it will be easily understood why the frame of the growing girl is in a short time marked by a predisposition to many chest and abdominal complaints, as well as various deformities of the ribs and spine. *Fig.* 18 is a portrait of one of these unhappy girls, scarcely 18 years old, who besides the spinal curvature was suffering from fever, pain in the chest, headache, cough, and blood spitting.

73. SITTING AT THE FRAMEWORK.

The stooping position over the frame, and the leaning on it with the lower part of the left side of the chest, not only produces deformities in the anterior part of the ribs and of their cartilages, but also a predisposition to spinal curves; when the frame is to be arranged for the work, the girls and women are in the habit of pressing the frame with all their power towards their chest, which is also very injurious, and would be

Fig. 27.

easily prevented by placing a few screws in the frame; the working girl should be taught during her apprenticeship to use alternately both arms and hands above the frame, which would prevent a constant flexion to one side of the spine in its lumbar part, and thus indirectly a lumbar curve."

74. IRONING.

The girls in the laundry, whose constant occupation consists in ironing, are frequently subject to spinal curvatures; I have traced the cause in many instances to the ironing table being too high, and the weight of the iron being too heavy for the girls, they are consequently induced to raise the elbow beyond its natural height, and to assist the lifting of the heavy iron by raising the shoulder; but as both these actions (of raising the parts beyond their natural height) are more easily performed when the spine is bent to the opposite side, it is easily understood, why a weak girl working for days in a standing position will soon suffer from languor, pain, and lateral lumbar curve. As long as we have not ironing machines the girls should be accustomed to iron alternately with both hands; change of occupation—as housework, washing, scrubbing, &c., are very good antidotes to the bad effects of ironing; the introduction of ironing desks instead of tables, and a contrivance for raising and lowering the desk, according to the height of the working person, is desirable. It is to be hoped that the ingenuity of some engineer will soon be directed to the invention of a mechanical contrivance for ironing which would certainly contribute to the diminution of the complaints to which the ironers are at present subject.

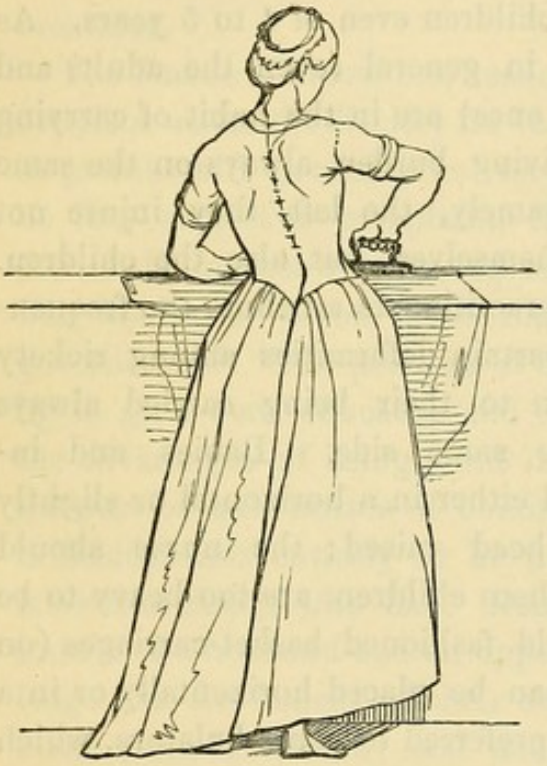


Fig. 28.

75. NURSING CHILDREN.

The custom prevalent in some classes of society of hiring girls of 8 to 15 years as nurses of infants and children, is also indirectly a cause of spinal deformities in a large number of these young nursery-maids, who are frequently seen in the streets carrying with the greatest effort very heavy children even of 4 to 5 years. As nurses in general (even the adults and strong ones) are in the habit of carrying their living burden always on the same side, namely, the left, they injure not only themselves, but also the children. Some practitioners attribute the frequency of certain deformities among rickety children to their being carried always on the same side. Babies and infants should always be carried either in a horizontal or slightly inclined position with the head raised; the nurse should use alternately both arms; when children are too heavy to be carried a long distance, the old fashioned basket-carriages (on small wheels) in which they can be placed horizontally or in a reclining position are to be preferred to perambulators, which should only be used when children are strong enough to sit upright for some time without letting the head drop and the body incline and bend forwards. It is in the interest both of nurses and children that the former should be strong, well developed, and straight, that they may be able to fulfil conscientiously their most important duties, of which the majority of them have scarcely any idea, as they have never been trained for their employment, which they are expected to know instinctively; there is an ample field for the Society for the Employment of Women to find the ways and means for training intelligent and *well educated* girls in the theoretical and practical knowledge of the art of bringing up judiciously, according to hygienic laws, our infants and children; I am sure the

Fig. 29.

society I have named would thus be the means not only of benefiting the community at large, but also of providing for a class of persons most necessary to mankind in general, without simultaneously neglecting the propagation of a knowledge in which every adult girl, without any regard to her future position in life, whether rich or poor, whether destined to remain single or to be married, should be versed, and thus be enabled to make herself useful either in her own future family circle, or to her friends and relations, or to the still larger circle of her fellow creatures.

The female compositors, readers, printers, book-keepers, and copyists, whom the Society for the Employment of Women trains at present will probably be very useful persons, but will they be less subject to complaints than their male fellow workers, and is the market overflowing with a stock of *educated* nurses, who would be better paid than at present the majority of governesses? The position of a nurse would be raised if intelligent girls were educated and trained for it, who would have the advantages of being alone in the market—no opposition on the part of male nurses of children is to be feared—and (what is besides not entirely to be despised, they would, like their American sisters who have been trained as school-mistresses) soon find a husband and an opportunity of applying their knowledge for the benefit of their own children;—they would then make room for others; and nobody will deny that theirs would be the right employment for women.

76. READING.

Notwithstanding the attention of educators, heads of private and public schools and school-inspectors, has been often called to the necessity of abolishing forms, they are still to be found in the majority of schools; the *fig.* 30 shows not only the stooping and crooked position into which the boy, after a short time, must fall, but also the uncomfortable dress of many a charity school boy;—to save a few inches of cloth the jacket is made so tight that the boy cannot breathe freely in it when it is buttoned; he is thus obliged to bring his shoulders forward, and to *narrow* his chest. The dragging of the trousers, fastened

with braces, induces the shoulders to shrug, while the very tightly bound laced boots interfere with the free circulation in

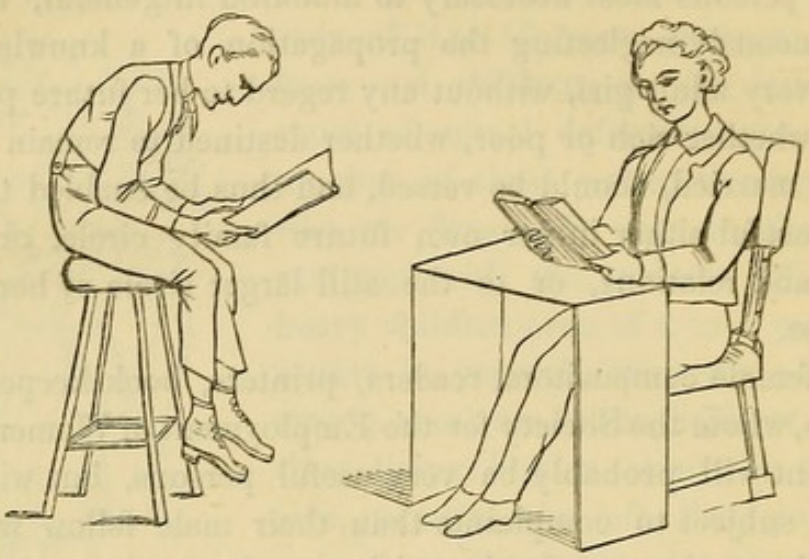


Fig. 30 and 31.

the feet, and produce cold feet. *Fig.* 31 shows the boy in a good position, only the desk should be slanting, or the book supported, as in *fig.* 33 ; the back should be always leaning on the chair ; the reading-desk, or table, should be high enough to support the forearms, and the feet should touch the floor. *Fig.* 32, considered by many girls very comfortable, is there-

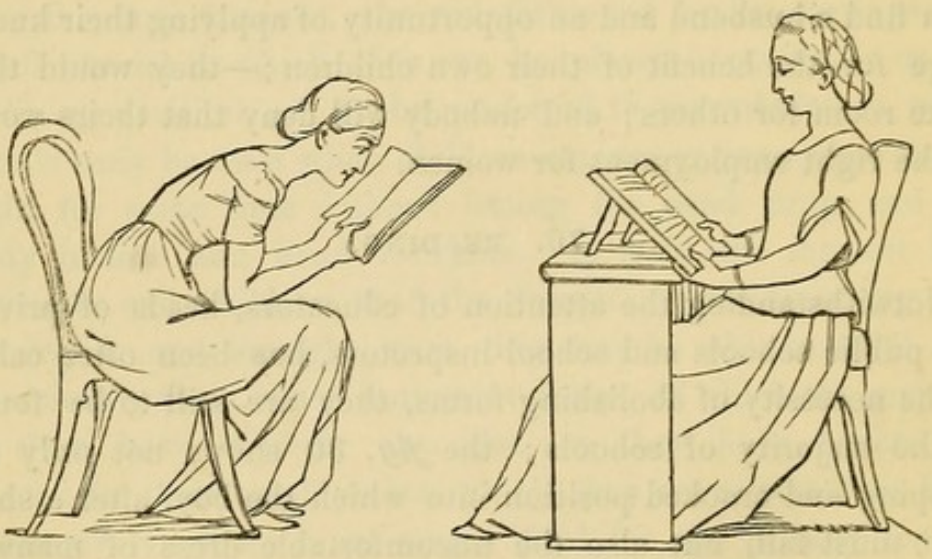
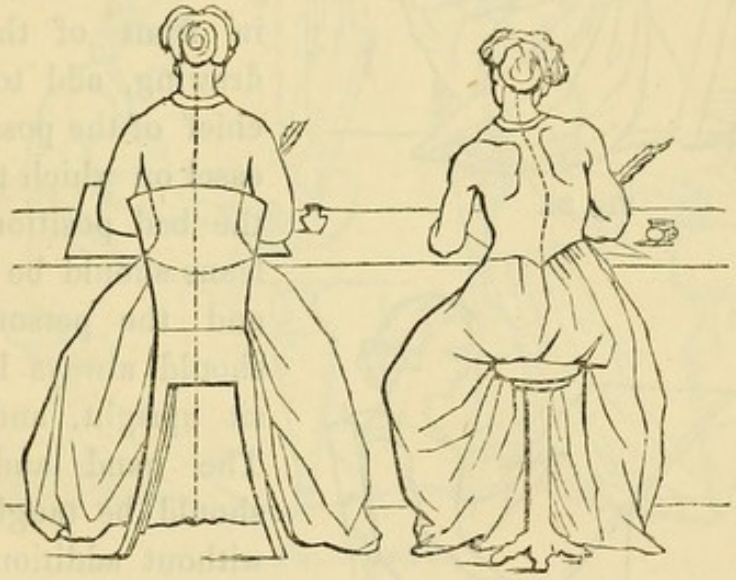


Fig. 32 and 33.

fore often to be seen ; the bad effects of the crooked position in the low and tight dress are not confined to the spine, but show themselves in various forms of abdominal derangements.

77. WRITING.

Boys and girls are constantly reminded to hold the paper on which they write straight before them; much attention is also paid to the position of the hand, and the mode of holding the pen, but the position of the body is not at all cared for, and no notice is taken whether the body is twisted to one, or bent to another side—whether one shoulder is higher than the other —whether the head leans to the left hand and turns to the right, &c. &c.



34 and 35. Writing.

There are many bad positions to be observed in every school. I have chosen only one of the most frequent, and not of the worst kind, to show its bad effects on the spine, and as it is the fashion in some schools to let the girls write for several hours a-day, as many lessons are done in writing, this will easily explain how the predisposition to spine curves can, and, I am sorry to say, is in a short time artificially produced. Slanting desks which support both forearms in their full length, that the weight of the upper part of the body should be equally distributed; a chair with a back, that the lumbar part of the spine may lean on it; a slightly oblique position of the paper, and shortening of the time for writing, are the principal means for preventing the bad effects.

78. DRAWING.

Drawing can be practised in a natural position without any injury to the body, as seen in *fig.* 37. The injurious effects of bad positions while drawing are similar to those mentioned in the preceding note on Writing. The great inclination of the body, not placing the object to be drawn or copied in front of the person drawing, add to the mischief of the position; the easel on which the girl in the bad position, *fig.* 36, leans should be discarded, and the person drawing should always be able to sit upright, and to lean. The hand and fingers should be taught to draw without additional movements of the arm, which movements are also often seen during writing.

Fig. 36.

Fig. 37.

79. PRACTISING ON THE PIANO.

To play the piano is considered one of the most important parts of modern education for a girl in the higher classes, as well as in that part of the middle classes which ape those above them. It does not matter whether the young lady has any talent, wish, or ear for music, she must be able to play a tune; and for years, one, two, and in some cases even more hours, are daily devoted to obtain this indispensable accomplish-

ment. It does not matter whether the young lady is constitutionally weak, anæmic, predisposed to curvature, to chest or other complaints; whether she has what is called a high shoulder or a high hip; whether she is short-sighted or has a pain in the neck;—all this is of no consequence: our young lady must practise the piano, and must do it only on a round music-stool, which can be screwed higher or lower, and consequently is not very firm. *Fig.* 38 illustrates one of the

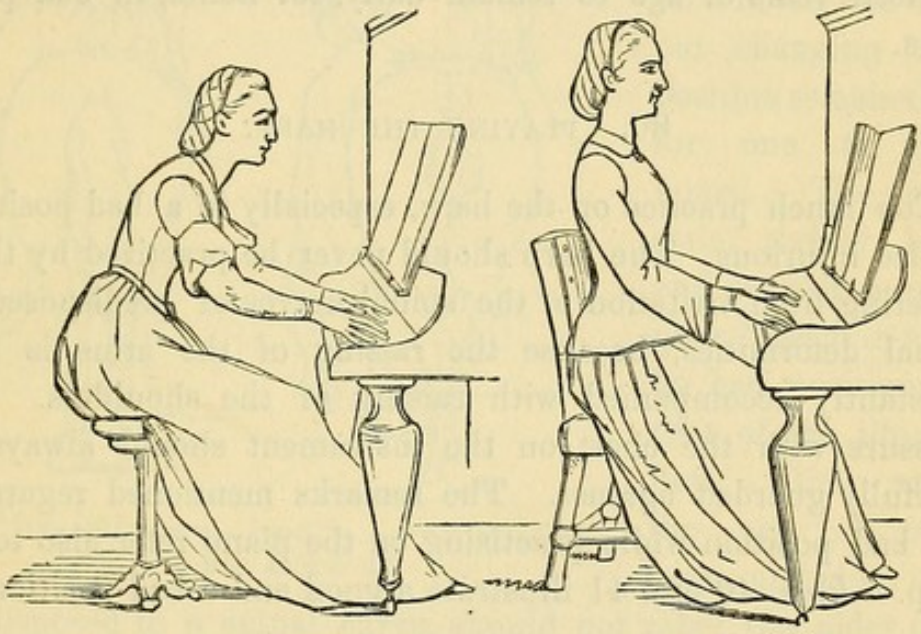


Fig. 38 and 39.

favourite positions in which the predisposition of the tightly dressed or laced young lady to any of the ailments I have named is soon and successfully developed, if it did not previously exist. If the tenth part of the time and attention bestowed on music were directed to an elementary knowledge of the most simple sanitary rules, and to the rational physical development of our girls, they would enjoy much better health; we should hear much less of the many hysterical and uterine complaints at present so prevalent amongst the classes which are at the top of society, and they would still be able to play the piano nicely.

Fig. 39 shows that the body can be in a natural position, and that the back of the chair can, without any inconvenience, support the body beyond the small of the back, up to the lower part of the shoulders. I may add, that the movements required

for practising on the piano are not at all interfered with, as I know by experience; and thus many of the injurious effects are prevented. Short-sighted persons will injure themselves much less by using spectacles.

I wish to guard against being considered an enemy to the most civilising of arts—music; my object is only to caution against its becoming the cause of many complaints, and against the very frequent fashion of forcing girls from eight, twelve or fourteen years of age to remain daily, for hours, in bad positions.

80. PLAYING THE HARP.

Too much practice on the harp, especially in a bad position, is also injurious. The harp should never be practised by those suffering from irritation of the spinal nerves or predisposed to spinal deformities, because the raising of the arms is thus constantly accompanied with raising of the shoulders. The pressure with the chest on the instrument should always be carefully guarded against. The remarks mentioned regarding the bad position while practising on the piano refer also to the harp. *Figs.* 40 and 41 illustrate a good and a bad position.

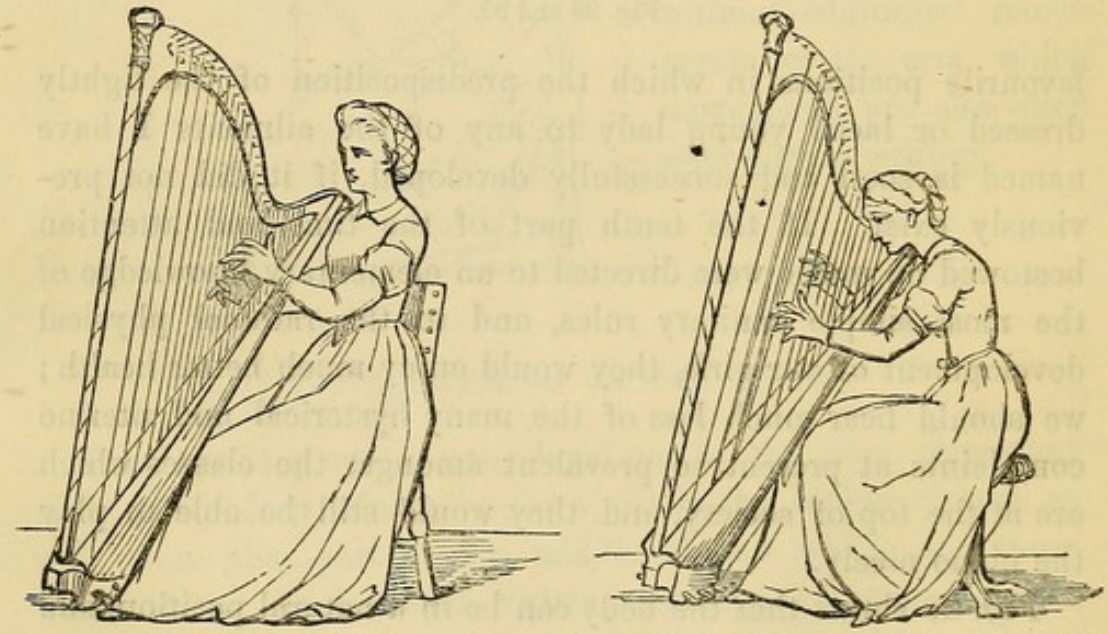


Fig. 40 and 41.

81. RIDING.

This healthy and good exercise is often the cause of lumbar curvatures, because very young girls, whose spine is not sufficiently strong to remain erect, are put on a horse, and without changing their position remain there for one to three hours. The older girls, tightly laced and dressed, are frequently seen in similar bad positions to that of the illustration. Girls under the age of eight years, and older ones predisposed to a spinal curve, should not ride; the older ones not remain more than half-an-hour, or an hour, on the horse. They should be taught to ride on both sides, and never have stays. If riding girdles are used (which are not necessary) they should not be tight. Loose jackets are always preferable to the tight riding gowns. The Spanish or Hungarian round hat, with holes for ventilation, which is carried on the whole upper surface of the head, is better than the chimney-pot hat which presses mostly on the forehead. The *fig.* 43 shows the influence of the bad position on the spine, and why exercise on horseback must be injurious to the spine, if girls are in any other position but that shown in fig. 42.

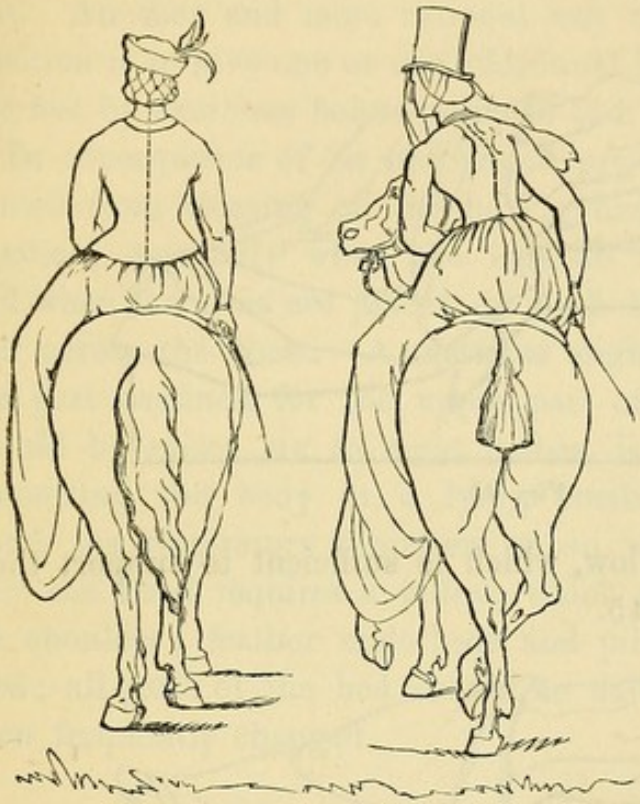


Fig. 42 and 43.

82. LYING POSITION.

Fig. 44 shows the curved position of the spine produced by

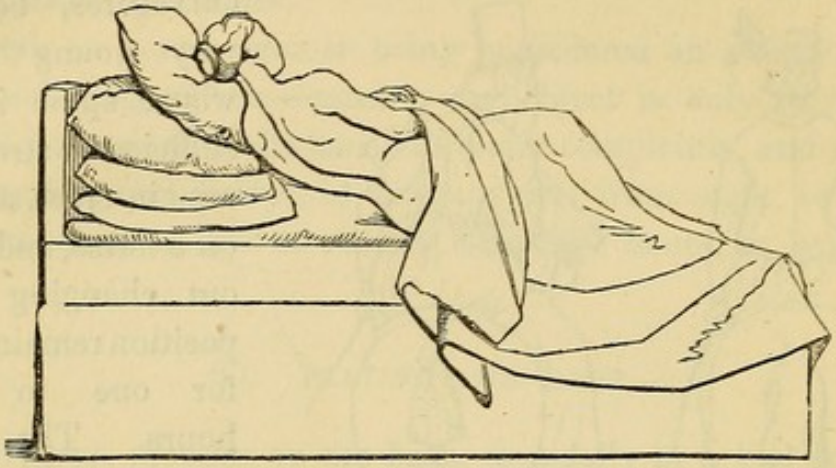


Fig. 44.

using more than one pillow, which is sufficient to support the head, as shown in *Fig.* 45.

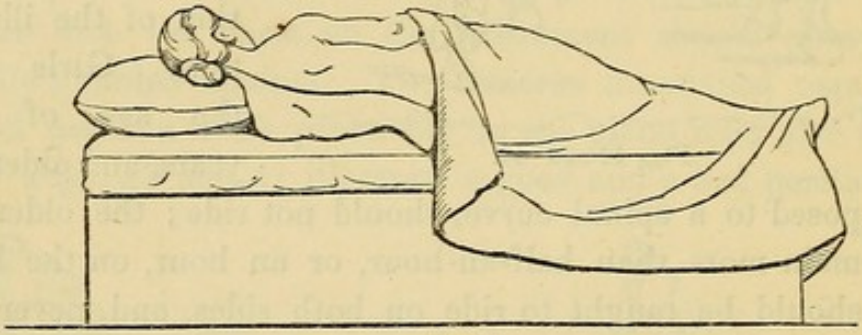


Fig 45.

Another lying position which is frequently assumed, especially in cold weather, is to crouch to such an extent that the knees almost touch the chin, while the shoulders are pulled up and brought forward, the spine very much curved in its longitudinal axis, with the convexity backwards, and the chest compressed: this position is generally chosen while the head is covered with the blanket, in order to warm the bed with the air which has been breathed out; this air, vitiated by carbonic gas, is again breathed, and not only languor in the morning, but an imperfect sanguification and circulation, with all their bad effects, is the consequence. The excuse for all this is, that the bed being so cold, the body must warm a larger part of it, if not in such a bad crouching position. Although

no advocate for hot bottles, I prefer that the part of the bed where the cold feet are placed should be warmed before the patient goes to bed; this causes the legs and feet to be stretched out. Another and more rational way of preventing this bad position is to give one or two additional blankets, and to warm the feet by exercises before going to bed.

In consequence of an unfounded prejudice, people are prevented from sleeping on the back, which is the most resting position, especially when the legs do not cross each other, and when the arms are placed on both sides of the body, but not across the chest. A mattress slightly inclined, so that the part destined for the upper part of the body and head should be raised six to eight inches, is very comfortable for supporting the body in a lying position on the back, in which the respiratory functions go on with the greatest ease; only the head requires a pillow, which must not reach under the shoulder; feather underbeds and pillows should never be used; all parts of the bed should be daily aired, and the bed linen frequently changed.

83. THE CHAIR AND COUCH.

In the preventive and curative treatment of lateral curvatures, the patients make exercises of the head, arms, feet and legs, while in a lying position on a couch thus constructed, that it can serve as a reclining chair.

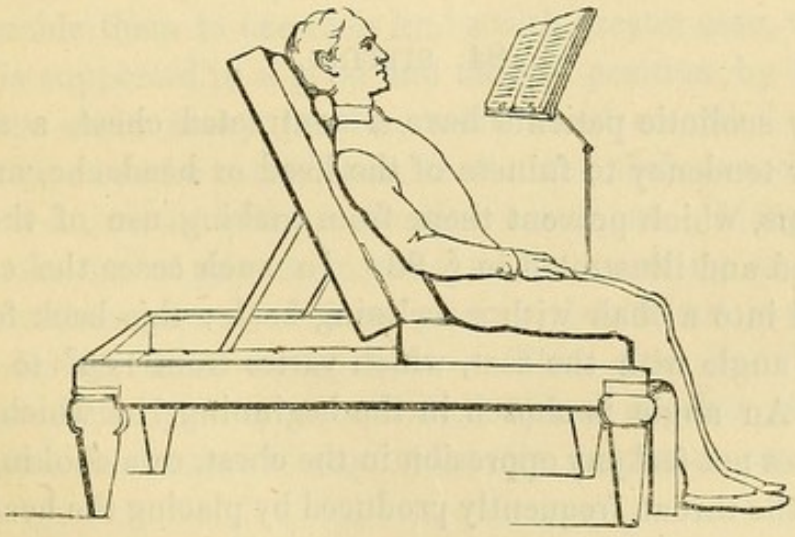
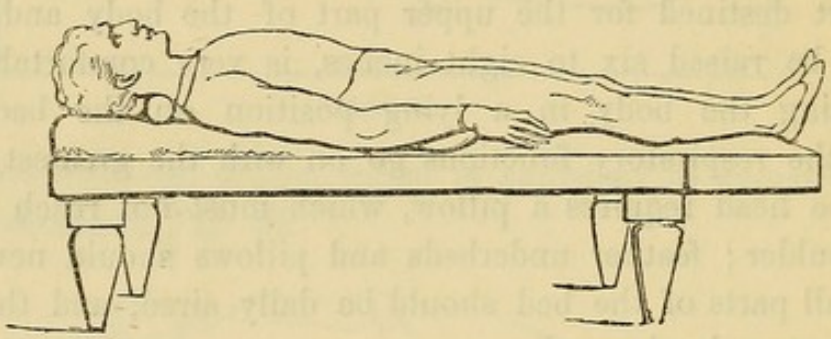


Fig. 46. Chair with reading desk.

The foregoing figure shews the construction of this chair: the middle part serves as a seat; the upper part can be more or less inclined, or placed horizontally, in the same manner as the flap, which serves as a support for the legs and feet; the whole couch is padded in order not to hurt the prominent shoulder blades or other parts of the body, which I have seen sometimes red and sore because the patients have been obliged to lie for hours either on the bare floor, or on the once very fashionable hard reclining board.

A pillow of the length and width of the upper part of the chair, and of a wedge-shape, is placed with the thick end, about



47. Chair used as a Couch.

three or four inches high, under the head, while the patient is lying, and thus the upper part of the body and the head are slightly raised, while the hollow of the neck is supported by a soft horsehair pillow, two inches in diameter and four to six inches in length; the wedge shaped pillow is placed with the thick end to the loins when the patient is sitting on the chair.

84. SITTING.

Many scoliotic patients have a contracted chest, a stooping head, or tendency to fulness of the head or headache, and other symptoms, which prevent them from making use of the couch described and illustrated in § 83. In such cases the couch is changed into a chair with a reclining back; this back forms an oblique angle with the seat, which varies from 115° to 135° or 155°. An angle is chosen in the beginning, in which the patient does not feel any oppresion in the chest, or a choking sensation in the throat, frequently produced by placing the head accustomed to stoop into the natural position; it is desirable to make

the patient so comfortable that he may be able to begin the respiratory exercises in the reclined position, which is intermediate between sitting and lying. *Fig.* 46 shows such a position in the chair; the small of the back or the loins should touch the wedgeshaped pillow, which is placed with the thick end down, as seen in the engraving, the easel or reading desk being moveable in all directions, prevents the patient from raising his shoulder while holding a book, and from bending the head forward while reading, and serves, also, as a writing desk or as a table. The foot board can, if required, be raised to the horizontal position to support the legs, which is desirable when patients complain (as is frequently the case in the beginning of treatment) of a dragging sensation in the loins; a leather or other strap can be fastened on the top on both sides of the back of the chair, and being provided with a buckle, like the arms of an armchair, serves for the support of the arms when the weak patient wishes to make use of his forearm and hands; these straps act like the arm slings in a carriage, and are very useful when the movements of the upper arms, or the holding of the arms in a certain position, produce pain or irritation in the spine. Having made an extensive use of these couch-chairs, with various modifications required by some cases of chronic diseases, and especially of spinal deformities, I am able to speak of the ease and comfort they afford to the patients, who, being tired of one position, can frequently change and still enjoy much rest; they also enable them to use their limbs with greater ease, while their spine is supported in a good and natural position by the chair. On this chair many passive, active, and so-called resistance movements can be carried out, so that the chair is useful during the preventive as well as curative treatment. Many patients also make use of this chair while writing, reading or drawing; they are thus prevented from placing themselves in bad positions during these occupations. This chair is also much cheaper than the very complicated spinal couches, and as no particular mechanism is required, every carpenter can make it.

85. BREATHING.

The importance of breathing exercises has not yet been sufficiently appreciated as a remedial agent in many chronic diseases, with irregular circulation, and inactivity of the majority of respiratory muscles, and which are constantly accompanied by *abdominal* breathing only.

In the majority of spinal curvatures the intercostal and other respiratory muscles are either partially or totally inactive, the form of the ribs more or less changed. In some cases there is on one or both sides of the stomach pit a depression of the ribs in the form of a longitudinal or circular scoop (concavity on the surface), or the interval between the ribs (the intercostal space) is in some parts very much diminished. In these and many other deformities the patient must be placed in a position suitable to the individual case before he does the various breathing exercises, which are not confined to the three elementary motions of each act of breathing, but are modified to a great extent, either by increasing the quantity or modifying the quality of each single motion.

In the positions, *fig.* 46 and 47, the patient is first taught to breathe very slow and deep, to control his breathing movements, to retain the air in the chest when this has been well filled, and to breathe out (to emit the air) very slowly by permitting only a small quantity of air to escape; the mouth being closed, the patient inhales through the nose, and breathes out (expires) by a very small opening between the lips, which is scarcely larger than when whistling: during these breathing exercises another person places the palms of both hands either on both sides of the lower part of the chest, or on the upper and anterior part, below the clavicles, or on any depressed part of the ribs, while the patient is encouraged to act or push by his deep breathing, and by filling his chest to its full extent, against the part on which the hand or fingers have been placed. The single parts of each breathing movement must not be done too long, so as to exhaust. To assist the patient, the exercise is done by the word of command, and the (inspiration) breathing-in is designated by *one,* the retaining of the air in the chest by

two, and the breathing out by *three*. These three parts form the respiratory exercise, which is repeated only three or four times, but can be done several times in the course of the day. The filling the chest with air, or the retaining the air in the chest, must not be prolonged too much, because the veins in the head and face will become turgescent, and great flushing and heat produced in these parts. The too prolonged repetition of the breathing exercises is also bad, because it produces an aching in the frontal part of the head; this has been frequently observed among soldiers when trying to light their camp fires by repeated and frequent blowing on the fire: anyone who continues for some time this blowing exercise will soon feel a heaviness in the forehead.

The Cong-fu, a Chinese mode of treatment for many chronic complaints, consists essentially in the application of the modified breathing exercises, performed in various positions suitable to the individual case; the followers of Tao-se prepare the patients by a particular diet for the treatment, and combine many religious ceremonies with the process.*

The breathing exercises are also very useful for the expansion of the chest in persons predisposed to chest complaints; reading, singing, breathing through a tube with a very small opening, exercises on the spirometer, &c., are only modifications of breathing movements and have been used successfully.

Autenrieth recommends the following as one of the most important means for the expansion of the chest and invigorating the lungs of persons predisposed to consumption.

"Breathe deeply, slowly, and with energy a quarter to half

* In the *Memoire concernant les Chinois, par les Missionaires de Peking* (Paris, 1779), in the chapter "du Cong-fu des Bonces Tao-se," an extract from which I have published in *Rothstein's Athenæum für Rationelle Gymnastik* (Vol. II., Berlin, 1855), more details on this subject will be found. Dally, in his *Cyneology* (Paris, 1857), has also reprinted the chapter on the Cong-fu, with a copy of the twenty positions contained in the original, which serve only as a specimen of the thousands of positions in which the respiratory exercises are performed.

A few years ago Dr. Neumann, in Berlin, published "*die Athmungs-Kunst*," The Art of Breathing, adapted to the treatment of diseases.

an hour; which exercise is to be repeated several times a day, and to be continued regularly for some time."

Although the breathing exercises which I am in the habit of prescribing are not practised for more than five minutes at a time and repeated several times during the day, very good effects are produced not only in deformed and consumptive persons but also in other chronic diseases, when the patients are scarcely able to make any other movement.

The most important part of the treatment of certain kinds of stammering consist in the practice of various breathing exercises.

The faculty of breathing to the full extent of the capacity of the lungs is very much interfered with by the still prevalent

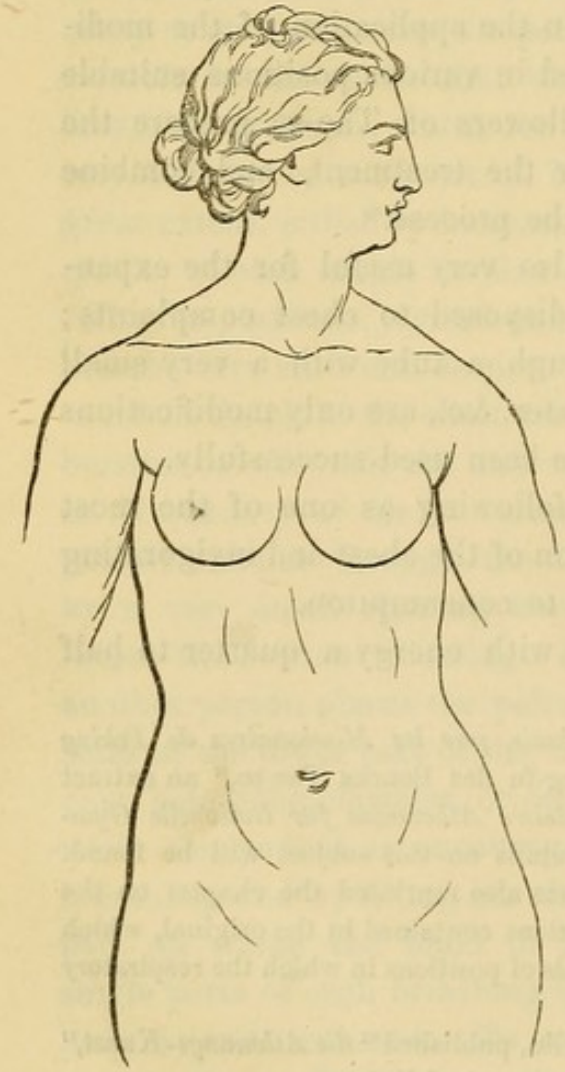


Fig. 48. Outline of the Venus of Medicis.

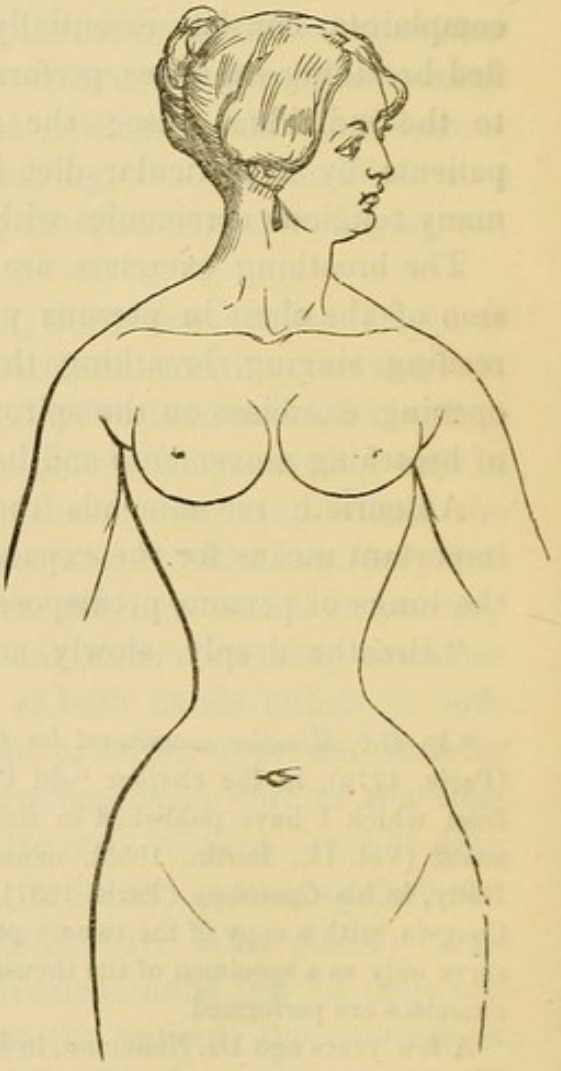


Fig. 49. Outline of a woman as compressed by stays.

fashion of wearing stays, corsets, bodices, or any similar article of dress, the object of which is to diminish the circumference of the lower part of the chest, and to give artificial support to those whose physical training has been neglected. Although many medical authors and educational writers have condemned the use of stays, of tight lacing, of compressing the waist, and have published long lists of diseases and deformities caused by this bad practice, the use of corsets is still very general, and I am sorry to say that as long as the majority of medical men (to whom the plea of ignorance cannot avail), continue to permit their wives and daughters to be exposed to all the bad effects of this injurious fashion, there is no hope that these medical men will earnestly oppose among their patients a bad

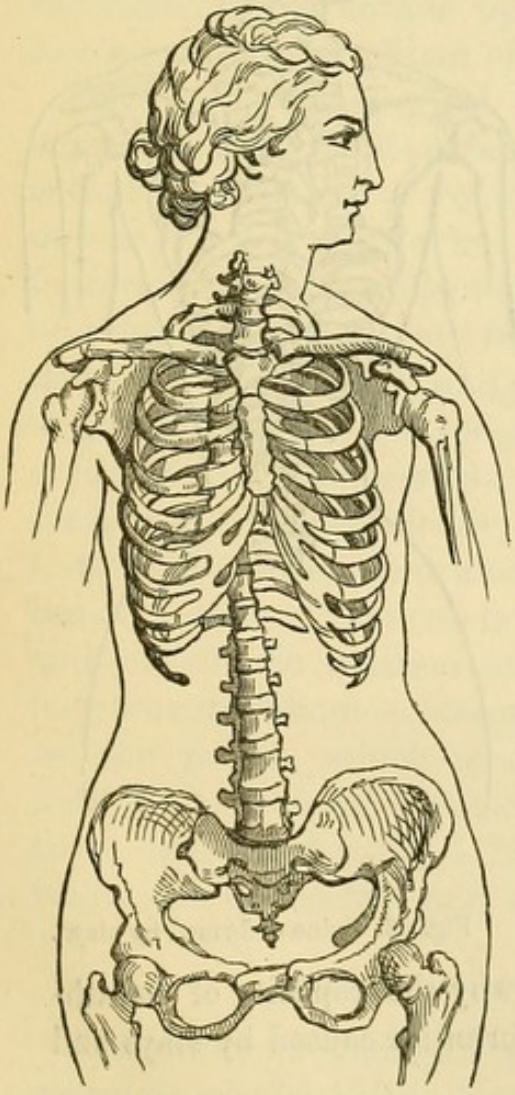


Fig. 50. The natural form of the chest of the Venus.

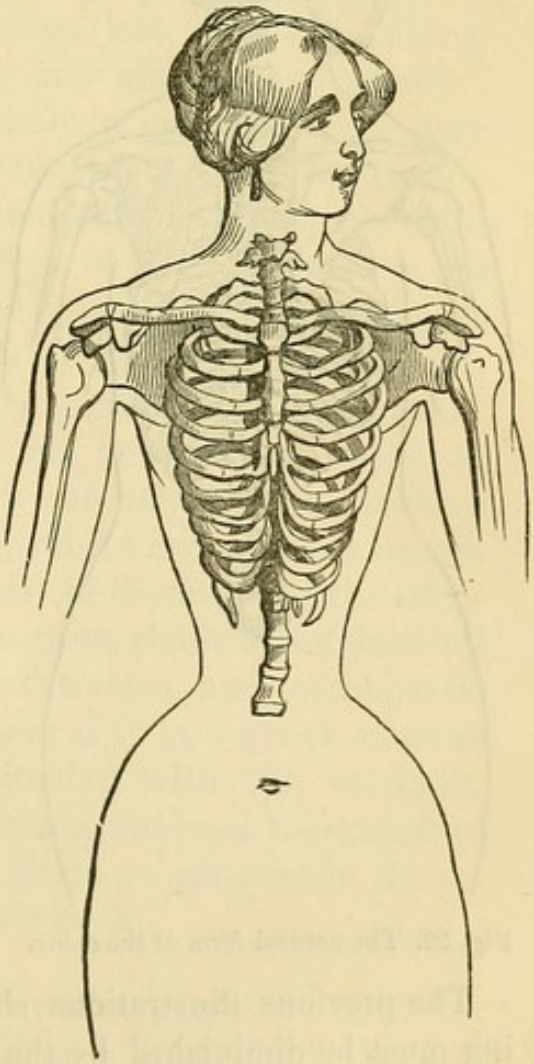


Fig. 51. Deformity of the chest caused by stays.

habit, which, to use the mildest term, they are too indifferent to check in their own families.

Those who wish for more information on this subject I must refer to a paper "On Dress,"* of which my reviewer in the *Lancet* says—"Dr. R. insists and very properly on the ill-consequences of stays, and when the matter is seriously considered we believe that an immense amount of human suffering and even great saving of human life would be consequent upon the total discarding of stays."

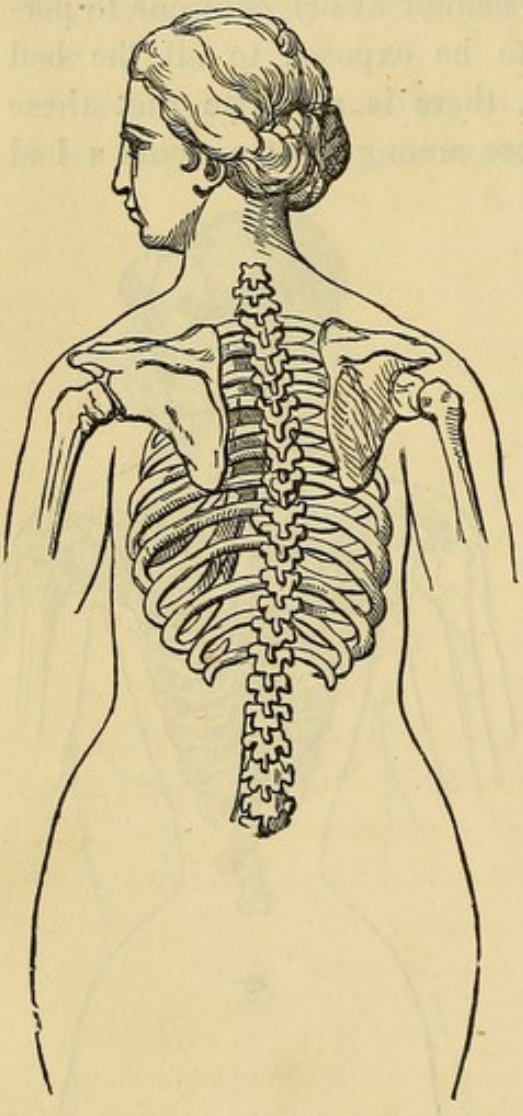


Fig. 52. The natural form of the spine.

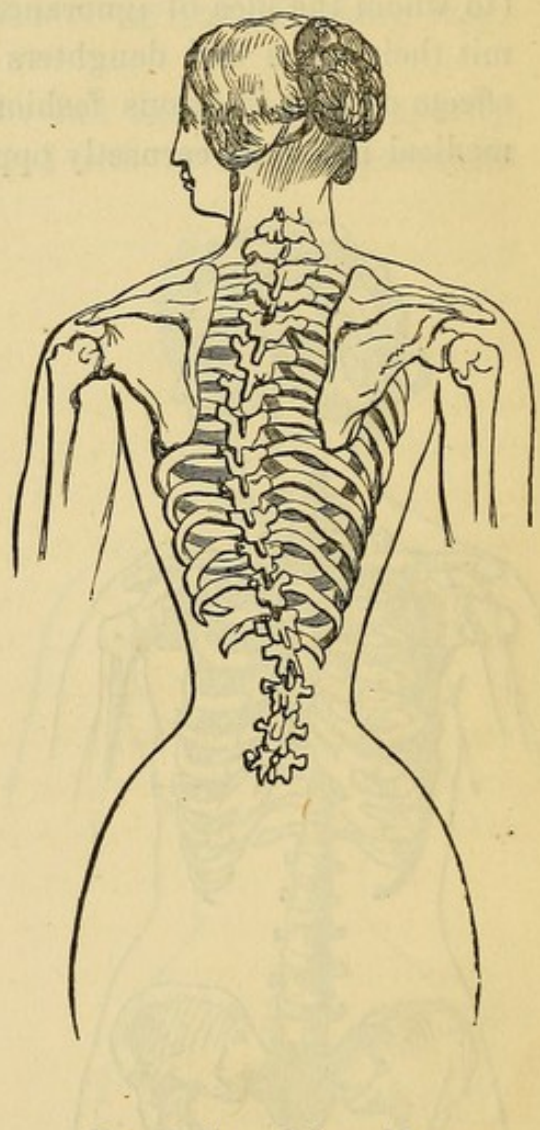


Fig. 53. Spine deformed by stays.

The previous illustrations show why the capacity of breathing must be diminished by the deformities caused by stays and by tight lacing.

* Published in the Cure and Prevention of Disease by Movements.—Groombridge & Sons.

THE TREATMENT OF THE MOST PREVALENT FORM OF LATERAL CURVATURE KNOWN AS SCOLIOSIS.

THE EXAMINATION, PROGNOSIS, AND PREVAILING METHODS OF TREATMENT OF LATERAL CURVATURE.*

IGNORANCE of the public in matters of hygiene, neglected physical education, and I am sorry to add, professional ignorance regarding the pathogenesis, diagnosis, prognosis, and treatment of incipient lateral curvature, are, according to my conviction, the three principal causes of the prevalence of this deformity among young and old of both sexes; a deformity which afflicts the patient, not only by the sufferings it entails upon him, but also by making him a conspicuous object of the pity and gaze of others.

As medical and surgical teachers in general do not pay much attention to this class of complaints, the consequence is that the majority of young men leave their schools without any or very little knowledge of them, therefore the following remarks, collected and extracted from the works of others (especially my friends Dr. Eulenberg in Berlin, and Dr. Dally in Paris), and partly from my own experience, might perhaps induce some of my younger colleagues to study scoliotic deformities more attentively; by treating these diseases scientifically, they might not only contribute to their diminution, but also assist in diminishing the number of victims of rubbers, bone-setters, electricians, dancing and calisthenic masters and mistresses, and orthopædic instrument-makers—classes resorted to in a great measure by the public, which is dissatisfied with the tolerably general professional ignorance of the rational treatment of these diseases of which I have given an account in the introduction of the first part of this book.

EXAMINATION OF THE SPINE.

"In order to find out a lateral curvature, *inspection*, *palpation*, *manipulation* (flexion and rotation of the spine),

* This paper was published in 1879.

examination of the functional energy of single muscles or of single groups of muscles, *mensuration*, and frequently even auscultation and *percussion* are required" (Eulenburg).

INSPECTION.

The patient must be stripped down to both trochanters, as it is absolutely necessary that the entire surface of the back, neck, and all sides of the trunk should be seen by the medical man. It happens but too frequently that *the family doctor only looks at the upper part of the trunk, and therefore does not see the deviation of the pelvis and of the lumbar part of the spine—he does not see the lateral curvature beginning in the upper part, after it has been developed for some time in the lower part of the spine, and after having considerably increased before the dorsal part* of the spine is to some extent deformed.

The inspection of the body down to both trochanters is therefore an indispensable duty of the examining medical man, sitting first behind and afterwards in front of the patient, who is placed with both feet at a right angle to each other, and with arms passively hanging down the sides of trunk which thus remains in a perfectly unconstrained position.

It is only in this manner possible to observe any pathological change of position and form along the whole spinal column, as well as of the neck, ribs, sternum, clavicles, shoulders, and pelvis.

PALPATION

Aids in ascertaining very precisely the slighter deviations of the spinal processes in their relative positions and directions, especially when the trunk is kept in a *vertical* position.

Many professional men are in the habit, during their inspection and palpation, of placing the patient in a forwards bent position; this method causes a fallacious result, because a vertical rotation of the axis is easily combined with the forwards bent position, and thus the lateral deviation of a higher degree

is considerably diminished, and the slight scoliosis disappears momentarily.

Attention must be paid to whether both halves of the trunk show everywhere the normal symmetry, and whether the position of the head and whole spinal column are in a vertical line corresponding to the middle of a horizontal line drawn across both *acetabula* of the hip joints. We must observe whether the two concave lines from both sides of the head down the neck to the shoulders are equal; whether the shoulders, the scapula, the ribs, the loins, and the hips are symmetrical on both sides or not; whether there are in these outlines any projections or indentures; whether these last are caused by the soft parts or by the bones; whether one half of the trunk is projecting or receding; and whether these inequalities of the various parts can be either diminished, or entirely removed by passive manipulations, or by a horizontal position, &c.

MENSURATION

Is used to determine exactly the degrees of the deviation. For this purpose a lead is hung near the spina ossis occipitis down to the pelvis, and the lines of the lateral deviation are noticed by the position of the line, and thus it is easy to measure the length and depth of the curves of deviation; the depth of the sinus is found by drawing a horizontal line from the point of the highest convexity to the lead line.

PASSIVE MANIPULATIONS

Are used for the purpose of replacing, as far as possible, the distorted spine into the normal position, while the patient is perfectly passive; for this purpose one flat hand is gently pressed laterally on the convexity;—it will depend upon the result of this pressure how far the convex spine can be replaced, and thus we can form an idea of the degree of moveability of the curved part of the spine. Another passive manipulation consists in trying to alter and diminish the vertical rotation of the spine

either by a rotatory movement on the shoulders or on the hips while the patient is perfectly passive; we can then ascertain the amount of moveability, or whether rigidity or anchylosis has taken place.

EXAMINATION CONTINUED.

When the patient is placed horizontally and prone on a firm horizontal surface, it is necessary to ascertain whether and to what extent the deviation observed in the vertical position is diminished. Both scapulæ are to be examined, partly by carefully comparing the position of both, partly by observing whether only one scapula has an abnormal position. If one scapula is placed abnormally high or low, we must find out which is the normal one; *this* covers with its whole anterior surface the posterior upper part of the thorax, the space between the second to the seventh rib, and thus extends from the first dorsal to the eighth dorsal vertebra; any higher or lower position is pathognomic (abnormal); the bases of the scapulæ must be parallel to the longitudinal axis of the body; a prominent abduction of the scapulæ while the arms passively hang down is abnormal; we must find out whether these irregular positions are primary, *i.e.*, caused by abnormal function of the muscles, or secondary, *i.e.*, caused by lateral curvature of the spine, and by the projection of the underlying deformed ribs; the special muscles acting on the scapula are to be examined either by passive, active, and resistance-movements, or by faradisation; further whether they are contracted, retracted, or have lost their tone. The abnormal state of the muscles varies from a minimum to a maximum. The inequality of both scapulæ might also be caused by unequal nutrition and development; they are really deformed after exostosis, rachitis, caries, and chronic paralysis of the adjacent arm.

The height, form, direction of both shoulders (not shoulder blades) must be compared; it is very frequently the case that a greater or less difference is seen in the lateral outlines from the head down the neck to the shoulders; the sinus is deeper on the side of the high shoulder where the neck appears shorter.

The position and circumference of the hips must also be examined, and whether the crista ossis ilium of one side is higher than the other, and whether the spinæ anteriores of the ilium are projecting beyond, or are in the natural square (front) line; the distance of the crista ossis ilium from the lowest rib to the arm-pit is to be measured, and compared with the corresponding lines on the other side, and the relative position of each hip to its adjacent lumber surface, well observed.

In proportion to the more advanced stage of the scoliosis the difference in the deviation is greater, from the normal vertical line between the armpit and the top of the hip. In the so-called habitual lateral curvature the lumbar segment of the spine, whether primarily or secondarily affected, is concave to the right, and causes a corresponding concavity (indenture) of the right lumbar lateral surface-outline, while the left outline is almost perpendicular.

If the patient is asked to stand with the weight of the body fully on the left leg, while the right leg is slightly placed forwards, the outlines over both hips are more equal, because the muscular action of the left side is increased by the left carrying the entire weight of the body.

A comparative examination of the volume of both hips shows the right hip more voluminous in scoliosis habitualis.

On the anterior surface of the trunk the position of the acromion, the length and form of the clavicles, of the sternum, and of the ribs and their cartilages are to be compared on both sides, which will show symptoms useful for a differential diagnosis. The measurement of the periphery and diameter of both halves of the thorax will be of value, both for diagnosis and prognosis as well as for the purpose of an exact scientific opinion.

Finally the lungs and heart are to be examined by *auscultation and percussion*, especially when there is some functional derangement which might be in an ætiological relation to the lateral curvature, or might secondarily be caused by it.

A similar complete examination would prevent any essential error in the diagnosis, and the lumbar curvature

would not *so often escape observation as is unhappily at present the case.* According to Dr. Eulenburg's daily experiences, the majority of practitioners only examine the upper part of the spine, while the lumbar part and hips are hidden by the garments, and entirely escape observation.* Even when the lumbar curvature is far advanced, *the upper dorsal surface shows frequently only a very slight deviation in the position of the dorsal vertebræ and of the shoulder blades, &c.; therefore those who have not practical experience in examining the spine do not even suspect the presence of a lumbar curvature;* hence it is of the utmost importance that medical men should be most conscientious while examining for spinal curvature. Daily must we listen to the reproachful accusations of medical men for scarcely taking time for a conscientious examination of a spinal curvature, and for telling the parents and relations that there is no curvature, or such a slight one that it is quite unnecessary to prescribe any treatment.

The consequence of this professional ignorance or neglect is that in course of time the deformity is developed in all directions; the shoulders and hips are considerably dislocated, the lateral curvature is combined with a considerable rotation of the axis of the various parts of the spine, the thorax falls in on the concave side of the curve, while it protrudes so much on the convex side, that the patients appear humpbacked at this stage, and even the least experienced recognises the mischief, and is sure of his diagnosis. But the poor patient, hoping still to recover, hears now, when applying to a *conscientious* specialist, only the fatal words, "Too late!"

I am sorry to be obliged to confirm all that Dr. Eulenburg says regarding the neglect of so-called eminent professional men while examining patients with slight spinal curvature; their time is so taken up that they can only speak a few minutes with each patient. But would it not be much better to charge a higher fee and examine the case conscientiously and minutely, than to dismiss the

* Extracted and translated principally from Dr. Eulenberg's monograph on scoliosis.

parents of the patients with the ominous words—"*Do nothing; the curve is very slight, your child will grow out of it!* which means, the spine will spontaneously get straight, which is never the case; or, when a curve is more advanced, to send them to an orthopædic instrument maker for a spinal support, which is manufactured on a general scale, without any special instructions from the eminent professional man; the third advice is to go to a dancing-mistress, to a gymnasium, or through a course of calisthenic exercises.

I feel it a duty to protest against such unscientific proceedings, especially on the part of highly educated and scientific men, who are at the head of the profession, and to whom patients apply with the greatest confidence in their skill, or relying on their advice restricted to the three classes of (*a*) doing nothing, which is the least expensive, and gives the least trouble; (*b*) spinal supports; and (*c*) gymnastic, calisthenic, and dancing exercises, under directions of people who have not the slightest knowledge of the osteology, pathology, and therapeutics of spinal curvatures. It is very painful to tell parents that nothing or very little can be done for their children, and that they have lost the time when a cure might have been effected; but it is still more painful to hear the parent say, "I beg your pardon, about a year, or six months ago, we consulted Sir, Dr. or Mr. —— (mentioning the name of some eminent professional man); he looked at the spine, and told us not to do anything, to buy a spinal support at the makers, to have calisthenics—what more could we do?"

Another of the many instances of medical ignorance concerning lateral curvature came under my notice while preparing these notes.

Dr. Wolston, of Croydon, sent me for examination one of his patients, a boy of ten years; this boy had the lowest lumber and three dorsel vertebræ kyphotic, with corresponding lordosis—besides this, a lateral curvature. The parents having for some time observed that the boy was weak, sent him, for the purpose of being strengthened, to a school in Margate, where the schoolmistress at once

suspected something wrong with the spine, and therefore asked her family doctor to examine him, but this good man had either no eyes, or was very ignorant about the normal form of the human body, and laughed at the idea of there being anything the matter with the spine. Thus from three to six months were lost, and it is doubtful whether more than an improvement will ever take place—a cure is out of the question.

There are many eminent London and provincial practitioners in the same position as the good man of Margate; it would be very easy for me to give many similar instances of cases rendered incurable by the loss of precious time at the period when a cure might have been effected. It is a serious matter that such loss of time is caused by the opinions of men undoubtedly eminent in other branches of medicine and surgery, but certainly without eyes for the normal form of the human body, and ignorant of the bad effects of neglecting slight spinal deformities.

ON PROGNOSIS IN LATERAL SPINAL CURVATURE.

Every lateral curvature, even when apparently very slight, should be an object of special attention to the professional man whose advice is asked.

Firstly, because if permitted to develop, in its further stages, to a deformity, it spoils the natural form of the body, and is a lasting misfortune to the patient.

Secondly, because it undermines the general health and shortens life by its injurious influence on the function of the organs of respiration and circulation. There is the *greatest probability* that *every lateral curvature* when neglected gradually becomes worse; this happens especially in all those cases where a hereditary predisposition exists; but independent of hereditary, and any other organic, physical or external cause, a sufficient reason for the further progress of the curvature is the inevitable weight of the superincumbent parts on the pathologically distorted spine.

While considering the most frequent curvature, usually called *scoliosis habitualis*, two questions are to be considered.

1. Whether there is any probability reasonably based on theory and practice for a spontaneous cure, or at least an arrest of the curvature in its present stage, without any external or internal aid?

2. Whether by the aid of a rational treatment, a complete cure of the scolosis can be effected, or its further progress arrested, and what are the conditions required for the purpose?

Regarding the first question we are constantly told by the parents, or relations of the patient, at the first visit, that a scarcely observable curve had begun years ago, and had continued, very slowly getting worse and worse; most of these patients are from ten to sixteen years old.

The majority of the anxious mothers of these scoliotic patients say that they have consulted their family doctors years ago (usually when the children were from seven to ten years old), and that they have pointed out to their medical friends that the child is not straight, that one shoulder or one hip, is higher than the other, and that they made the observations, that the dress falls down on one shoulder, that the skirt appears longer on one side, that the walk is unequal, or else that the head always inclines to one side, &c. Their doctors assured them there was no reason for being anxious, or even when admitting a slight curve to be visible, declared there was no special treatment required, and that the child *would grow out of the curve.* Sometimes the doctor advised a corset of some kind, or that the child be sent to a gymnasium, or to do chamber gymnastics—in the latter case, the title of some book on gymnastics was mentioned, but no directions for any special exercise was given.

These are the reports unhappily heard daily in the presence of the scoliotic patients who suffer in a higher degree, from having several vertebræ deformed to such an extent as to have a wedge-like form, and we are placed in the sad position of being obliged to say that there is no more any hope for a considerable improvement, and that a cure cannot even be thought of.

We cannot explain in any way how it happens that

medical men—notwithstanding the thousand-times' repeated practical proofs to the contrary, have such an unfounded belief in *spontaneous arrest and cure of spinal curvature, a belief amounting to a kind of dogma.*

Such a belief in a spontaneous arrest or cure of a scoliosis is decidedly a most injurious prognostic error. The cause can only be that a practitioner usually engaged in the treatment of internal complaints, takes little or no interest in the abnormal forms of the human body, that his eyes are not practised in observing the slighter degrees of the deficiencies of the form of the body, and that he restricts himself to a superficial inspection, which has not the slightest claim to be called an exact examination.

This indifference of many practitioners while inspecting a commencing lateral curvature, is a great misfortune to their unhappy patients. It is strange that the same medical men, when consulted for other diseases, in the study of which they have not taken any special interest, as for instance, diseases of the eyes and ears, &c., are very glad to send their patients to some specialist, but when consulted for spinal curvatures, take, without any reason, the responsibility upon themselves, although the frequent sight of the numerous unhappy victims of this deformity, makes this responsibility very great.

Without denying the possibility of a spontaneous arrest of a commencing scoliosis, by carefully avoiding all the external circumstances which contribute to make it worse, Dr. Eulenberg says that he has never seen a spontaneous cure, and in this respect all the known observations of Delpech, Malgaigne, and Stromeyer confirm his experience.

If some practitioners have ever seen a spontaneous cure of scoliosis, it must then be admitted as one of the rarest exceptions, and cannot under any condition be considered as a rule.

But not only a spontaneous cure, but even a spontaneous arrest of a scoliosis belongs to the very rare exceptions.

BAD EFFECTS OF DELAYING THE TREATMENT.

The number of Dr. Eulenberg's observations being very considerable, he is positive in stating that almost all the

lateral curvatures he has seen left without treatment, have, after an interval of a year, for instance, very much increased, their curves increased according to the length of the intermediate time.

It frequently happens that parents or relations are by various circumstances prevented from placing their children under a regular treatment; they bring them only for examination: when they find that the deformity has much increased, then only do they decide to begin the treatment. Such a delay has usually an injurious, and sometimes an irreparable effect, because in the interval the deformity of the previously slightly deformed spine has so much increased as to cause the intervertebral substances and vertebræ to be wedge-shaped, which of course makes the prognosis worse.

These facts, which occur very frequently, prove that a neglected scoliosis of a lighter degree advances slowly to such a bad deformity, as cannot be beforehand expected.

Neither an apparently very good constitution, nor the regular continuance of the most essential functions of all the organs, are capable of preventing the injurious progress of the deformity.

Certain conditions have a decided influence on this increase of the deformity.

Thus the prevalent want of muscular energy in girls is the cause of their greater predisposition to the quicker development of the deformity; it is not only at the period of the first catamenia, but long before this, that this want of muscular power in the majority of girls is observed.

Do not believe that a very considerable lumbar curvature, with obliquity of the pelvis, has been developed within the last four weeks, as the mothers often assert; if you inquire more minutely, you will soon hear that a slight degree of curvature existed for the last five or six years. Very rapid progress of deformities is observed after acute diseases, as well as after severe chronic complaints, especially in early childhood, and during the period of puberty; but even at a later age, we observe quick increase of deformities after severe illnesses, and even after a normal course of child-

birth. Hereditary predisposition, a generally weak constitution, and too quick a growth of the body, have a most injurious influence, and accelerate the development of the curvature.

The most injurious cause contributing to the increase of the curvature, is the maintenance of those abnormal bad positions, and habitual muscular actions to which the deformity owes its origin,—in fact, the school and the occupations connected with it have the greatest share in causing and increasing lateral curvature.

Without the aid of external injurious influences, scoliosis continues to advance more or less slowly in its various stages, from the sixth year till the body ceases to grow or even later; it is most stationary between twenty and thirty; even at this age, and later, bodily and mental exhausting over-work, and continually depressing mental influences, favour the further progress of spinal curvature, till finally an anchylotic immoveability of the deformed vertebræ limits the further progress of the most advanced incurable deformity.

ON THE TREATMENT OF LATERAL CURVATURE.

I have elsewhere made remarks about rubbers, bone-setters, drill sergeants, dancing mistresses, professors of gymnastics and calisthenics, electricians, magnetine contrivance manufacturers, and orthopædic instrument makers as being the classes of persons to whom the public resorts for the treatment of this deformity. It is a painful duty to say that the public is often encouraged by their medical advisers to resort to one or the other class of these persons, who have not the slightest idea of the cause, nature, and scientific treatment of a deformity which frequently requires a combination of medical, surgical, dietary, and mechanical treatment.

Every medical man who recommends rubbers, an electrician, a professor of gymnastics, or orthopædic instrument maker, without first giving him special directions—how, where, when, and how long the prescribed manipu-

lations are to be made, or to the uneducated electrician how, where, how long, how strong, and which kind of electric current is to be used, or permits the orthopædic instrument maker to make an instrument of his own choice, and without giving him special instructions, or sends his patient to a gymnasium without special instruction regarding the movements needed—every medical man who acts in this way is doing harm to his patient and indirectly to himself—because he leaves his patient to the tender mercies of these unprofessional people; he would never like to act in this manner by sending the patient to the chemist with a message that he should give him some medicine.

The reason why many medical men act in this way is not that they attribute little importance to the manipulations, electricity, movement or orthopædic instruments, but because they have never been taught by their teachers the value and precise mode of these additional means, and consequently, having merely a vague idea that these means are useful and recommended, fear to betray their own ignorance by applying to those of their colleagues who have more experience, and have paid more attention to these subjects. They prefer therefore to recommend uneducated people whom they can patronise without losing dignity in the eyes of their own patients. If a part of the time which is taken up by mere medicinal therapeutics were spent in instruction in the use of the application of heat and cold, of water, of manipulations, of localised electricity and movement, and of mechanical contrivances, and if the professors of medicine and surgery would pay as much attention to all the non-medicinal agents as to their drugs and knives, our young medical men would be able to leave their school more enlightened and less prejudiced towards everything which is not a drug or an operation.

Amongst the profession the most prevalent modes of treatment, are by *orthopædic spinal supports*, by the *lying down system*, the *do-nothing system*, and finally the least resorted to, the combination, where required, of a dietetic and medicinal treatment, with the passive, active, and resistance movements, as first invented by Ling.

ON THE BAD EFFECTS OF THE ANTI-RATIONAL AND ANTI-PHYSIOLOGICAL TREATMENT BY ORTHOPÆDIC PORTABLE SPINAL SUPPORTS.

"It is impossible to find a combination of such bad, anti-rational, and anti-physiological treatment as that of the manufacturers of orthopædic portable spinal supports, to whom the treatment of deformities and abnormal attitudes is left by the negligence or indifference ('and ignorance') of medical men.

"Long experience and numerous consultations, describing the bad results from the use of such spinal supports, have convinced Dr. Dally that deformities are *aggravated and more quickly developed from the moment that corsets, and stays, with iron crutches, metal plates, and springs, are applied.*

"Some reasoning on the subject is sufficient for proving, even without direct observation, that such bad effects must necessarily follow.

"In fact, the only object of the so-called orthopædic instrument maker is to press back any projecting part; if a curved rod is to be straightened, pressure must be applied on the convex side; hence, his natural logic induces him to compress as much as possible the humps, curvatures, and other raised parts, which he finds on the trunk. Thus, if one shoulder appears too high, he places an iron down ward pressing shoulder-piece on the corset; if the trunk inclines to one side, he puts a metal-plate on the projecting parts of the deformed ribs, which plate is supposed to push back the body in the opposite direction, and thus to cause the disappearance of the costal deformity. All this is absolutely of no use; the raised shoulder usually counteracts the pressure of the metal plate, and while trying to act against it, the lumbar part of the spine on the opposite side serves as a point of support, and a lumbar curvature is developed; as soon as the shoulder piece which has caused the additional mischief is removed, the shoulder is higher than ever, the metal pieces for the depression of the projecting ribs act in a similar injurious manner, by offering a place on which the body counteracts: thus, the body is more bent to the other side, and the deformity is increased.

"Besides this, the irritation caused by the compression is frequently a sufficient cause for the development of an *osseous hyperplasy*, which constitutes a further cause to the previous and primary one of the deformity; the costal projections which have been subject to such a compression show enlarged hypertrophic ribs, with a larger space between them, and are considerably more voluminous than those which have not been subject to such an absurd treatment; the same symptoms occur here as in the epidermic tissue of the skin, which is more dense and hard in places generally subject to energetic pressure, as it is seen frequently in the callosities of the hands, feet, and other parts.

"The bad effects hitherto named are not the only ones caused by orthopædic spinal supports. They have, besides, such a bad influence on the general and constitutional state of health, that owing to this circumstance their spinal support is left off, and the young scoliotic patients have to thank this bad effect for some respite in the aggravation of their disease."

While translating this extract from Dally, I have been this day (January 18th, 1877), asked to undertake the treatment of a scoliotic girl of 14, who was kept (immediately after the mother had observed the curvature of the spine), by the advice of a personal friend of the family, a justly celebrated and well known surgeon and surgical author, in a spinal support, with crutches; as this surgeon did not perceive any improvement, he sent the patient to a well-known specialist and orthopædic surgeon, who continued the same treatment by another spinal support; thus the girl was kept during two years in irons which prevented any movement of the trunk, and caused no less *than nine small and large dark red deep colored places, with suffusion of blood*, on which this beautifully-worked iron scaffold, with crutches, waistband, large metal plate, and shoulder straps, had been pressing for two years; on both armpits, on both shoulder blades, on the projecting deformed ribs on the right side, on the upper curve and the

lowest lumbar part of the spine, on both hip-bones, these dreadful effects of the pressure of the spinal support were visible.

I may add that the uncle of the patient was a well-know hospital physcian. Professional etiquette does not permit me to give the names of the well-known surgeons, and to send an illustrated photograph of the state of this patient's anterior and posterior view of the trunk to all medical men, especially those professors of surgery and authors of surgical handbooks who are advocating the use of spinal supports in their lectures and practice.

What are we to expect from orthopædic instrument makers, if a great surgeon, a good pathological anatomist and a skilful orthopædic surgeon pursue such a practice. Dr. Dally says: "Medical neglect and indifference leave spinal deformities in the hands of orthopædic instrument makers"—would it not be just to add *medical ignorance?* The case just mentioned is one of the copious proofs that first-rate surgeons might be very skilful and good operators, and still be ignorant of the simple physiological, pathological, and therapeutical principles according to which lateral curvatures are to be treated.

On 17th Jan., 1875, I was consulted for the purpose of recommending a spinal support in a case of incurable and immovable kyphosis, where all the dorsal and lumbar vertebræ formed one large ankylosed kyphotic curve, in consequence of an accident ten years ago, notwithstanding that the patient, who is 18 years old, has during ten years *constantly* worn a spinal support; the mother, although always advised to let her son wear the instrument, finally had the common sense of observing that these supports have never done any good, and there was not the slightest movement in the spine, which was curved to the highest degree. I need not say that I have advised her to save her money in future, and not to believe anybody who says that her son can be in the least improved.

According to my experience orthopædic specialists advocating spinal supports, and orthopædic instrument makers, *never* refuse to apply spinal supports, even in the most

desperate ankylosed incurable deformities, and very rarely tell the patients candidly that there is not the slightest hope of an improvement.

An instance of the *abuse* of orthopædic supports came under my observation while revising these notes for the press. The following extracts are from a letter of a clergyman in Croydon, dated Jan. 2, 1878.

"One of the pupil teachers in my national school, daughter of a poor labourer, is suffering from lateral curvature of the spine, and has been examined by the surgeon of . . . . Orthopædic Hospital. I am very unwilling that the girl should be put into an instrument, and should much value your opinion of her case, and will gladly pay the usual fee. I know that you are interested in both teachers and scholars, and this has emboldened me to make this request."

This clergyman had seen the result of treatment of lateral curvature *without* any instrument, which explains his objection to the anti-physiological orthopædic iron support. The following opinion was given by the surgeon.

"A. G. has been examined by me to-day. She is suffering from curvature of the spine and weak ankles, for which supports are necessary. I estimate the cost as approximating £7. She will have for the first month to attend here weekly, and afterwards at longer intervals, according to progress made. A. G., though suffering from lateral curvature of the spine, will not be prevented from following the usual duties of teacher in a school."

Surgeon . . . . Orthopædic Hospital.

"Dec. 16, 1878.—The case promises to be a good one if instructions are implicitly carried out, as there is no overwork as regards standing and long hours."

I am unable to judge whether the surgeon intended to give also some special support for the ankles, or only for the spine—but there is no doubt that the surgeon does not consider the case a grave one—as he wishes, besides the support, only eight visits should be paid to the hospital during the first month. As the patient did not name the special instructions, I cannot give them.

The result of my examination was, that the very strong girl of 17 years had such a *tight* dress, as to be unable to expand her fine chest or to take a deep breath, had a *slight* lateral curvature with flat chest, head bending forwards and weak ankles; by placing the left arm in an *oblique* position, 45 degrees above the level of the shoulder, and the right arm horizontally sideways, while the feet touched each other at their interior edge, I was able to *straighten* her spine; she was told to walk while the arms remained in this position, and was able to retain the straight position of the spine, while the head was in its normal position, and her previous flat chest nicely rounded.

This proves that the scoliosis is very slight, that the patient has still the power to redress herself, and even to remain for a short time in a good position; consequently I advised that no instrument should be used, but that the muscles which straighten the spine should be more developed, and that the surgeon's directions about *standing* and *long hours* should be carried out.

Without the clergyman's experience of the treatment of lateral curvature *without machines*, this girl's parents would have been obliged to make the great sacrifice of £7, for the benefit of the orthopædic instrument maker, or friends interested in her welfare might have clubbed together for the same purpose; she would have been encased in the the usual spinal instrument, a description and recommendation of which is unhappily still to be found in the latest editions of many handbooks of surgery; she would have been prevented from using the muscles of the trunk, would have been dependent on the support—and after a time she would have *ceased* to make any effort to straighten herself, the muscles would have been more relaxed and less nourished; there is not the slightest doubt that, as Dr. Dally and other observers declare, from the moment the instrument would have been used, this patient would have been worse.

I do not reproach this orthopædic surgeon specially, because all London and provincial orthopædic and many eminent surgeons are still advocates of this pernicious

system, against which Shaw, Delpech, Dally, many others, and myself, have been in vain fighting for the last fifty years.

Besides the omission of the spinal support, I have suggested that the dress should be changed, that the money necessary for the instrument should be saved, and rather be spent for placing her for a month in one of the homes in Brighton, that she should daily visit there one of my assistants, who would gratuitously treat her by spinal localised movements; an additional advantage would be there, the use of the tepid salt-water swimming bath.

Dr. Dally says, "It is my conscientious duty to call the attention of my colleagues to the bad effects of spinal supports; if orthopædic science has no other resources than these supports—which might belong to the primitive ages of the healing art, then it would constitute *a public danger*. Prof. Delpech, of Montpelier, called this treatment by instruments, '*an art which is more injurious than useful*, kept up by collections of *false plaster casts*' (made for the purpose of showing the imaginary results obtained by orthopædic instruments).

"Medical men must first give up all traces of physiological knowledge, in order to be able to imagine that the living body will mould itself like cotton, and that they can remove the projecting humps, and that they can reach and replace the costo-vertebral subluxations and dislocations by a mechanical compression of the projecting humps.

"The action of deformed joints is too complex, and cannot be cured by such a rude and rough treatment, which has been abandoned almost everywhere else except in France."

I am sure that Dr. Dally reading my notes will be sadly disappointed to find that old England is still boasting of numerous advocates of elaborate iron spinal supports, and that it is still at present too conservative to give up, during the present generation, the interests vested in these injurious instruments. I have in my collection, American and German spinal supports worn by patients of mine from these countries, which will convince my friend Dally that France is not the only El Dorado of orthopædic instrument makers.

The bad effects of the general use of spinal supports are confirmed by

A. SHAW IN HOLMES' SYSTEM OF SURGERY. SECOND EDITION.

"But the *efficacy of spinal supports is not to be relied on.* The endless variety of apparatuses of the sort invented, tried, and abandoned, shows the difficulties and disappointments connected with them. The main obstacles to applying mechanical supports successfully, proceed from its being impracticable to accommodate the rigid materials composing them, to the flexible and yielding form of a young person. Whatever ingenuity may be exhibited in the construction—in forming a secure *point d'appui* at the hips—in introducing contrivances to hoist up the column, or to unbend it—inserting props for strength, or compresses to push the gibbous ribs inward—it is liable to fail; because, while the metallic instrument retains one unchangeable form, the compressible, flexuous body, encased within, is incessantly varying its position and shape.

"Lateral curvature of the spine in a young girl, however slight, ought always to be regarded as requiring immediate care; the patient ought not to be left to the chance of her *growing out of it.*

Syme is also opposed to orthopædic spinal supports.

SYME'S PRINCIPLES OF SURGERY, PAGE 230.

"Should the patient unfortunately, during the process, fall into the hands of a machine-maker, who attempts to prop up the weak and twisted spine by means of iron frameworks, the morbid alterations which have been described will be accelerated; for all such contrivances must prove either insupportable to the patient, or inefficient in straightening the spine; and granting even that they could accomplish this, they would still labour under the great objection of confining the movements of the trunk, and preventing the muscles from obtaining that exercise which is essential to the recovery of their strength. The result would be not more satisfactory if the practitioner

were to go to the opposite extreme, and, regarding the muscles as the sole seat of disease, attempt to strengthen them by enjoining exercise in the erect posture, or, still worse, recommending a weight to be carried on the head, in order to render their actions in balancing it more energetic than usual. Such means, however useful in preventing curvature, must manifestly tend to increase it when once commenced.

In the management of persons pre-disposed by their age, sex, temperament, or constitutional make, to this disease, every means ought to be used for strengthening the system in general, and the trunk in particular. All long-continued and constrained positions must be interdicted—frequent exercise of such kind as calls into action the muscles of the trunk, should be enjoined. The use of stays, corsets, and every rigid article of dress, however designated, must be strictly prohibited."

THE LYING-DOWN SYSTEM.

The lying-down system, and the mechanical horizontal extension of the spine, which were for some time in fashion seemed to do some good, and are still advocated by some practitioners ; but the improvement was only apparent, not lasting. The horizontal position (protracted sometimes even for years), had a very bad influence on the general health of the young patients,—in fact it is not sufficient to diminish the curve, and to straighten the spine, but it is absolutely necessary to *invigorate the organs* which *will maintain the straightened spine* in its good position, and therefore the weak atrophied or paralysed muscles must be strengthened.

This can neither be done by mechanical support nor mechanical extension, nor by a horizontal position, although this last, when used in combination with other rational means, is of the greatest value. Syme advocates the lying-down. If curvature has already taken place, it is evident that the first step towards reparation must be relieving the weak and bent spine from pressure. The

only mode of effectually accomplishing this is to make the patient assume the horizontal posture, which can be done without any great hardship, if a smooth, well-stuffed sofa is provided, instead of the floor, or a board, which is sometimes used for the purpose. When the curvature begins to diminish, the patient may rise occasionally for a few minutes, and exercise the muscles by some suitable employment, which ought never to be continued after the slightest feeling of fatigue is experienced. By persisting in this system, the disease will certainly be arrested in its course; the distortion, if not very great, will be removed; and the worst cases will be considerably improved.

For a short time, it appeared that Paré's iron corsets would give way to the tenotomy of the spinal muscles, advocated and performed by Guerin; but owing to Malgaigne's severe critical examinations of the results of the section of the tendons of the retracted and contracted muscles of the trunk and spine, these operations had soon to be given up.

GYMNASTIC TREATMENT.

Professor Delpech, of Montpelier, was the first to try the scientific application of common gymnastics in the treatment of curvatures; he invented many apparatus on which special movements had to be done, and as he used special exercises in special cases he had many good results. But the inexperience and ignorance of the usual gymnasts of the nature and development, as well as of the treatment of deformities, are the causes why the usual gymnastics have done more harm than good.

"*There is no more difficult physiological problem than to determine exactly which positions and movements are the most suitable for the purpose of acting on a certain region of the body.* Gymnastics, therefore, can be only of value when directed by a medical man acquainted with the study of muscular physiology, a study which is so *complex* that we frequently see parents justly alarmed because after having consulted two medical men about their scoliotic children,

the one recommends the right arm to be specially exercised, while the other especially recommends the movement of the left arm, although in the majority of similar cases, there is no rational indication for the special exercise of either arms. There is no doubt but that the common gymnastics, recommended by medical men, is sure to aggravate the scoliotic curvature, while the free exercises will only increase the strength of the parts which are well-developed, and which the patient uses naturally in preference to the weak ones."—(Dally).

Electricity has also been used but merely empirically, just the same as vapour baths, fumigations, and other useful things. Unhappily, many of these means have been applied irrationally, and the consequences are that the public, followed by the profession, again take refuge in mechanical supports.

"I may now be justly asked what I suggest for all that which I have criticised. My answer is this—

"We do not find so much fault with the means applied, as with the unscientific mode of application, although we maintain that the so-called orthopædic corsets aggravate the complaints which they pretend to cure, and that there would be less hump-backed people if the iron corsets, cuirasses, metallic plates and levers, iron girdles, &c., were never invented; mechanical assistance may be used in cases where cervical extension is required, nor do I undervalue the help of apparatus when a part is to be fixed in a certain position—I have made use of all the means I have named.

"The treatment I am advocating is not a system based on the effect of a special agent, but on the combination of all those organo-plastic means, the good effects of which have been proved by experience, viz.: suitable regime, fresh air, localised exercises and localised electricity, various hydro-therapeutic applications, spontaneous or forced positions, and finally manipulation and passive movements."—(Dally).

My own experience confirms that of Drs. Eulenburg and Dally. I wish only to add that besides all the means named

by Dally, I make use also of Ling's movements, with resistance, and the so-called self-straightening method; for which purpose the patient must be taught, first, to *see* when he is in a good or bad position; secondly, to try to retain it before the looking glass; thirdly, to be aware of the difference of mental impressions produced by the normal and abnormal position, and finally to change, by often repeated practice, the *intentional* good position (that is, the position which he obtains by the effort of his will for a short time) into a *habitual* one when the repeated efforts of the will are wanted no more. I lay special stress on the importance of directing the influence of the patient's mind to the effort of maintaining a good position, because no real cure of a lateral curvature can take place so long as the patient is unable to remain in the normal position without constantly thinking of this position.

ON THE VARIOUS MODES OF TREATMENT OF LATERAL CURVATURE OF THE SPINE BY UNPROFESSIONAL AND PROFESSIONAL MEN.*

THE study and treatment of the deformity of the spine, which is the most frequent and well known as lateral curvature, is usually neglected by the so-called great and eminent surgeons and clinical teachers; the consequence is, that the majority of general practitioners leave their schools without knowing how to treat those complaints which, although mostly curable in their first stage, are frequently progressing towards the further and incurable stages; when independent of the painful deformity, the patient suffers from its consequences, namely, general debility, and irregular function of the thoracic and abdominal organs, which make life a burden. The ignorance of many general practitioners regarding the treatment of lateral curvatures induces the public, especially the ignorant, to apply for relief to the following classes, all of whom promise always a cure.

* This paper was published about ten years ago.

1. *Rubbers*, who pretend and try for weeks and months to rub or press away the deformity, especially when they are using their celebrated serpent or other oils, which, as having special virtues, are to be paid for as extras. They use also pitch plasters, which are applied in various ways in order to support the spine.

2. *Bonesetters* are frequently resorted to, who, with the sound of a snap, assert to have replaced in an instant the curved spine. Some time ago a mother asked me to examine her child; when I told her the child's spine was curved, the mother exclaimed, "It cannot be, because Mr. ——— (giving the name of the bonesetter) assured me that he had replaced the curvature, and I thought the spine was all right." As I am mentioning only facts occurring in my own practice, I must add that a physician told me he had a lateral curvature after a prolonged rheumatic complaint, and was placed by a bonesetter for an hour and a half under chloroform; during this prolonged anæsthesia his spine was pushed to and fro, and finally replaced, but when I examined him I still found a lateral curvature. Another physician told me that the bonesetter found the sacro-iliac synchondrosis dislocated, and that the man pretended to have replaced it. I need not say that such a displacement had never taken place.

3. *Drill sergeants*, *dancing mistresses*, and teachers of *calisthenics* and *gymnastics* are the next class to which parents, I am sorry to say often at the suggestion of their medical advisers, resort. As one shoulder is always higher in a single lateral curvature, in consequence of the dorsal convexity, these various teachers try their best to bring down the high shoulder; little or big patients are treated as recruits and ordinary pupils, and are constantly reminded to pull the high shoulder down; and *when this is finally brought down*, the patients and practitioners are surprised to hear *that a double lateral curvature has been artificially* formed, which causes the more equal appearance of both shoulders.

4. *Electricians* are another class of unprofessional curers of curvature, of which the public has been, and partly still

is, very fond; independent of the periodical application of electricity, they use electric chains, bands, belts, &c.; to this class may be added the *magnetine* manufacturers, who cure all complaints by their so-called "chiasma."

5. In the same manner as the ignorant public applies to the druggist for a medicine, without consulting a medical man, so does the public resort to the *orthopœdic instrument maker* for an instrument to cure a lateral curvature. To inquire whether such an instrument is necessary or not, whether *it is useful or injurious*, is *not the business of the maker*, who advertises his instruments, wishes to sell them, and therefore makes, according to his best knowledge, an instrument which he believes suitable for the case. The practice of consulting surgeons of great fame, and of a large number of such general practitioners as do not know much about the treatment of these deformities, of sending their patients to the manufacturer for a spinal instrument, without giving in each individual case the exact directions for its construction, is the reason that orthopædic instrument makers believe themselves quite competent to be consulted in these deformities, and that some actually charge a consultation fee, without possessing any medical degree, and without deeming it necessary to go through a course of medical training. I have frequently occasion to observe the mischief caused by such supports, as well known to many professional men; hence their opposition to the spinal machine.

This is a subject to which the attention of the Medical Defence Association might be called.

I have already mentioned that those professional men who know nothing about lateral curvatures send their patients either to drill sergeants, dancing mistresses, teachers of calisthenics and gymnastics, or to instrument makers; but in some cases to a specialist or an eminent surgeon with or without a handle to his name. These eminent *consulting surgeons* may be divided into (A) those who object to spinal instruments, and (B) those who approve of them.

A. Those who object give the following advice: "*Do*

nothing—your daughter will grow out of it." "Let your daughter romp with the boys—she will soon be all right."*

Another practitioner advises horizontal position for twenty minutes, three times a day; and I am told by an eye-witness that he proves the sincerity of his advice by making his six or seven daughters lie down daily for a similar period on the floor. "Let your daughter hang daily for five minutes from the edge of the top of the door," was the advice of one of the most celebrated surgeons, combined with a prescription of rhubarb pills; a few years later the young lady to whom the advice was given had an *incurable double lateral curvature.* I have repeatedly had opportunities *of being consulted six months or a year, after similar advice had been given, because the mothers found, to their regret, that the renowned surgeon's advice had not had the promised and expected good result.*

Many curable curvatures have changed into incurable ones, in consequence of the "do-nothing" systems advised by eminent surgeons.

B. Those who approve of spinal instruments send their patients without special instructions to the maker, who thus acts on his own responsibility. The majority of the specialists, orthopædic instrument makers, and several surgeons, see in lateral curvature a merely mechanical aberration of form from the normal line, and therefore the principal and great sheet-anchor for them is a spinal instrument, which should lift the weight of the head from the spine, and actually prevents the free movements and action of the spine in any direction. The principal objects of these machines are, the raising of both shoulders by

* Mr. A. Shaw (a well known surgeon who is still alive, but being old has retired from practice) is opposed to this system, he says: "Lateral curvature of the spine in a young girl, however slight, ought to be regarded *as requiring immediate care; the patient ought not to be left to the chance of 'growing out of it.' When the column leans habitually, even to a trifling degree, to one side, the superincumbent weight ceases to be supported in the line of the vertical axis, and falls chiefly on the oblique processes of the side to which the patient inclines;* these rapidly undergo absorption, and in proportion as they are diminished the curvatures get progressively worse."—"A System of Surgery," edited by T. Holmes, M.A. Cantab. Second edition, vol. v., p. 875.

two vertical crutches fixed on a horizontal waistband, to which is added a quadrangular or oval, padded, concave, steel plate, which, fixed by a spring, presses on the projecting ribs; the spring of the steel-plate is fixed either to one of the vertical crutches, or to a third vertical steel rod placed parallel and behind the spine. There are many variations in the crutches, the hip-band, the steel-plate, the springs, &c., according to the various whims and caprices of the specialist and his attendant instrument-maker, both always believing their special instrument to be the only one which is really good.

Lately the fashion prevails to encase patients in poroplastic cases, and Sayer's plaster of Paris bandages; both contrivances are just as injurious as any other orthopædic spinal machine of steel and iron; all these contrivances prevent full movements of the trunk, weaken the spine, and do not prevent the further progress of the lateral curvature.

A few years ago Dr. Protheroe Smith (who shares with those I have named before the false idea of being able to cure a lateral curvature by spinal instruments) transformed his abdominal into a spinal support, and upon the use of this instrument is based what has been constantly advertised, by an instrument maker, as the "*gentle treatment of lateral curvature.*

Steel corsets, or stays with *vertical steel bands* sewn on, are only modifications of the regular spinal support, and are preferred merely because no machine is seen, and because young ladies squeezed into them show their curvature less. I am sorry to be obliged to mention that there are still many medical men who advocate such stays, and send patients to makers of such stays. I remember a young patient under treatment who was recommended by a well-known oculist to wear a stay with vertical steels sewn on behind, as the oculist fancied these would support the back. Some surgeons opposed to spinal machines believe they can cure lateral curvature by bandages; they apply one above the *raised* shoulder, lead it obliquely across the chest and back to the opposite side of the trunk, cross it again, and fasten it on the hip of the same side.* Besides this, the

* See Barwell's treatment of lateral curvature.

patient is, according to an old plan, recommended to make use of a seat slanting from one raised side to the other, in order to straighten the curves. Another practitioner, previously a great advocate of spinal instruments, a few years ago modified his views, and recommends a few exercises, which he minutely described as a panacea for the cure of all lateral curvatures.

Professor Erichsen's treatment will serve as a specimen of the treatment usually advocated in surgical handbooks: See Erichsen, 6th edition, *The Science and Art of Surgery*, 1872.

"There are three principles of treatment to be carried out in the management of lateral curvatures.

"*a.* The improvement of the general health.

"*b.* To strengthen the muscles of the spine.

"*c.* To take away, as much as possible, the weight of the head, neck, and upper extremities."

"Iron and aloetics are of great moment, also nourishing food and exercise in the open air.

"The muscular power is more directly strengthened by sponging the back with cold salt water, or vinegar and water every morning, and methodically rubbing* from top to bottom, either with the naked hand or with some slightly stimulating embrocation, principally the erectores spinæ on each side; or, if the patient's strength permit it,

* *Methodical* rubbing. Erichsen does not mention what method he means, although the manipulation of rubbing varies according to the greater or smaller pressure of the whole hand, of the palm, or of the fingers; further, regarding the special direction and special form of the single passive movements of which rubbing is composed.

The *hand-swing* can be used when the body is hanging or when the whole foot or only the toes are touching the floor; further, when one or both hands are used and the legs are raised:—Erichsen does not mention the mode and time for the hand-swings to be used.

Calisthenics is the name of hundreds of free exercises, which, according to their author, Captain Clias, are to beautify and strengthen the healthy body.

In a book of surgery, where all operations are minutely described, we are justified in expecting to find the special exercises suitable for each patient to be described in detail, especially as the majority of medical students have not the slightest idea of calisthenics; but besides the name no further information is given in Erichsen's Handbook.

the hand-swing or calisthenic exercises may be allowed, but these are not to be continued if they produce a feeling of fatigue or exhaustion.

"If there is a decided projection of the ribs on one side, and the shoulder and hip be prominent, with apparent difference in the length of the limb, more decided measures must be had recourse to:—iron, good living, fresh air, form the basis of the constitutional treatment, cold bathing and frictions of the local treatment of the muscles of the back, but it is essential to take off the weight of the head and shoulders and to prevent its continuing to keep up or to increase the deformity.

"This is done by the recumbent position, or by wearing proper supports.*

"The recumbent position although valuable as an adjunct has been greatly abused, by being employed as an exclusive plan. The mechanical contrivances for the purpose of taking the weight† of the head, neck, and upper extremities off from the weakened spine are of various forms; however much their details may vary, they have three principal objects.

"1. To form a broad basis of support round the pelvis by means of a strong well-fitting (iron) band.

"2. To carry off the weight of the head and upper extremities from the spine, by means of lateral crutches, which transmit it to the band.‡

* A *proper support* is recommended, but it is difficult to understand how a support can be called *proper* when it interferes with the action of the muscles and prevents all the movements of the spine. While Erichsen recommends in the slighter stages muscular exercises, in the more advanced stages he recommends a support to be worn both day and night, which does not permit any exercise.

† The *weight* of the head and neck cannot be taken away by the usual spinal supports, but these have been made spinal supports with a perpendicular iron rod curved over the head; and to which bands, pulling and supporting the head, have been attached.

‡ It is a mistake to believe that the *crutches*, which usually only raise the shoulders, should take away any other weight than that of the arms and shoulders; they do not at all influence the dorsal and lumbar curve, the trunk hangs on the crutches when they are high enough, but if they are not high enough, the stooping of the body is still more increased.

"3. To influence the convexities of the spinal curves by means of movable plates, acted upon by means of springs or by screw-power." The best of these apparatus is, according to Erichsen, that of which the engraving is published in his book. The instrument is to be worn first only during the day, later it is to be kept on at night.*

I may mention that it is for the important operation of screwing these moveable plates tighter, or of placing them higher, an operation lasting one or two minutes, and which must be done twice a week, but at any rate once a week by the specialist or orthopædic surgeon, that a guinea is to be paid; you will therefore understand that *conscientious* general practitioners object to this practice in the interest of their patients' pockets. A few years ago the medical papers published the details of a trial where the guardians of a young lady having refused to pay several hundred guineas to an orthopædic surgeon and special friend of the patient's father for the screwing operation which was most skilfully performed twice a week, have been condemned to pay the full fee, because the plaintiff's medical witnesses spoke highly of his skill in screwing.

BAD EFFECTS OF SPINAL SUPPORTS.

In cases where young ladies have worn such spinal supports for two or three years I have seen atrophy of the long muscles of the back, incapability of moving the spine freely and turning round in bed without support, the shoulders raised, the head projecting, with the chin forwards. Sometimes several months have been required to restore the usual movability and strength of the spine, and to restore the natural form of the spine which seems to have lost the natural curves; in fact the spine appeared to have the form of a spine as seen in the prepared skeletons of young babies, where a straight iron rod is surrounded by the vertebræ.

* The *movable plates* press only on the projecting ribs, and act indirectly on the spine itself through the joints of the ribs, which joints have already undergone a change of position.

LEADING POINTS OF A RATIONAL TREATMENT.

I will now mention the leading points which form a scientific basis of every treatment which is to be called rational; for this purpose some of the principal pathogenetic causes of curvatures must be named first. Curvatures are frequently considered as an idiopathic disease itself, although they are, in the majority of cases merely the symptoms or effects of other complaints.

The scrofulous, phthisical and rickety constitutions, the stage of convalescence, after any weakening illness or eruption in infancy and youth, whooping-cough, bronchitis, pleurisy, and other diseases, mental and bodily over-work of any kind, general weakness, too quick a growth, tight-dresses, bad positions, &c., predispose to lateral curvature, which for practical and curative purposes may be divided into three stages.

In the first the patient can by his own exertion replace himself into the normal position, although but for a very short time. In the second, more or less *external* help is required for the purpose of attaining the normal position even for the shortest period of time.

The third no more permits, either by the patients or by any external help, the replacement of the body into the normal position, and is consequently incurable, although some improvement is still possible, but this can only be obtained by much work and perseverance.

In the usual lateral curvatures, where the dorsal convexity on the right and the lumbar on the left compensate each other, the head is slightly bent forwards and turned to the right, the right shoulder raised and slightly pulled forwards, while the lower angle of the right shoulder-blade projects, and is more distant from the spine, which is twisted round the longitudinal axis. The chest is flat, and even concave, the patient usually stands on the right leg only, while the left knee is bent, and turned inwards, the right hip appears higher, the right longitudinal outline of the trunk is more concave in the lumbar part, and the space between this line and the right arm, hanging down, is much larger than that on the opposite side; one, or both, ankle-joints are

weak; the foot frequently flat; the spine twists by degrees in order to keep up the vertical position. This scoliosis is often combined with posterior cervical and anterior lumbar curves, with various deformities of the ribs accompanied by pathological changes, partly in the tissues of the ligaments and muscles, which are retracted on the concave, and relaxed on the convex side; the intervertebral substances are depressed and wedged in the concave parts, and as long as these do not resume their natural height, a real cure of the curvature cannot be attained. When the balance of the spine is thus once deranged, it is *never* replaced except by the artificial help of the patient and the professional man.

The plan I pursue generally is first to find in each individual case the causes of the curvature, to improve the constitution, partly by strict hygienic, partly by medical means; further, to remove those causes which still continue to act injuriously on the patient, *i.e.* when a leg is short, contracted, raised or paralysed, to make use of a high sole or some artificial support, till the corresponding hip is raised to the same height as the other hip,—in one case the artificial support will be a higher boot, in a case of paralysed leg causing the curve it will be a movable steel support; every patient is advised to stand as little as possible, to sit during the various occupations in comfortable and easy positions, to recline from the seat up to the head; for this purpose a chair with a movable back is recommended, with the addition of an easel for reading or writing. Great attention is paid in the preparatory part of the treatment to the expansion of the chest. As the general power of the patient is in proportion to his power of breathing, the power of exertion increases with his breathing capacity; good positions, special breathing and arm movements, are used for this purpose. The position of the head is improved by diminishing or removing the retraction of the platysma myoides or of the lateral flexors of the neck, which either raise the shoulder to the head, or when the shoulder is fixed, pull the head down. The usually weak ankles are stengthened, partly by special

movements, partly by passive manipulations, or douches of salt water; in a similar way the knee and hip joints are strengthened, and thus a kind of strong basis is prepared, on which the body is to be carried.

After such a preparatory treatment, during which the patient begins to gain in strength and energy, the special treatment of the spine itself begins.

It is always necessary to attend first to the lower and lumbar curve; for this purpose the patient is placed into a riding position, his body is turned or bent, one or both arms are raised into different positions which are chosen according to the individual case; the spine is, partly by the patient himself and partly by the medical man, stretched in the direction of the convexity of the curve, to such an extent as can be borne without pain.

In this and similar positions, in which the lumbar curve is either diminished or entirely disappears, various curative movements suitable to the individual case are carried out, while the patient either assists or resists the movement; later the patient, while leaning on, or supported by some gymnastic apparatus, is placed into a special standing position, and further movements are done in order to lengthen the spine: by this time a change in the previously relaxed and retracted tissues takes place, the wedging of the invertebral substance diminishes, and the patient begins to be able with the help of special positions of his arms, to assume, at least for part of a minute, a more normal position.

Whenever the first stage of improvement takes place, the further and quicker progress of the cure depends upon the assiduity of the patient in carrying out the given instructions; he gains daily a greater power of retaining a good position, firstly with the aid of his arms, later without them, but merely by the effort of the will; he learns to walk during one minute in a good position, this minute is repeated several times a day; in a short time the number of minutes is doubled, and the period of walking prolonged. This self-acting method of the patient is combined with the ordinary treatment, and finally, although

slowly, a perfect cure is obtained. The positions and movements required are minutely described and illustrated in my *Handbook of the Movement-cure.*

I wish to point out that lateral curvatures are symptoms and consequences of other constitutional and weakening complaints and influences, that certain pathological changes take place which cannot be removed merely by rubbing, plastering, lying down, bandaging, hanging, dancing, calisthenics, or by electricity and spinal instruments, or by special supports (which last may be used in incurable cases or in paralytic curvatures); that each case must be individually treated, and that all morbid symptoms and changes should be taken into account during the treatment just as in the selection of a specific drug; that hygienic, surgical and medical means, as well as curative movements, adapted to the individual cases, and the will of the patient himself, are absolutely necessary for a rational treatment and a lasting cure, which means not only a better and straighter appearance, but increased power of breathing and moving, better circulation, and improved general health and energy.

There is a large field open to those who besides all other hygienic, medicinal, and surgical means add the scientific application of movements according to Ling's system to their means of curing lateral curvature,—and it is to be hoped that clinical teachers of surgery and eminent surgeons in general will pay more attention to, and give their pupils more instruction on this subject, as this is the only way for preventing the public from applying to the various classes of unprofessional people pretending to cure lateral curvature.

THE RATIONAL TREATMENT OF LATERAL CURVATURE, KNOWN AS THE ROTH-TREATMENT

Can be well carried out only by medical men who have been seriously studying, theoretically and practically, the medico-gymnastic treatment of Ling in the manner I have suggested in the introductions. There is no "pons asinorum," or royal road to the Kinetic treatment of chronic diseases and deformities without a serious preliminary

study of the *science of curing disease by movements*, usually called *Kinesi-therapia*. This includes the knowledge of the *materia medica Kinesi-therapeutica*, consisting of the various active, passive, and resistance movements of which more than 6,000 have been described years ago; the editors of surgical manuals are mistaken in believing that an article of a limited number of pages will enable their readers to carry out practically a special treatment which requires a long time to be studied.

The following are the *leading points* of my treatment which has three parts, the *preparatory*, the *curative*, and the *final;* I claim for it priority and originality because it differs from any previous treatment. The word *Essay* on the title page of this little book, will shew that I did not intend to write an exhaustive treatise, but only some practical suggestions for those who wish to know something of the rational treatment of lateral curvature, and how to pursue this study.

1. The greatest attention is to be paid to the general state of health and strength; all suitable hygienic, medical and surgical, means are to be used for the improvement and cure of any constitutional complaint, weakness, &c. (see pages 56, 57, 58).

2. The causes which have produced, or continue to keep up, or to increase the curvature, are as far as possible to be removed. Injurious occupations must be discontinued, in many cases the bodily or mental work diminished, or for some time interrupted (see pages 13, 14, 15, 16, 17).

3. Special attention is called to the change of all articles of dress interfering in the slightest degree with the functions of respiration circulation and digestion, or with the free movements of any part of the body; every tight stay, corset, band, vest, dress, boot, &c., is to be discarded.*

4. All positions preventing deep breathing, favouring and increasing the abnormal form of the neck, chest,

* Models of my hygienic dresses and underclothing for women are made by Mrs.. Wise, Ladies' Outfitter, 15, High Street, Marylebone, W.; shirts drawers, belts, digitated stockings, by Messrs. Pool & Lord, 318, Oxford Street, W.; trousers, etc., by Messrs. Stammwitz & Co., 15, Argyle Street, Oxford Street, W.; boots and shoes by Mr. Hall, 39, Edgware Road, W.

shoulders, and spine, as well as the stooping of the head must be avoided (see pages 59 to 75), The figs. 54, 55, 56, 57, show some additional bad positions during writing.

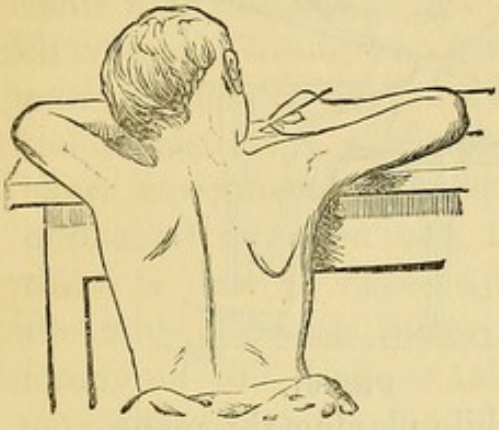


FIG. 54.

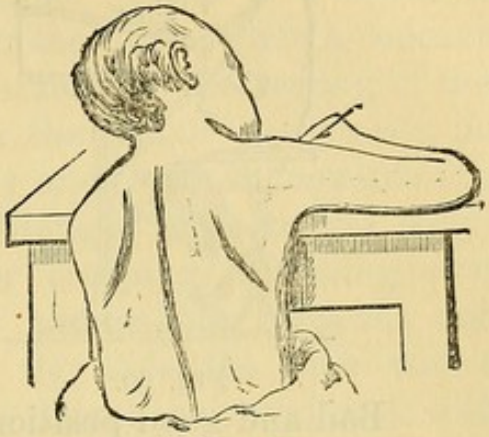


FIG. 55.

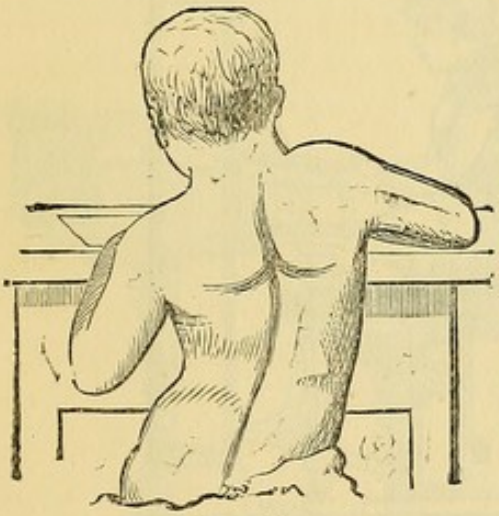


FIG. 56.

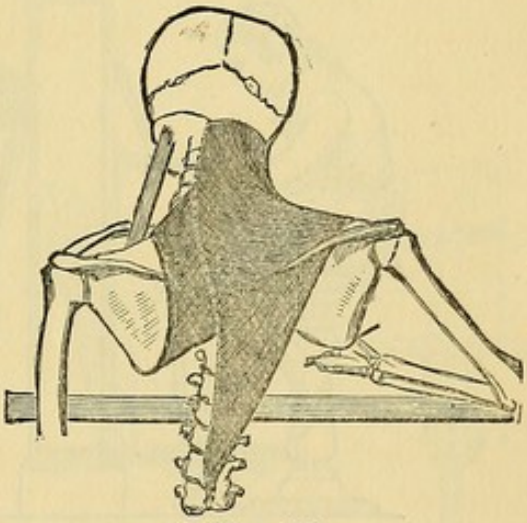


FIG. 57.

Additional bad and good positions while reading are seen in the following figures.

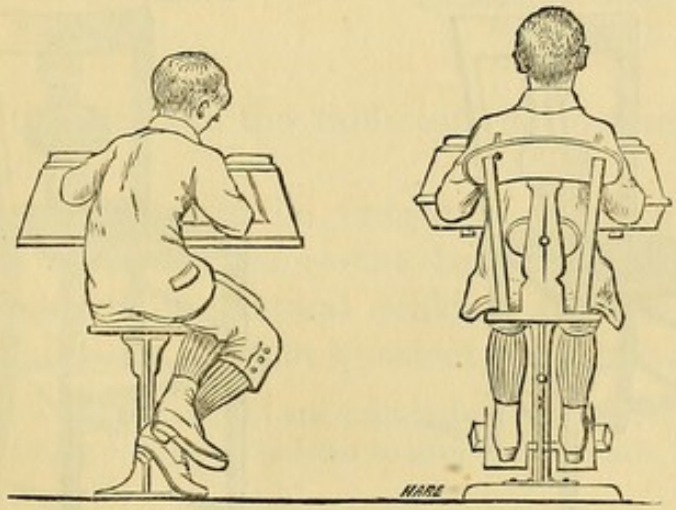


FIG. 58.

FIG. 59.

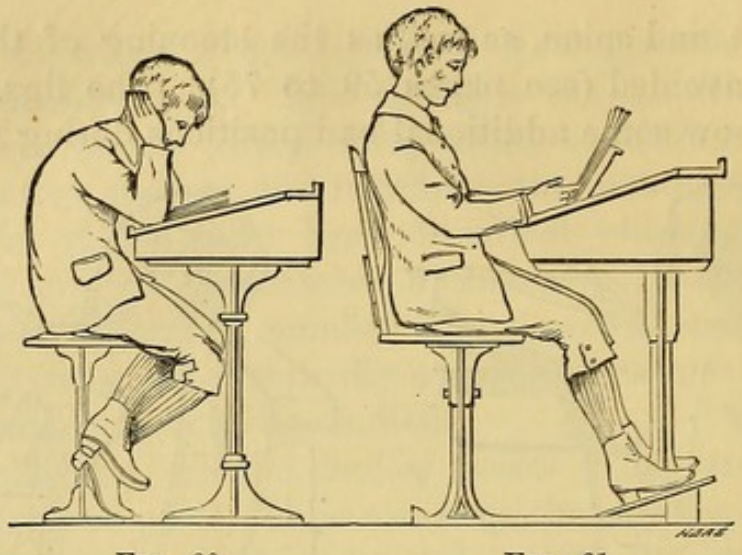


FIG. 60. FIG. 61.

Bad and good position while playing the piano.

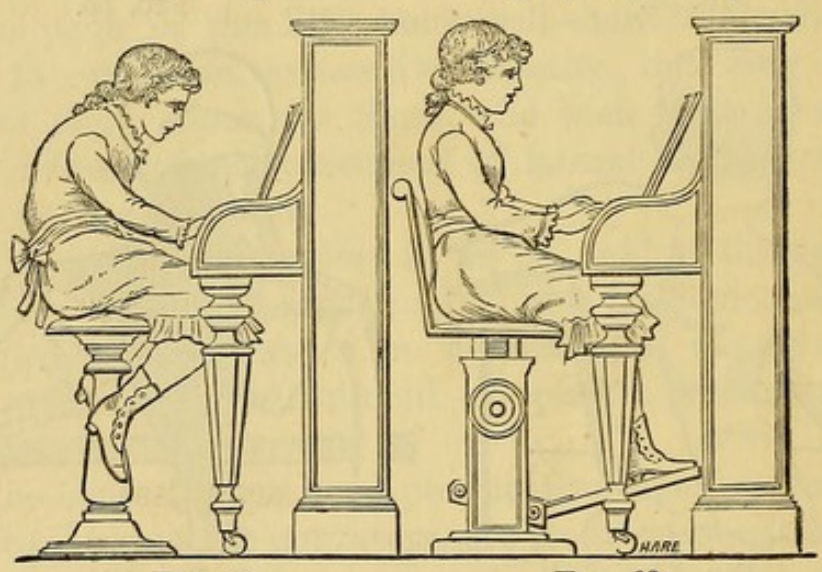


FIG. 62. FIG. 63.

To prevent similar bad positions I have designed various chairs, desks, school benches, music chairs, &c.

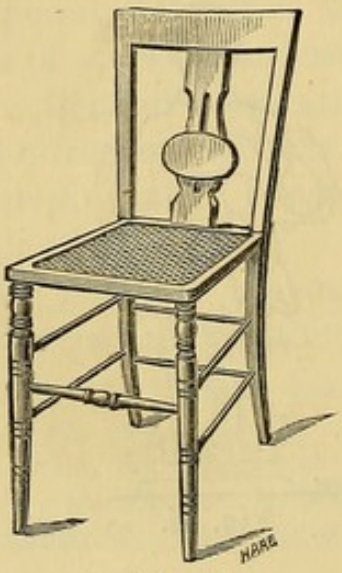


FIG. 64.

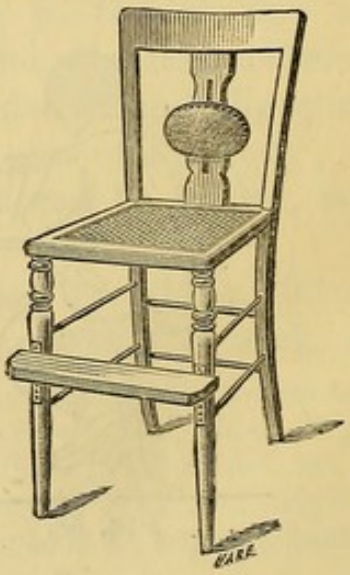


FIG. 65.

Fig. 64 is a chair in which the height of the seat corresponds with the length of the legs, the depth of the seat with the length of the thighs, aud the height of the back of the chair with the length of the spine. There is a movable convex part fitting into the lumbar curve, while a concave part at the top of the chair admits of the resting of the shoulders. In a similar chair the whole body rests, no effort is required for sitting up; and the desk movable in a horizontal direction can be brought close to the body; there is thus no necessity for stooping or leaning over the table, because the writer places both forearms uniformly on the desk or table; fig. 65 is the chair with a moveable foot-rest; fig. 66 is a school chair and desk with the movable top; fig. 67 shows an additional adjustment

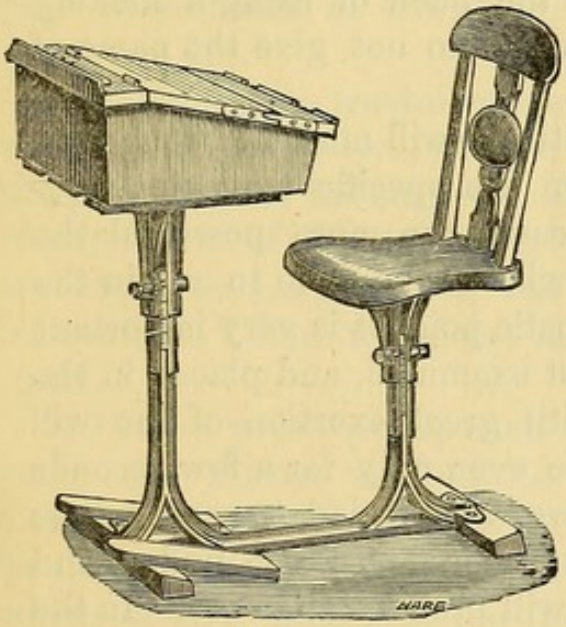


FIG. 66.

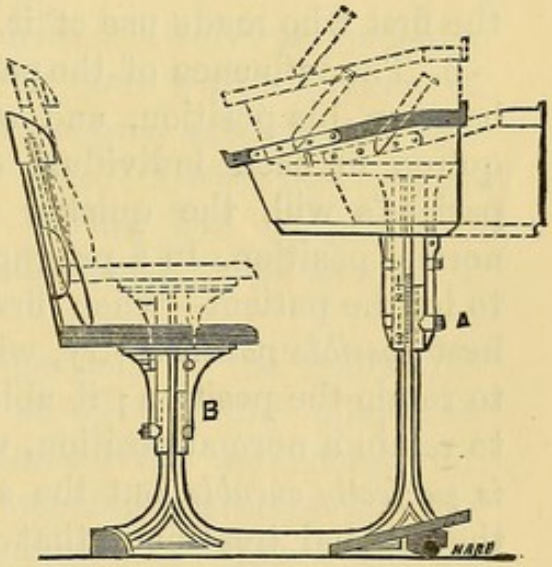


FIG. 67.

by which the seat and the table can be lowered or raised as required.*

5. The patient must be taught to *see* and afterwards to feel his abnormal form—the bad position of his face, head, shoulders, the lateral sinking and twisting of his body and hips, &c. When a patient, after being for weeks,

* The chairs I have designed are manufactured by the North of England School Furnishing Company, and can be seen at Mr. Iron's, 101, Hampstead Road, London, N.W.

months, or years in an abnormal position, is placed in the normal and natural position, he complains of being on one side, twisted or bent, of his head being too far back, of his chest and body falling forwards, &c., &c. Many years ago I began and was the *first* to make use of the looking glass, in order to enable the patient to convince himself that his sensations of being in a wrong position, when placed in a good one, are in contradiction to what he sees. In a later paragraph it is mentioned how the looking glass is used. Sometimes patients are not aware, and cannot see, even when before the looking glass, that their *usual* position is a bad one; they must be actually taught to see the difference between their usual bad position and the normal one in which they are placed, and in which they have difficulty in remaining. People who describe my treatment say, "I am in the habit of using a looking glass," but forget to mention and do not give the name of the first who made use of it.

6. The influence of the patient's will must be brought to bear on his position, and on the specific movements required in each individual case; the more powerful the patient's will, the quicker will he be able to retain the normal position. In a prognostic point it is very important to let the patient—when first examined, and placed in the best *possible position*—try, with great exertion of the will to retain the position; if able even only for a few seconds to retain a normal position, we are entitled to say the *case is perfectly curable*, but the surgeon must also understand the rational treatment that will produce the cure. In the *Transactions of the Clinical Society* of 1883, the history of the treatment of a lateral curvature—according to my principles—is published, in which photographs of a girl in anterior, posterior and lateral aspect, (in her usual state of lateral curvature), are published side-by-side, with the photographs of the almost normal position in which she was placed by the surgeon, one of my late assistants, and who encouraged her to exert herself *as much as possible* in retaining the position while she was photographed—this photographic proof of the entire

change of position by the mere influence of the will is very interesting. Although I had heard that Dr. Kjölsled, a Norwegian physician, had fifty years ago based his treatment partly on the energy of the will, I could never get any information on the subject till 1878, when I went to Christiania for the special purpose of obtaining some information on that gentleman's treatment. My mode of using the will is quite different from the Norwegian's; it was first described in my Monograph on Infantile Paralysis about eighteen years ago. On my return from Christiania, I published a paper on the Influence and Use of the Will in the Treatment of Spinal Deformities, which is partly reprinted in one of the later chapters of this book.

7. In the preparatory treatment respiratory movements in various commencing positions, as well as several elementary movements of the head, arms and feet are used (see page 76).

8. In *the curative* treatment a series of twelve movements, which are either active, passive, or done with resistance of the patient, or of the surgeon, are chosen according to the requirements of the individual case. These movements are based on Ling's ideas, but having had no practical instruction, I had to invent and choose them as best I could.

9. In the prescription, such positions of the trunk and limbs are chosen as help to straighten the spine or diminish the spinal curvature. Since every movement can be done in many different commencing positions, the one which mostly improves the form of the spine will be the most suitable, is used as a key note as often as possible, and so long as it neither strains nor hurts the patient, until the normal position is reached.

10. The *final* treatment consists in the instruction of the patient in such *active* movements as contribute not only to retain the lately acquired improvement, but also enable him to make further progress in *health*, *strength*, and normal position.

THE PREPARATORY TREATMENT, LYING, AND RECLINED SITTING POSITIONS, FIGS. 47, 46.

As the majority of patients are weak, anaemic, strumous, suffer from cold feet, pain in various parts of the spine, shoulders and hips, weak ankles, a flat foot, incapability of breathing deep, they are at first placed horizontally, as in fig. 40 (page 74), when a wedged cushion is placed with the thicker part under the head, and a small round horse-hair pillow is placed in the hollow of the neck—this position is called *lying* position; if the patient is not very weak he can be placed into a *reclined sitting position*, as in fig. 46 (page 73), here the lower curve, the lumbar part of the spine, is supported by the thick part of the large wedged cushion, and the small round pillow is in the hollow of the neck.

BREATHING.

The mode of breathing has been described on page 76. I have only to add that it is desirable the patient should count or think of the single letters of the alphabet, but without speaking; he will then be able to judge how long the three component parts of a respiratory movement lasts, and in the course of one or more weeks will be pleased to find that the length of the periods of inspiration, of retaining the air, and of breathing out have increased; the increased power of respiratory movements has an excellent influence on the circulation, and increases the energy of all movements.

LYING AND STRETCHING.

While the patient is lying he is encouraged to push

(a.) With the heels—(the feet being flexed in a right angle at the ankle joint) the legs are so far turned outward that the inner edges of the feet form a right angle, the heels only touching each other; this foot position is called feet: open! Feet: close! designates the touching of the inner edges of the feet.

(*b.*) To push with the hands and fingers downwards till

the arms in their whole length from the shoulders out to the tips of the fingers are stretched; the thumb is in front, the little finger and the elbow behind.

(*c.*) To push with the head upwards, without raising or lowering the chin, the full length of the throat must be seen without any wrinkle between chin and throat.

(*d.*) The shoulders touch the couch and the chest forms an arch.

EFFECTS OF STRETCHING WITH PUSHING.

Sometimes the pushing with the heels is done towards a fixed object or towards the wall, which enables the patient to push better the head in the opposite direction; the stretching of the body diminishes the spinal curve as long as the pushing with head and heel lasts; viz., about one-third, one-half, or a whole minute. The pushing down the stretched fingers and arms draws the shoulders down, while the endeavour of touching the couch with the shoulder increases the action of the usually relaxed muscles which approach the shoulders to the spine. The patient counts *loud* during his exertion of stretching, thus he is aware of the length of time he stretches, which, according to his power, he tries to prolong; instead of counting he makes sometimes two or three breathing movements, and this forms a combination of a general stretch and respiratory movement. When the patient is stronger he does the stretching and breathing in a standing position while leaning on the wall or door; patients in a weak state begin their breathing in a half-lying position, when they stretch only the head up, the stretched arms and fingers down, while the shoulders lean on the back of the couch and the chest forms a good arch.

THE USE OF THE LOOKING GLASS.

An oblong looking glass of 10 to 12 inches in length, 5 to 8 inches in width, with a handle, is held before a patient to convince him that he is in a good position; while looking at

the glass either one shoulder is raised more than the other or the head turned or bent to one side. Thus the patient sees many bad positions, and he is asked to replace himself into the normal and good position; the same changes of positions are made *without* the looking glass, and when the patient places himself in what he feels as the straight position, he is quite surprised to find himself in a bad position when the looking glass is held before the face; never use the words *put yourself straight*, because the patient having a false mental impression of his position places himself always in a wrong position.

COLD FLAT FEET AND PROJECTING ANKLES TOUCHING EACH OTHER

Are also very frequent symptoms of scoliosis, which should be removed as soon as possible. In the article on dress (page 42, 43) it was mentioned what kind of boots with a pad are required, in order to diminish the flatness of the feet and to prevent the ankle joint from projecting inwards; if the boot is well made the patient feels comfortable, and while standing on one leg, the other being slightly raised sideways, he is able to stand more firmly without a lateral to and fro movement in the ankle joint of the foot on which it stands. In some cases a pad will be required only under one foot, in other cases the pad must be higher under one foot than under the other, but the boots do not suffice for curing the weakness of the ankle. I use sometimes a so-called Scotch douche on the feet; a watering can with a rose filled with warm water is used for pouring the water on the foot and ankle, which is followed by a tepid or cold shower—the alternate use of warm or cold shower is repeated two or three times—each application varies from 10 to 15 seconds. After the last cold water application the feet are well dried and rubbed till they feel in a glow; where there is an opportunity a jet of warm steam is used, followed by a douche of cold water—here the steam is substituted for the warm water.

Besides the boots and the douches, it is necessary to

make special movements on the ankle joints. In fig. 68, the patient is comfortably placed in reclined sitting position, the foot rests on the surgeon's or assistant's knee, who makes a circular movement on the patient's ankle joint, the foot is brought *more inwards*, and while in *adduction*, a *semicircle* is made —the *outer* half of the circle is very rarely wanted—this movement is first done *passive*. Afterwards the patient tries to make the movement *active*, while the surgeon holds one finger in a vertical direction, above the patient's big toe—round this finger the patient makes the

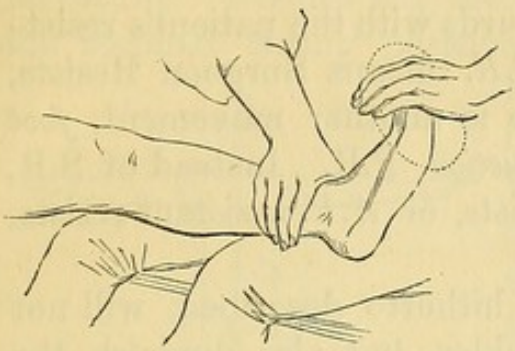


Fig. 68.

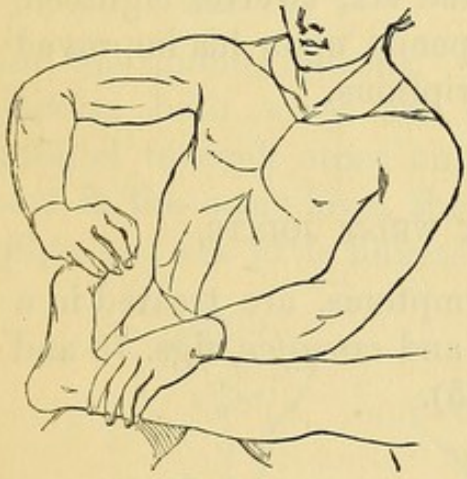


Fig. 69.

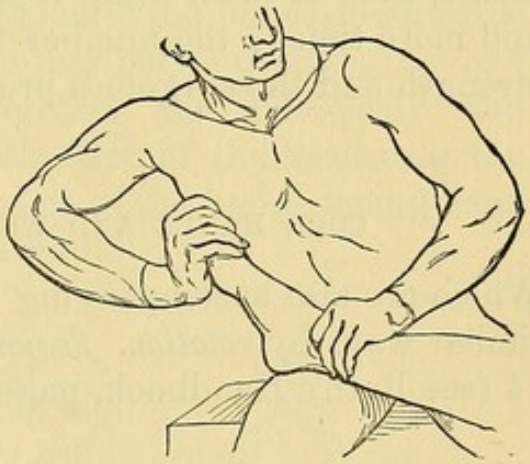


Fig. 70.

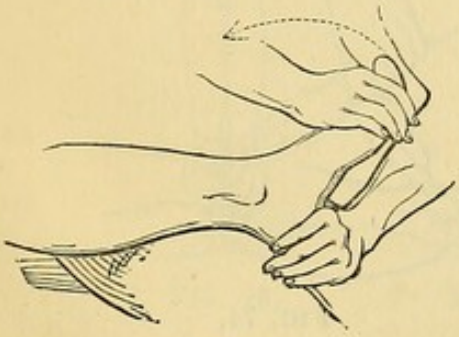


Fig. 71.

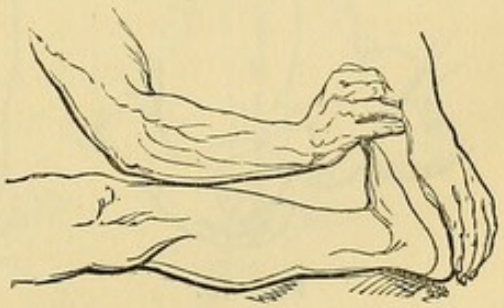


Fig. 72.

inner half of the circle, while the foot is bent in position at the ankle joint, and forms a right angle with the leg; at a

later period of the treatment, the surgeon *resists* gently the patient's movement—but this resistance must not be greater than the patient is able to overcome. The figs. 69, 70, 71, 72, show an extension and flexion of the foot, first with the surgeon's and afterwards with the patient's resistance—(in the prescription *S.R.* means Surgeon Resists, P.R. Patient Resists). There is another movement, *foot adduction*, S.R., and foot *abduction*, P.R. Instead of S.R. the letters *G.R.* Gymnast Resists, or *A.R.* assistant resists, are used.*

The means and movements hitherto described, will not only strengthen the weak ankles, but also diminish the cold in the feet. The patient being taught to do the various movements alone at home, will assist in improving the circulation in the lower extremities, by increasing the flow of blood to the feet as often as he does these movements, each of them being repeated six, twelve, eighteen, and more times; the number depends upon his improved strength and the surgeon's prescriptions.

COLD HANDS AND WEAK WRIST JOINTS,

Which are also accompanying symptoms, are treated in a similar way, by *rotation*, *flexion*, and *extension*, figs. 73 and 74 (see Roth's Handbook, page 65).

FIG. 73.

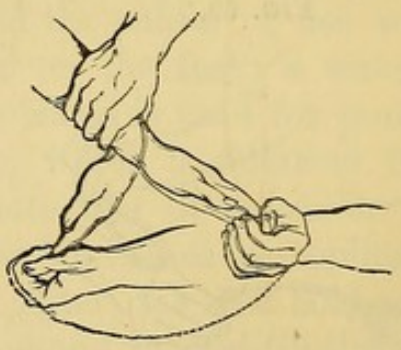


FIG. 74.

* As I do not intend here to write a *Kinesi-therapeutic* treatise nor a *Kinesi-therapeutic* materia medica, I must refer for the minute description of every Kinetic operation to the Handbooks named in the Introduction.

A FLAT DEPRESSED CHEST; DEPRESSED RIBS ON ONE OR BOTH SIDES; HIGH, ROUND, FORWARD-PROJECTING SHOULDERS,

Are another group of symptoms accompanying spinal curvature. Besides the *breathing* movement in a lying and reclined sitting position with the *arms down*, it is necessary to place the arms in a *horizontal* position, fig. 75, which in the *Kinesi-therapeutic* terminology is called *yard* position, because people are in the habit of using their stretched arms from the tips of the fingers to a certain point on their chest as a yard measure; both arms are on the same level with the shoulders and the palms of the hands downwards and the thumbs in front. Another useful position is *stretch position*, both arms are stretched perpendicularly and parallel to each other on both sides of the head near the ears in the same level, the palms of the hands facing each other and the little fingers in front.

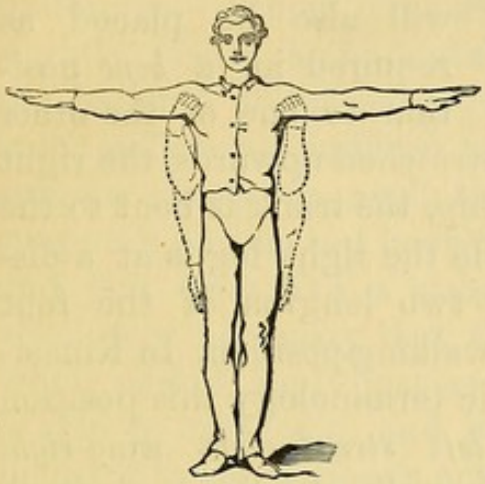


FIG. 75.

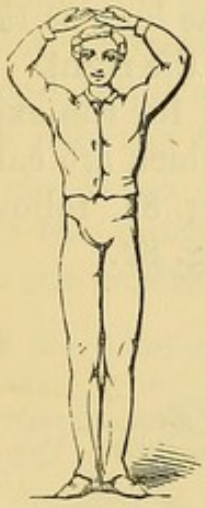


FIG. 76.

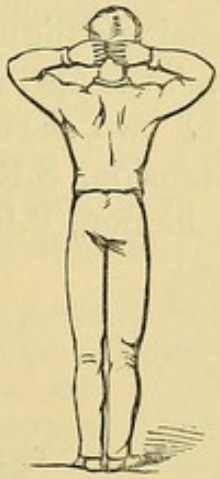


FIG. 77.

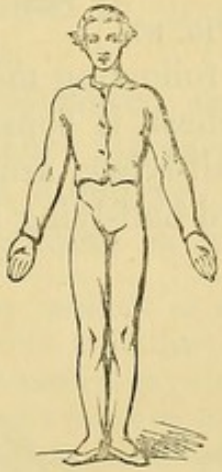


FIG. 78.

Shelter—fig. 76, rest—77 speak—78, wing stride-lying position—79, are instances of other commencing positions in which respiratory movements are done; according to the

case, the surgeon will prescribe that one arm should be in stretch and the other in yard position, or in any position which mostly contributes to straighten the spine; the trunk itself will also be placed as required in a *bent* position to one or the other side. Fig. 80 has the left arm stretched upwards, the right fixes the hip, the trunk is bent to the right, while the right leg is at a distance of two lengths of the foot placed in walking position. In Kinesitherapeutic terminology this position is called *left stretch-right wing-right oblique-left walk standing;* a weak patient would be placed into a lying position, and the legs either apart (see fig. 78) or both legs placed together. Thus a lateral curvature of the spine with a lumbar curve concave to the left, would be elongated and straightened as long as the body remains oblique to the right.

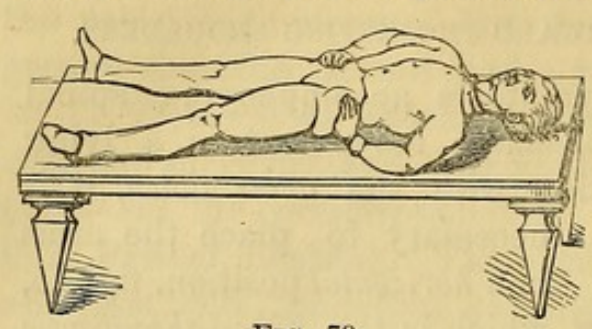


FIG. 79.

FIG. 80.

The following movement is also used for the expansion of the chest, it consists of two parts, which are called (1) Rack half-lying, arm extension, S.R., fig. 81, followed by (2) Yard half-lying arm flexion, P.R., fig. 82.

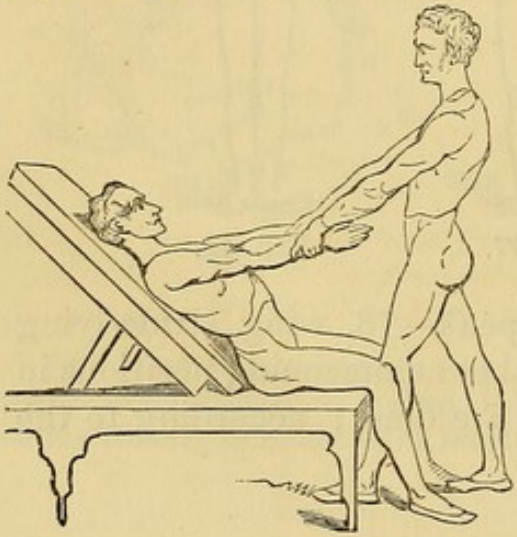


FIG. 81.

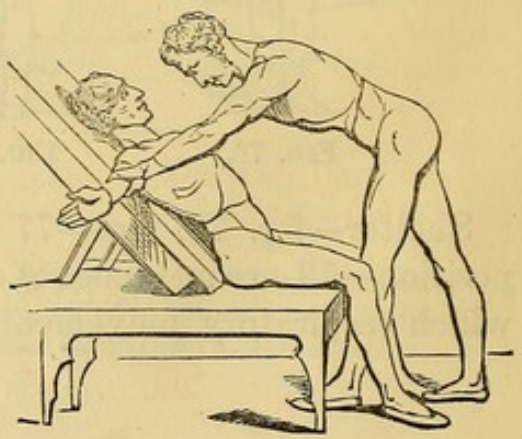


FIG. 82.

In the *commencing* position the patient has his arms stretched forward on a level with the shoulders, which he holds down and back; the surgeon stands opposite the patient, takes hold of the latter's arms at or above the wrists. The patient moves his arms horizontally till they are in *yard* position; he then tries to move them uniformly—without jerks and stoppage—while the surgeon slightly resists, and adapts his resistance to the power of the patient; if the surgeon resists too little, the patient is not sufficiently induced to use his powers; but when the surgeon resists too much, the patient cannot overcome the surgeon's power, and he will constantly interrupt his action and jerk (just like a *staccato* in music); therefore it is absolutely necessary that the surgeon should, during the whole period, apply just as much resistance as the patient is able to overcome, and he *must* adapt his power every moment to the patient's action, and modify his resistance.*

When the first part of the movement is done three to six times, the patient begins in the *final* position of the first part, where the arms are placed horizontally in *yard* position, fig. 75. The surgeon takes hold of the arms as before and tries to bring them slowly forward into *rack* position (the commencing position of the first half of the movement), while the patient trying to retain his arms, but not being able to resist sufficiently, is obliged to give way; this second half is also done three times.

Afterwards the two *halves* of this movement are done alternately three times; this movement increases the power of the muscles which have been acted upon, and improve the position of the shoulders; there is a great

* Every Kinesi-therapeutic movement with the patient's or surgeon's resistance must be considered as a surgical operation to be done with the greatest precision, although no knife is used; to prevent any strains, too great an effort or a rupture—the surgeon must strictly insist on the patient speaking while making an effort of moving. I find that counting loud or repeating loud the letters of the alphabet, is the easiest and surest mode of preventing the patient from *retaining* his breath, which in the majority of cases is the cause of a strain or an inguinal rupture; this caution must never be forgotten, and therefore let the patient count loud as soon as he begins any treatment by movements; when thus trained he will soon acquire the habit of speaking loud.

tendency in this movement on the part of the patient to raise the shoulders to resist *too much*, and to work very hard by pressing with the back of the head, which should be avoided.*

When the movement is done in lying position, the surgeon stands near and behind the patient's head.

Stretch sitting arm flexion, S.R., *and extension*, P.R.

Figs. 83 and 84 are instances of other movements,

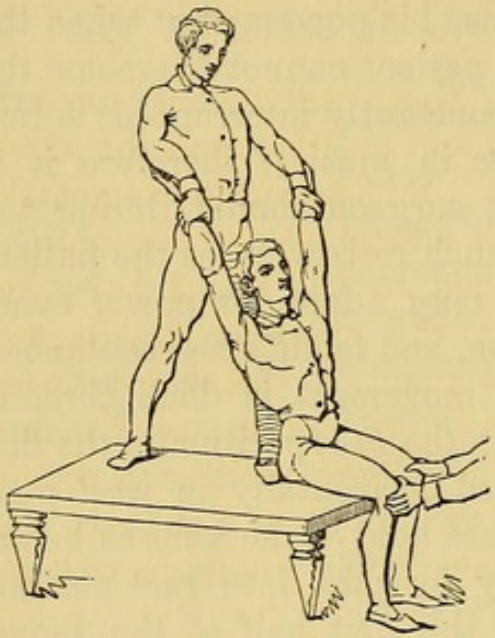


FIG. 83.

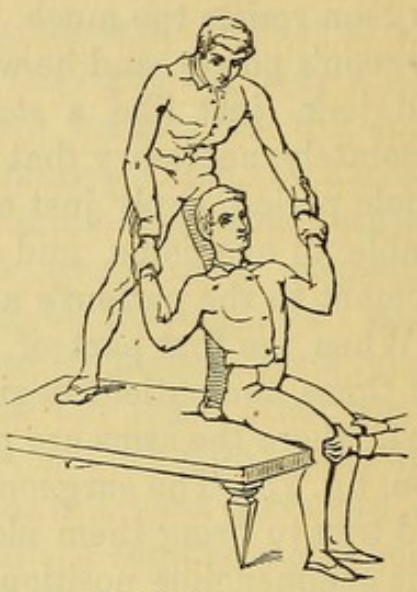


FIG. 84.

used for the expansion of the chest, and which during the preparatory movement are usually done in *lying* position.

Fig. 83 shows the patient in stride sitting position, while his knees are fixed by an assistant; he leans with his back on the outer side of the surgeon's left leg, while his stretched arms are held by the surgeon. This is the commencing position from which the patient tries to come into the final position by drawing his arms down while the surgeon gently resists, and at the same time moves his left leg into a more perpendicular line and

* In every scientific and well executed movement, whether active, passive, or with resistance, or assistance, there is a *position* in which the movement begins, this is called the *commencing* position, similar to the key in music; there is a *final* position when the movement *finishes*. All the movements between the commencing and *final* position are called *intermediate* movements, which must be executed with the *greatest precision*, in a *certain period of time* and in a *prescribed* direction; if these conditions are not fulfilled it is not considered as a curative movement.

slightly bends his body forwards (see fig. 84); when this part of the movement has been done, the patient makes one or two breathing movements and gently resists the surgeon, who slowly tries to stretch the patient's arms and to bring the body into a more reclining position. There is a modification of this movement, or rather an inverted resistance when the surgeon in fig. 83 tries to *push* down the patient's arm, who gently resists till his arms are bent as in fig. 84, when he pushes them up while the surgeon gently resists.

According to the symptoms there will be only one arm up, while the other is in a different position, and the movement will act only on *one* side. Some *active* movements of the arms, in which they are stretched *up*, *out*, *down*, or some forearm movement added to the few I have just described, will explain how the chest is by degrees developed to such an extent that the distance between the shoulders in front increases 2 to 6 and even 7 inches. In the course of this year I have received a letter from a lady patient, sent to me by Dr. Read of Southsea, who mentions that she had to enlarge her dresses across the chest by 7 inches.

It happens frequently that scoliotic patients have

WEAK LEGS AND KNEES.

I give a few instances of movements which are used in similar cases:—

Half-lying, leg-flexion, P.R., *and extension*, S.R., figs. 85, 86

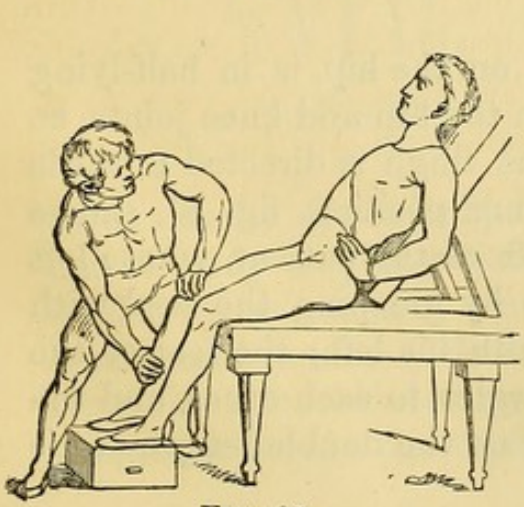


FIG. 85.

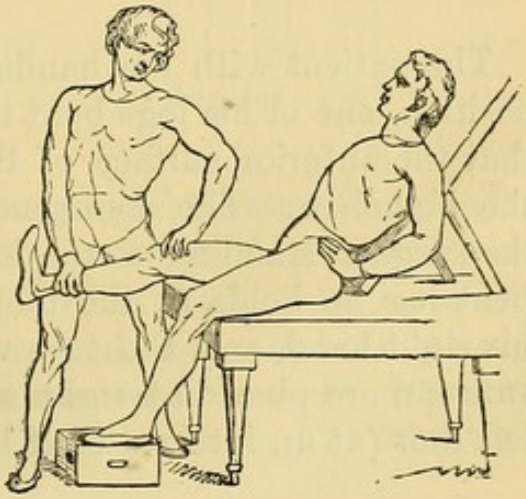


FIG. 86.

The patient in half lying position rests on the couch, only to the knees. While his leg is stretched, the surgeon stands in walk position, on the right side of the patient's leg projecting beyond the couch, and fixes the lower part of the thigh above the knee-joint with his left hand, while he bends the knee with the right hand, grasping the patient's leg above the foot-joint, which he presses gradually down while the patient resists: the surgeon consequently stoops when the final position of *leg-flexion*, P.R., is attained, he then resists without any change of hands while the patient again stretches his leg, and thus the *leg-extension*, S.R., is executed. Fig. 86 illustrates the commencing position of *right leg-flexion*, P.R., and fig. 86 the final position, which is also the commencing position of *right leg-extension*, S.R., while fig. 85 is its final position. The movements are done alternately three times.

Wing half-lying hip and leg extension, S.R., figs. 87, 88.

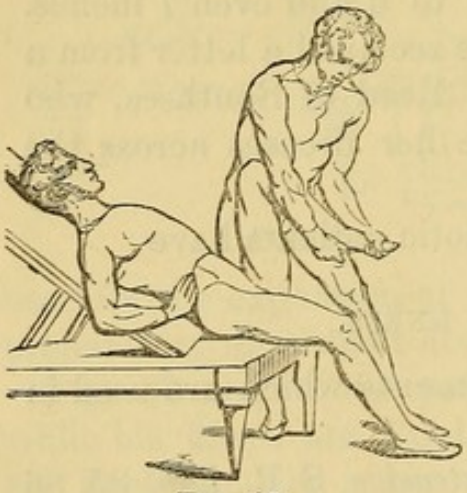


FIG. 87.

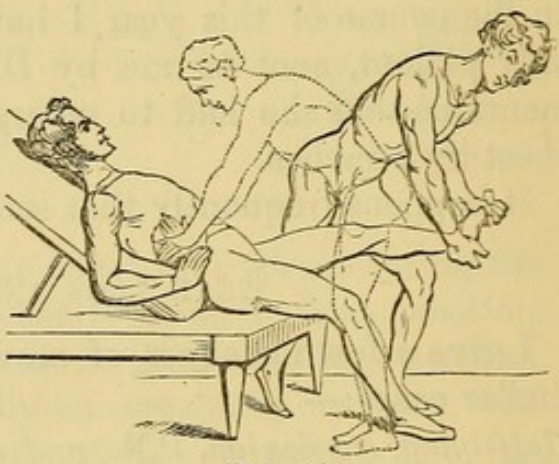


FIG. 88.

The patient with his hands on the hip, is in half-lying position, one of his legs bent in the hip and knee joints, so that the anterior surface of the thigh is directed towards the abdomen. The commencing position, fig. 87, shows the surgeon standing at the left of the patient, whose left bent leg he holds at the foot by grasping the heel with his right hand, and the toes with his left; the feet of the surgeon are placed at right angles to each other, and the left foot (at an interval of at least the double length of his

foot) forwards, and parallel to the direction of the left leg, the extension of which he resists. Fig. 88 exhibits the final position of the movement, the patient's leg is perfectly stretched, the surgeon's body and left knee bent, while his arms are still as stretched as they were in the beginning; the other leg of the patient and his hips are fixed by an assistant, whose position is represented by the dotted line in the engraving. This latter places his hands on the patient's hands, in order to fix his hips, and prevents the patient's leg, kept between his knees, from moving.

BAD POSITIONS OF THE HEAD.

The head of scoliotic patients is usually either slightly bent forward while the chin projects, or the head is bent to one or the other side, or there is a combined position of head forwards and sideways, bending with turning to one or the other side. These positions of the head vary according to the form of the curvature and the degree of weakness of the spine; for the purpose of curing these bad positions of the head the following active movements are

FIG. 89.

FIG. 90.

used. In the *Appendix* I have given drawings of my collection of thirty-six high-relief figures of Ling's elementary and combined movement. Numbers 11 and 12 represent the *bending* and *turning of the head to the left*, which the patient, lying in a horizontal position as previously described, makes not only to the left but also to the right; later these

movements are done with S.R. or P.R., according to the case; *flexion of the head backward*, S.R., is done while the head of the patient in lying position projects beyond the table. The surgeon, standing behind the patient, gently resists the patient from bending the head *backward;* after the head has been brought back, the patient gently resists while the surgeon tries to raise the head and to bend it forward. The same movement is done in half-lying, and later in *standing* position, as seen in figs. 89 and 90. The surgeon stands higher in order to place his forearms with more ease on the shoulders of the patient. (For detailed description see Roth's Hand-book, page 86, also page 110. under Head Flexion).

PASSIVE MANIPULATIONS

Are also frequently used for scoliotics. Figs. 91, 92, represent *fulling* of the arms, which is also used on the

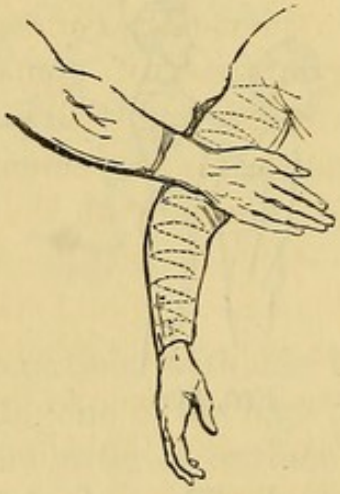


FIG. 91.

FIG. 92.

thighs and legs to improve the circulation and nutrition. See Roth's Hand-book, page 73.

CHOPPING, OR GENTLE VIBRATING PERCUSSION.

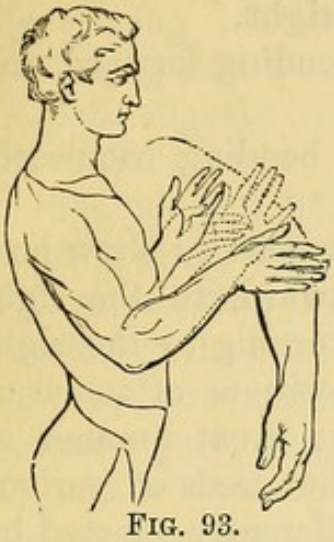


FIG. 93.

Fig. 93 shows the position of both hands being alternately raised and lowered when they touch the part to be acted upon. This movement is used along both sides of the spine, also transversely across the spine in its whole length. It relieves, at the end of the prescription, the fatigue caused by the previous exertion of the muscles of the back. (See Chopping, Roth's Handbook, page 221.)

CLAPPING AND TAPPING.

Fig. 94 shows the movement done by the surgeon on the back of the patient in *yard* position, and is used as relieving and soothing the patient. (See Hand-book, page 225.)

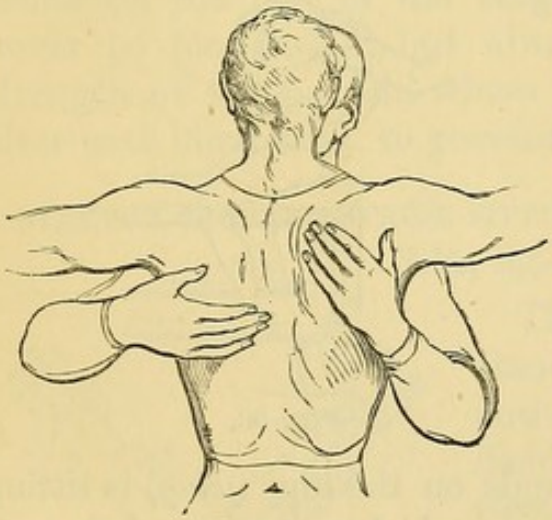


FIG. 94.

I have given these instances of movements used in the various concomitant symptoms of spinal curvatures, and shall mention now some movements acting specially on the spine —some in sitting, others in a kneeling and standing position; in the beginning the *sitting* position is used, later the kneeling and standing.

The elementary movements of the spine are illustrated in the *Appendix*, page 176. Fig. 22, bending of the trunk to the left.

Fig. 23, bending of the trunk forward (with arms stretched forward).

Fig. 25, bending of the trunk backwards (with right arm stretched up and left arm and hips firm).

Fig. 26, turning of the trunk to the right.

Fig. 27 is a combination of trunk bending forward, and trunk turning to the left.

Fig. 28 is a combination of trunk bending backward, and trunk turning to the left.

The two last combinations are instances to show how bending of the trunk forward, backward, to the right and left, can be combined with the turning to the right and left. Further, how the various positions of the arms in the same or different levels, and the great number of leg and knee positions, form many hundreds of various positions in which the spine will be differently affected by the various movements.*

CURATIVE MOVEMENTS ACTING ON THE SPINE.

WING HIGH-STRIDE SITTING, TRUNK-TWISTING, S.R. and P.R., figs. 95, 96.

FIG. 95.

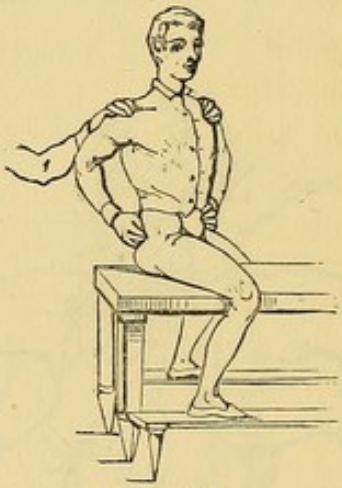


FIG. 96.

The patient with the hands on the hips (*wing*) is sitting with the feet apart (*stride*) on a *high* operating chair provided with two narrow boards on each side, on which the feet rest, and are prevented from slipping by a half circular

* Those who really are anxious to master the subject cannot do better than go through these various combinations, of which hundreds are described in the Hand-book, as I am obliged to restrict myself here to giving a few illustrations.

strap fixed on the boards. In this position the patient twists his body first to one side, while the surgeon resists by placing his hands on the patient's shoulders, and pushes against the shoulder which is moving backwards, he pulls slightly with his other hand the shoulder which is moving forwards.

Figs. 95 and 96 show more distinctly how the movement is done. The first represents the patient in *wing-high-stride-sitting position*, with the upper part of the body twisted to the left; the right hand of the surgeon, who is supposed to stand behind him, is placed on the upper and posterior part of the patient's right shoulder, against which he pushes, while the left hand of the surgeon is placed on the upper and anterior part of the patient's left shoulder, which he pulls or rather holds back, when the patient twists from the left to the right. In fig. 96 the right shoulder, which was previously directed forwards, is now directed backwards, because the body is twisted to the right. The *twisting* is done three times alternately to the right and left while the surgeon resists, and as often by the surgeon while the patient resists. The resistance either on the part of the surgeon or the patient, must never be too strong, but always in proportion to the strength of the patient, whom I advise to breathe deep after each movement, to prevent his being fatigued.

STRETCH CROOKED STRIDE SITTING, TRUNK BACK FLEXION, S.R., fig. 97.

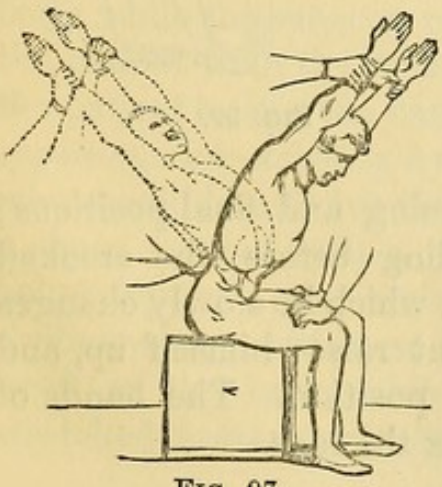


FIG. 97.

The surgeon and assistant stand one on each side of the patient, and resist with one hand placed on the outstretched arms during the flexion backward, and at the same time exert a pressure on the lumbar part of the spine with the other hands, which cross each other on this part. Another assistant fixes the knees.

Fig. 64 shows both commencing and final position of this movement, which takes place especially in the joint between the last lumbar vertebra and the sacrum, as the pressure of the gymnasts on the loins prevents any other action; the six hands of the three assistants indicate the places on which the pressure in the loins, the resistance at the wrist-joints, and the fixing of the knees are done. The surgeon can also alone press with one hand on the lumbar curve, and with the other on a short stick held transversely by both hands of the patient.

OPPOSITE CROOKED-HIGH KNEELING, TRUNK BACK FLEXION. S.R., WITH HIPS FORWARD PULLING, P.R. figs., 98, 99.

The patient kneels on a couch, the surgeon stands before him, on whose shoulders he places his arms; the surgeon holding him with both hands on the loins pulls his hips forwards, while the patient bends backwards.

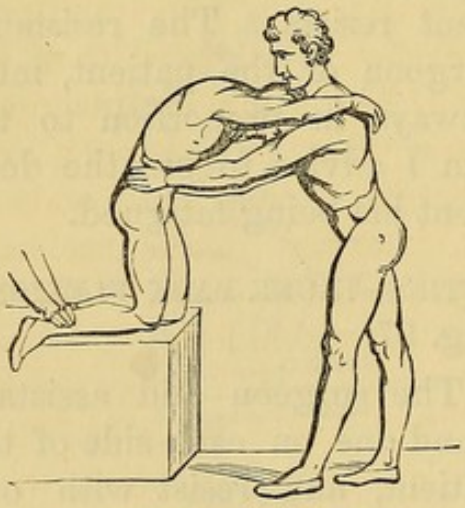


FIG. 98.

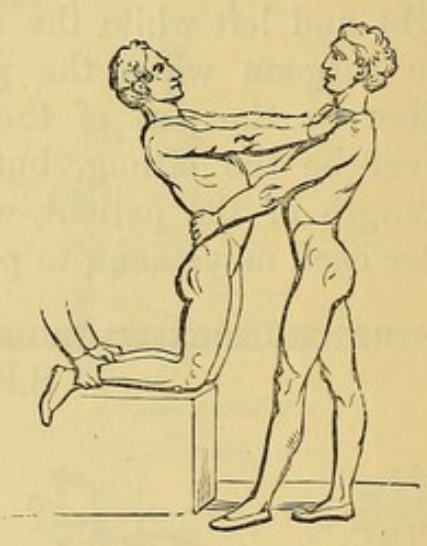


FIG. 99.

The figures show the commencing and final positions; in the first the surgeon, standing before the crooked patient, is in the inclined position, which he slowly changes into the reclined, while the patient raises himself up, and bends back, as shown in the final position. The hands of an assistant behind the patient fix the legs.

RACK-CROOKED-THIGH OPPOSITE, CLOSE STANDING TRUNK FLEXION BACKWARD, S.R., fig. 100.

Fig. 100 represents to the left the patient, who raises the body from the *crooked* position, upwards; to the left are seen only the two stretched arms, and the left leg of an assistant, with his hands on the patient's hips, and his left foot behind the patient's heels; the patient's hips and legs are thus fixed, and prevented from moving in any direction. The surgeon, seen on the right of the engraving, stands in a *right-pass* position before the patient, of whose stretched arms he takes hold above the wrist-joints, and resists while the patient (whose feet are closed, while his thighs are leaning against a transverse padded bar, and whose body is bent forwards) raises his body, and even bends it a little backwards, as shewn on the left of the engraving by the dotted lines. The name of this movement is due to "*Rack*," means, that the patient's arms are stretched forwards; "*crooked*," that the body is bent forwards; "*thigh-opposite*," that the thighs are leaning against some fixed object; "*close-standing*," that the feet are touching each other in their whole length; "*trunk-back flexion*" (*S.R.*), that the patient bends backward the body while the surgeon resists; but if the surgeon brings the patient from the reclined position again forward, while the patient resists, the name would be *rack-*, *reclining-*, *thigh-opposite-*, *close-standing*, *trunk-forwards-flexion* (*P.R.*) Those who would like to try this movement, can use the back of a chair, covered with a pillow to prevent the thighs from being injured; the assistant remains immovable in the commencing position, and the surgeon moves only in the bend of the back, while his feet remain fixed, and his stretched arms move as the body moves; the person

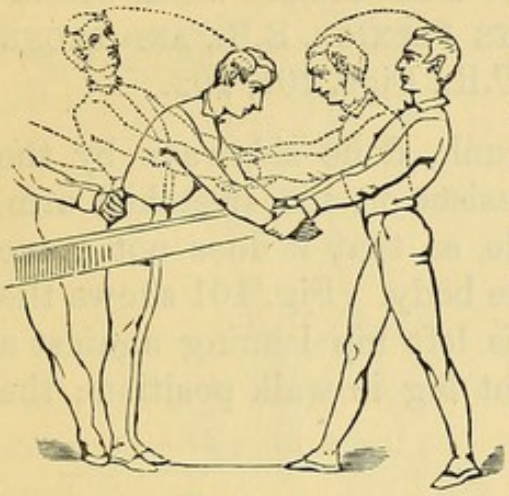


FIG. 100.

representing the patient must keep the arms and hands constantly stretched, the chest constantly arched. Persons trying this movement should change places, at one time acting as the surgeon, at another as patients.

LEFT (ARM) STRETCH-LEFT HIP LEAN-RIGHT WALK STANDING, TRUNK LEFT SIDEWAYS FLEXION, S.R., AND TRUNK FLEXION TO THE RIGHT, P.R., Figs. 101, 102.

This is a flexion of the trunk, done sideways by the patient, while the surgeon resists on the stretched arm, which is vertical and inflexible, so that it does not move except simultaneously with the body. Fig. 101 shows the patient's left arm stretched, his left hip leaning against a horizontal padded bar, his right leg in walk position; the

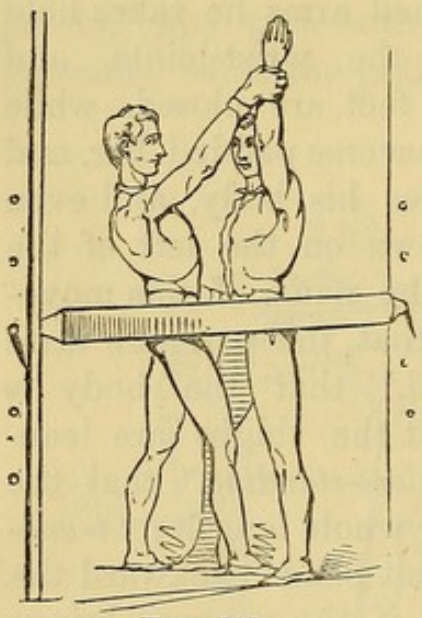


FIG. 101.

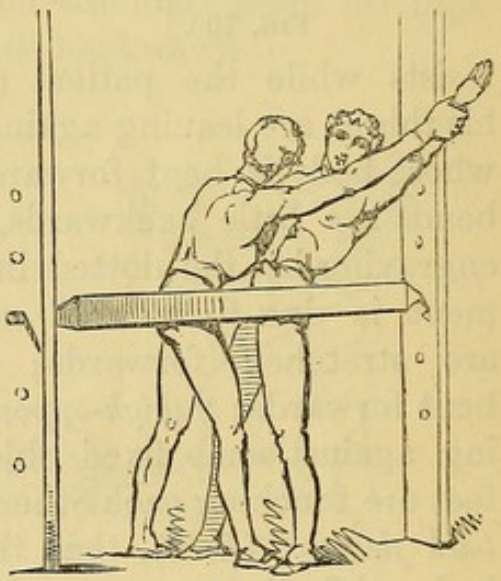


FIG. 102.

surgeon in front of the patient is in right-walk-position, his left hand on the patient's right hip fixes the body, while he takes hold with his right hand of the patient's stretched arm and resists as long as the patient bends his body to the left; from this position (fig. 101) he again raises the patient, who resists, into the commencing position. After a short interval the two movements are alternately repeated three to four times, and as often on the

other side. The operator as well as the patient move only in the spine, while their feet and legs remain immovable.

Yard close standing trunk twisting, S.R. and P.R., is seen in figs. 103 and 104. (See Hand-book, page 80.)

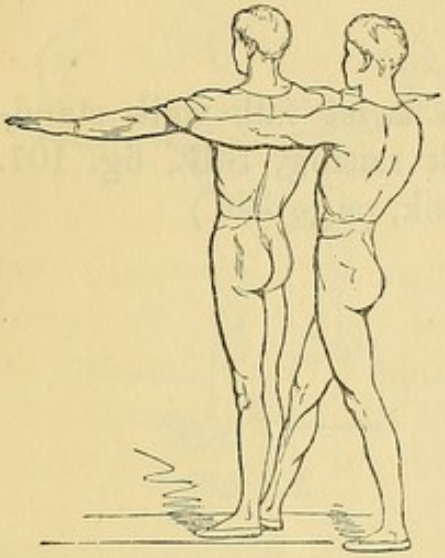


FIG. 103.

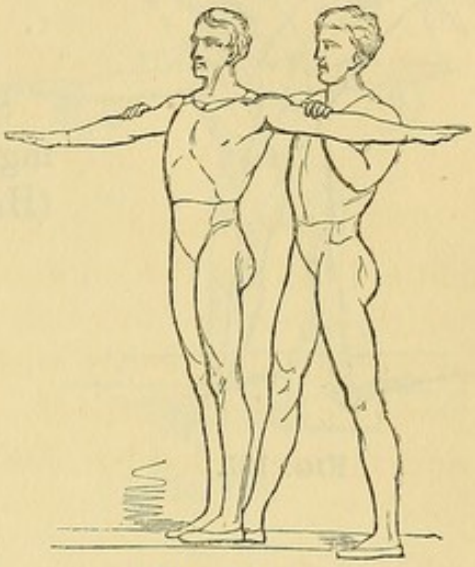


FIG. 104.

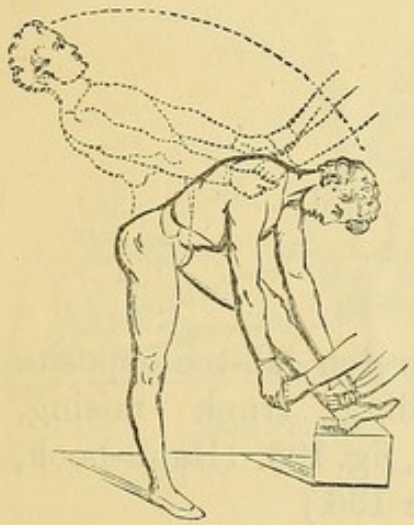


FIG. 105.

Crooked heel support standing, trunk back flexion, S.R., fig. 105. (See Hand-book, page 131.)

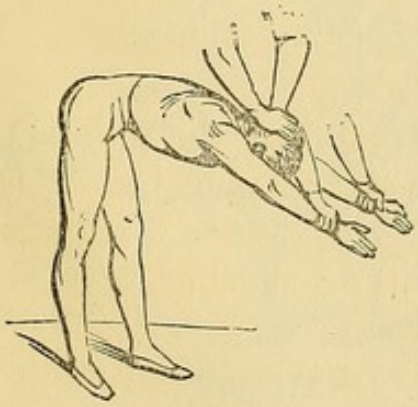


FIG. 106.

Stretch deep crooked stride standing trunk raising, S.R., fig. 106. (Hand-book, page 130.)

FIG. 107.

Stretch twist fall, walk standing, trunk raising, S.R., fig. 107. (Hand-book, page 136.)

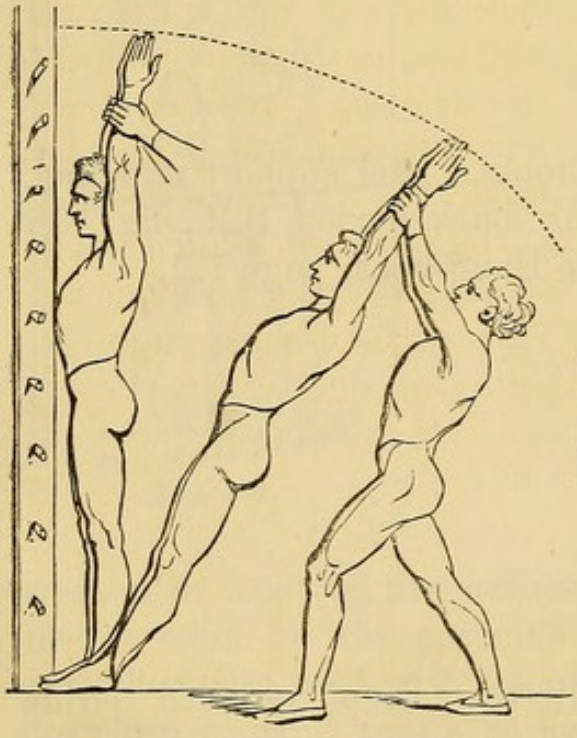


FIG. 108.

Stretch fall-toe opposite standing, trunk raising, P.R., fig. 108. (Hand-book, page 136.)

Yard crooked-left step standing, trunk raising and back flexion, S.R., figs. 109, 110. (Hand-book, page 132.)

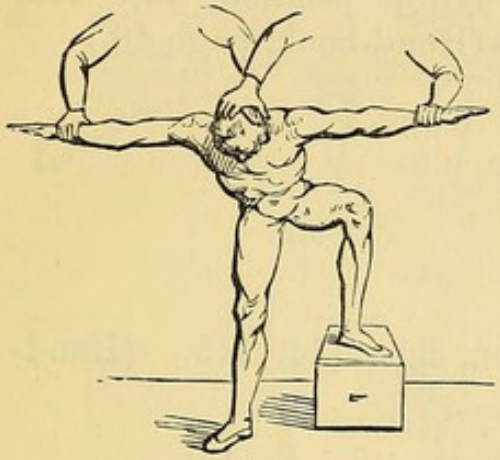


Fig. 109.

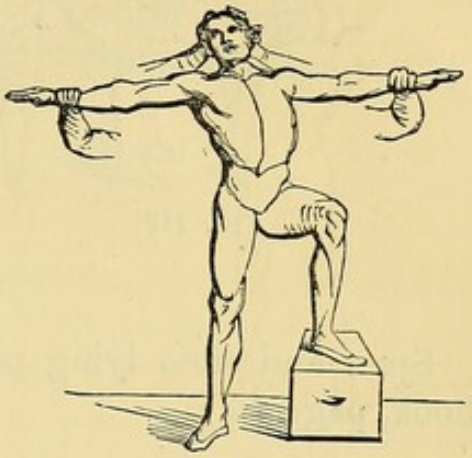


Fig. 110.

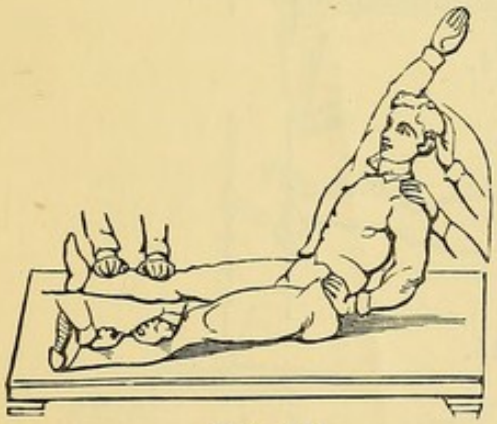


Fig. 111.

The movements acting specially on the spine can also be done in many different commencing positions, of which several are frequently used.

Right stretch-left wing-stride half lying position, fig. 111. (Hand-book, page 75.)

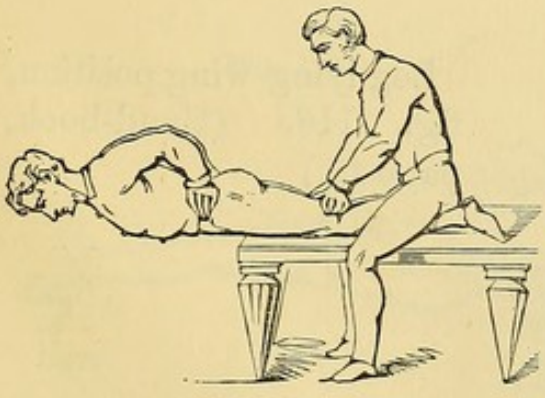


Fig. 112.

Wing-leg forward lying position, fig. 112. (Hand-book, page 45.)

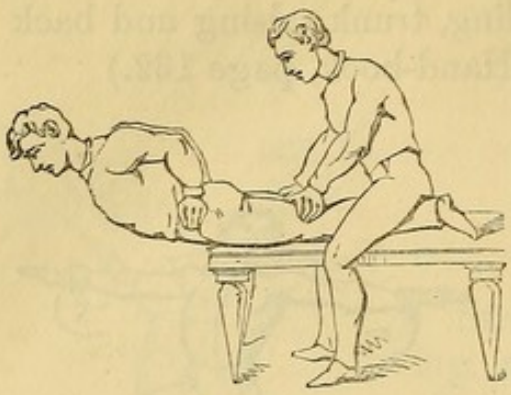


FIG. 113.

Reclined leg forward lying position, fig. 113. (Hand-book, page 46.)

Span and stem lying position, figs. 114, 115. (Hand-book, page 46.)

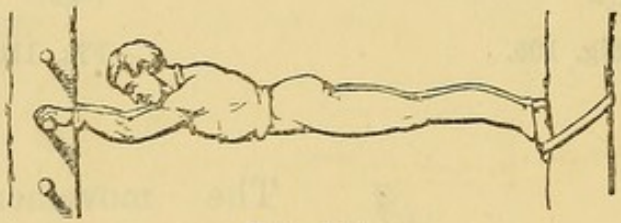


FIG. 114.

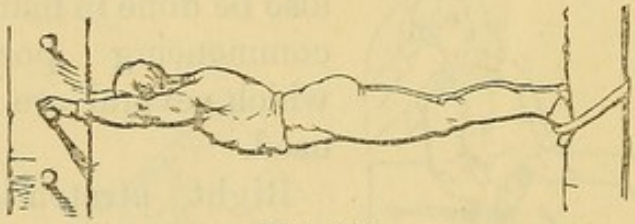


FIG. 115.

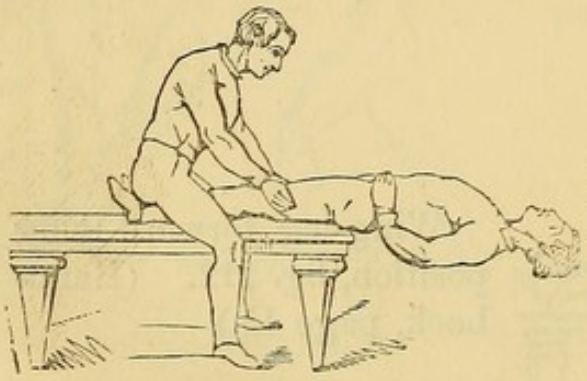


FIG. 116.

Leg lying-wing position, fig. 116. (Hand-book, page 43.)

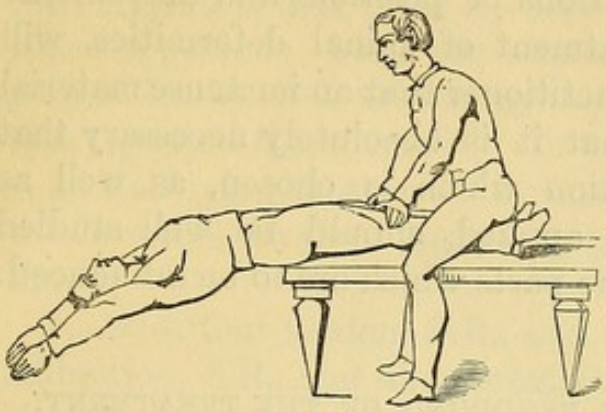


FIG. 117.

Stretch fall-leg lying position, fig. 117. (Hand-book,page 43.)

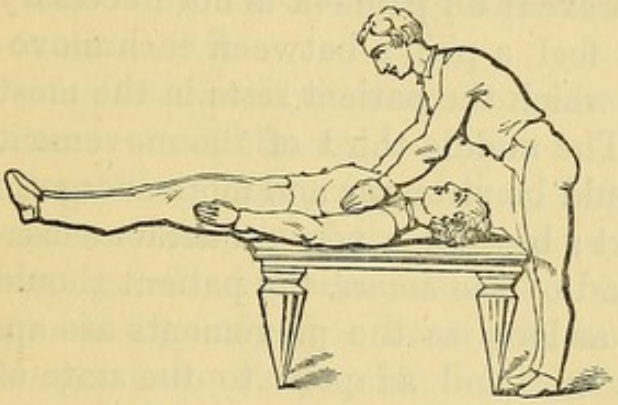


FIG. 118.

Trunk lying position fig. 118. (Hand-book, page 43.)

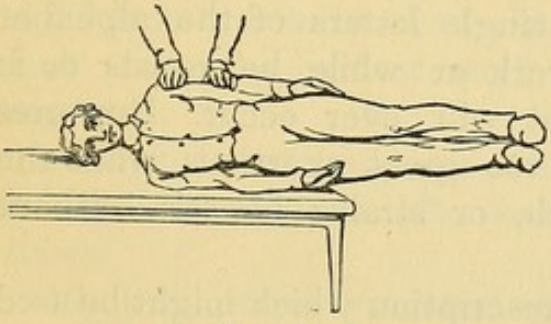


FIG. 119.

Trunk sideways lying position, fig. 119. (Hand-book, page 44.)

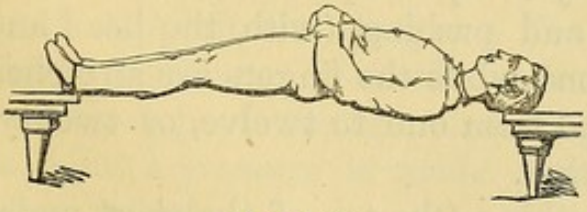


FIG 120.

Head and heels support, lying position, fig. 120. (Hand-book, page 42.)

The preceding illustrations of positions and movements used in the curative treatment of spinal deformities, will easily convince every practitioner that an immense material is at his disposal, and that it is absolutely necessary that every commencing position which is chosen, as well as every movement to be applied, should be well studied regarding its effect on the parts which are to be influenced.

A FEW HINTS FOR THE BEGINNING OF THE TREATMENT.

In preparing a prescription gentle movements should be first selected, according to the state of health and power of the patient; prevent all pain—it is not necessary the patient should ever feel a pain; between each movement is a pause during which the patient rests in the most comfortable position. The middle third of the movement prescribed may and should be stronger and more energetic than the first or last part; beyond a very moderate sensation of fatigue at the end of the *seancé*, the patient should not feel any uneasiness as long as the movements are applied with the necessary care and adapted to the state of health; the *weakest* patient will be able to undergo the treatment. Accustom the patient from the beginning to breathe deep between each movement; let him count loud or let him say the single letters of the alphabet *while* he is doing *active* work or while he resists or is resisted; thus no accident will ever occur. Ruptures might be brought on by too great exertions while the patient restrains his breath, or strains himself without speaking.

The following is a first prescription which might be used in the usual lateral curvature, in which the spine will be straightened by stretching the *right arm up* and the left out, while the feet are in *feet: open!* position:—

1. Lying, stretching, and pushing (with the head and heels in opposite directions while the fingers are stretched down) with counting loud from one to twelve, or twenty-four; three times repeating.

2. *Idem*, with *deep* breathing (the top of the chest under

the clavicles is first filled by deep breathing), this is three times repeated; when the lateral expansion of the lower part of the chest is proved by a deep respiration, which is also repeated three times.

3. Half lying foot rotation inwards, first passive, afterwards active, twelve, eighteen, twenty-four or thirty-six times.

4. *Idem*, foot flexion, S.R., and extension, P.R., also foot adduction, S.R., and abduction, P.R., each repeated three, six, or nine times.

5. Stretch lying arm flexion, S.R., and extension, P.R. (four to eight times).

6. Wing half lying leg separation, S.R., and closing (adduction) P.R.

7. Rack half lying arm extension, S.R. and flexion, P.R. (three to six times).

8. Wing high stride sitting, trunk turning alternately—with assistance; if the patient is very weak, an assistant sitting behind places his hands under the patient's armpits and gently tips the whole body upwards, while the surgeon standing on the left of the patient, raises the head and placing his right hand on the occiput of the patient; the latter in this commencing position, is encouraged to try to turn in the lumbar part of his spine either to the right or left, or to bend to either side. The surgeon soon feels where the hardest work is going on. Three times repeated.

9. Lying stretching *head turning* alternately to right and left in four motions, also *head side flexions*, three to six times.

10. Left *oblique* lying arm stretching up, out, down; also double arm rotation, each four to six times.

11. Trunk and thigh lying leg extension, S.R., and flexion P.R.

12. Opposite kneeling (on the couch) back longitudinal *stroking*, both hands of the assistant placed on both sides and the top of the spine, a longitudinal stroke (with or without a pressure is made only downwards for two to three minutes.

Sometimes the patient feels very tired; then an additional friction downwards only from the head to the shoulders, down both arms, is made six to twelve times.

After a fortnight or a week of daily treatment.

SECOND PRESCRIPTION.

1. Consists of one and two of the first prescription.

2. Consists of three and four of the first.

3. Right stretch left yard left oblique lying, right arm pushes constantly upwards, S.R., while the left arm pulls down, bends in the elbow, and pulls the surgeon's arm gently down; after this the surgeon, while still continuing to push the patient's right arm, pulls the left up while the patient gently resists; both movements are alternately done three or four times.

4. Trunk and thigh lying leg extension, S.R., and flexion P.R.; also leg separation, S.R., and closing P.R.

5. Right rest and left wing, high stride sitting.

a. Trunk turning alternately to both sides, P.R., and

b. The same, S.R.

c. Trunk bending to the *left*, and repeat *a* and *b* each three to four times.

6. Speak lying—both arms are stretched down and the fingers about a foot away from the sides of the body.

a. Head turning.

b. Head side flexion.

c. Arm extension, out, up, down.

7. Rack half lying arm extension, S.R., and flexion, P.R.

8. Stretch right high grasp toe opposite standing (both stretched arms grasp the pegs of a ladder, the right grasps a little higher to cause a stretch over the right hip and under the right armpit) hip back pushing, and twisting alternately, S.R. and P.R.

The patient pushes the hips gently back and turns, at first S.R., later P.R., while the surgeon tries to turn the hips alternately.

9. Lying leg rotation, up, out, and down, first W.A.

(with assistance), later *active*, six to twelve. The legs are kept perfectly stretched in the knee.

10. Climbing forward right (arm) higher, one to nine. The patient makes *nine* movements. 1. begins with the right hand grasping a peg. 2. The left hand the same. 3. The left foot is raised to, and placed on, one of the lower pegs. 4. The right foot above the same. 5. The hips are pushed back, while the right arm and both legs are well stretched. 6. Both knees are bent and kept astride. 7. The legs are again stretched, while the hips are pushed back. 8. The hips approach, while both arms are bent at the elbow. 9. The patient slowly takes a deep breath; these nine movements are repeated three times by the patient climbing on three pegs.

11. Left oblique lying with two arm rotations, of which the large circles are formed by raising the arms from both sides of the body, pass each forward, upward, and outwards; this is repeated three to six times. The small circles are done while the arms in yard position (horizontally outwards) are moved in a circle forming the basis of a cone, the apex of which is in the shoulder joint.

12. Chopping and stroking the back while the patient is kneeling opposite to the raised part of the couch.

THIRD PRESCRIPTION.

1. Speak half-lying, head flexion forwards, P.R., and backwards, S.R.

2. *Idem*, arms forwards, pulling, P.R., and backwards stretching, S.R.

3. Stretch, stride, left oblique sitting, arm flexion, S.R., and extension, P.R. (The surgeon stands behind the patient.)

4. Right stretch-left yard-left oblique-high stride sitting, trunk right twisting, S.R., and forwards twisting, S.R.

5. *Idem*, trunk forwards flexion, P.R., and back flexion, S.R.

6. Rack (right arm higher) thigh opposite-crooked-stride standing, trunk raising and back flexion, S.R., forwards flexion, P.R.

7. Rest (right higher) reclined-long sitting, trunk back flexion, S.R., and forwards flexion, P.R.

8. Right stretch-left wing-left hip lean-right walk standing, trunk left flexion, S.R., and right flexion, P.R.

9. Wing leg-forwards lying, trunk raising, S.R., and trunk flexion downwards, P.R.

10. Stretch-deep crooked-right heel support-walk standing, trunk raising and backwards flexion, S.R., and forwards pulling, P.R.

11. Walking backwards on a pole with arm movements in different levels; a pole of 15 to 18 feet in length egg-shaped transversley is used for this purpose with the broader surface upwards; the patient tries to keep up his balance while his feet are placed in an angle of 45 degrees to the pole, he places his full weight on the hind leg which is counted as *one.* In the second motion this leg is moved side-ways, and in the third it is placed on the pole when the weight of the body is distributed on both legs, and the surgeon or his assistant gently places the hands on the patient's hips to assist him in preserving his balance.

12. Rack grasp-opposite stride standing, back longitudinal stroking and percussion.

The preceding three prescriptions suffice for the purpose of giving an instance of the arrangement of movements required during the progress of the treatment. I will add a prescription of some movements used in the final treatment and practised by the patient alone.

1. Speak right-walk standing (with well stretched arms and knees) head turning, and head side flexion.

2. *Idem,* large arm rotation, also three forearm movements.

3. Right stretch, left yard, right walk standing, trunk left flexion and alternate turning to the right and left.

4. Stretch, left oblique, stride sitting, trunk flexion forwards and backwards, also, trunk turning.

5. Hand support, forwards lying, trunk raising, three to four times, afterwards trunk raising and arm extension out, up, and down.

6. *Idem,* leg raising alternately from the hip, and leg rotation from the hip outwards.

7. Yard, left pass standing, trunk forwards and backwards flexion, also trunk turning alternately right and left.

8. *Idem*, trunk back flexion, with large arm rotation.

9. Walking in time with arm movements, (*a*) right arm up, left arm out, (*b*) right up, left back, (*c*) right out, left back, (*d*) both arms up and (*e*) both arms out.

10. Yard long sitting, slowly lying down and raising again.

Every practitioner will choose in the final treatment, movements suitable for improving and strengthening the parts which have been weak.

Minute descriptions of all these active exercises will be found in the little book, *Ling's Free Exercises*, published by Balliére. In the appendix will be found—1st. The reprint of a part of a short paper on the "Use and Influence of the Will in the Treatment of Spinal Deformities," to which reference has been made in the leading points. 2nd. A reprint of a paper on angular curvature. 3rd. The drawings of my collection of high relief figures of Ling's Free Exercises, the study of which is specially recommended to all those who wish to apply the Kinesi-therapeutic treatment in any form of disease or deformity.

APPENDIX I.

ON THE INFLUENCE AND USE OF THE WILL IN THE TREATMENT OF MANY SPINAL DEFORMITIES.

"Oh well for him whose will is strong,
He suffers, but he will not suffer long."—TENNYSON.

THE majority of patients suffering from the various forms of spinal curvatures are not aware of their abnormal position; they feel straight while in a crooked position, and while the spine is curved; the spinal curvature is usually accompanied by a compensating abnormal position of the head. It is well-known that, when the body is slightly bent to the right, the head is bent to the left; when the compensating position of the head is not sufficient to counteract the flexion of the trunk to the opposite side, the patient instinctively twists to one or the other side, to keep up, as far as possible, a *vertical* position; in the lumbar anterior curvature the head is usually bent forward and turned to one or the other side; this depends upon the combination of the anterior curve of the spine with a slight lateral one; in the posterior curve of the spine with a slight lateral one; in the posterior curve there is a more or less constant endeavour to hold the head slightly bent backwards.

I could easily name a larger number of abnormal positions of the head caused by various combinations of lateral with anterior and posterior spinal curves, in which patients still believe themselves straight.

As it is the aim of every medical treatment really to straighten the spine, the medical man places his patients in the normal position; but as the patients feel crooked or twisted the moment they are placed in a normal position, they immediately return into the wrong one; to prevent this falling back from the normal into the abnormal position, all kinds of braces, spinal supports, corsets, orthopragms, stays and machines (with and without vertical steel crutches resting on a horizontal band fixed on and

round the hips, or with the addition of steel plates pressing on the projecting parts,) have been invented and unhappily are still used, notwithstanding all the writings and the opposition of those specialists who not only believe, but are convinced, that without removal of the cause no real cure can be permanently effected.

At present I intend to speak only of those forms of spinal curvatures where the patient himself can straighten the spine by his own will, or where he can do the same by placing the arms in different positions, or by placing the the body as well as the arms in certain positions; and finally of those cases where the spine cannot be straightened by the patient alone, but must be assisted by a second person.

The majority of the patients being unconscious of their abnormal position, the *first object* to be obtained is to change the false mental impression they have in believing themselves straight when they are crooked, and feeling crooked when placed in a normal position. The second object is to enable the patients to *retain* the normal position, which at first causes the sensation of being crooked.

While the patient is reclining in a comfortable chair which with its broad seat supports the full length of the thighs, and with its suitably curved back the spine of the patient, a looking-glass with a handle is placed before the patient to enable him to watch his own position. It happens that many patients cannot and do not observe that the head is either turned or bent to one side, or that it is both turned and bent; that one shoulder is higher or projecting forward more than the other; that the trunk is more inclined to one side than to the other. If the same patient is placed in a standing position before a full-length looking-glass, it also frequently happens that he cannot see the difference of form in the outlines of his head, neck, shoulders, trunk, and knees.

Where such a deficiency of sight and observing-faculty exists, that the patient can neither feel his abnormal position nor see it in the looking-glass, he must be shown *how* and to which side the head inclines or turns, or inclines *and* turns; the different height of both sides of the neck,

and of both shoulders, the difference of the outlines from the head down to the shoulders, the abnormal direction of the median line from the middle of the front along the face, neck, chest, abdomen, the stride of the legs and feet must be pointed out; every visible irregularity of the outlines of the two sides of the body must be minutely pointed out till the patient begins to see and to admit the differences actually existing. The quickness of perception, the gift of observation and judgment, being so very different in various individuals, both young and adult, a shorter or longer period of time will be required till the eye recognizes all these differences.

As soon as the patient has acquired the faculty of seeing his abnormal position, he must be instructed to feel the wrong and good position; these last being always accompanied by the sensation of being uncomfortable and crooked, he is recommended to place himself with closed eyes before the looking-glass; when asked to place himself in the right position, he usually chooses the wrong one, because he feels straight only in the abnormal position; after his repeated assertion of being straight, he is told to open his eyes, and is quite astonished to see how crooked he is, and how the various parts are far from the normal line. While his eyes are open he is asked to place himself in the best positions in order to make the lateral outlines of the body as equal as his powers of observation and the character and the stage and gravity of his curvature will permit; while the medical man points out where he is still deficient, he at the same time assists the patient by supporting him with one or both hands. In cases where the curvature cannot be straightened in this simple manner by the effort of the patient's will, and the assistance of the medical man, all those positions of the arms must be chosen which contribute to the straightening of the spine.

As I wish to restrict myself to the influence of the will, I will only give an example how the position of the arms is used for the purpose of *lengthening*, which is here identical with straightening of the spine.

A patient begins to incline his body to the right because

the muscles of the lumbar part of the spine are weak or irregular in their action; he is told to stretch himself while the medical man touches the part which is to be stretched; the patient's usual answer is, "*I cannot*," or "*it is not comfortable*," and he refuses even *to try* to stretch, because it is fatiguing. Now is the moment when the medical man encourages the patient by his words to make an effort; thus the patient's *will* is roused for a few seconds, and muscles which probably for some time have been inactive receive the stimulus of the will and contract for a short time more than usually, and probably more than they have done for some time. If the patient is really very weak, the medical man standing behind him will, at the moment the patient is trying, either assist in lifting the body, or in gently replacing it to the left; if the patient is strong enough, he will, while touched by the medical man, straighten himself without any assistance; if the inclination of the body is so great as not to yield to the patient's endeavour and will of stretching the lumbar part, it is necessary to raise the right arm into a lateral horizontal position. This changes the leverage; the muscles on the left side of the spine are brought into action, and thus assist in straightening the spine momentarily, while the patient tries to stretch; as the usual motions frequently cause a considerable inclination of the lumbar part of the spine, the lateral horizontal position of the right arm is not sufficient for straightening the spine, therefore the left arm is stretched out and up in a position intermediate between the vertical and lateral horizontal, the action of the different positions of the two arms will thus assist and enable the patient while using the effort of his will in straightening the lumbar part of the spine. In more complicated curves, other combined actions of the arms and trunk are used for producing a similar result, but without an additional effort of the will the various positions are and remain useless; it is the physiological and increased will-influence acting as an extra stimulus on the contraction of the muscles which is indispensable for the purpose of straightening the curved spine. Those who have entered fully into my ideas will understand why it is

so important to study on the naked body in each individual case of curable curvature, which positions of the trunk and arms are required to straighten the spine; all those which *lengthen* most the spine will be the leading positions in the beginning of the treatment.

I need not add that weak patients must be taught to see and feel the normal position while standing, sitting or lying.

If the will is directed to the special muscles which are to be strengthened, their nutrition, power of contraction, and volume increase, and the change of tissue is accelerated not only in the muscles, but in all surrounding parts. As the will cannot be constantly and uninterruptedly employed for the purpese of producing a more energetic action, it is desirable in the beginning of the treatment to practice the use of the will for a short time; the period of practice is increased by degrees, and the periods of rest diminished; the power of will, as well as its influence, can be considerably increased by the resistance of the medical man being opposed in a scientific manner to a special group of muscles or to single muscles, or by the patient resisting the medical man who does the gradual extension of voluntarily contracted muscles.

The final aim of the use of the will-influence is to change the intentional movements into habitual and automatic ones, that is, without the least consciousness or will-influence, and thus to permanently obtain that result which in the beginning was secured only for seconds or minutes by an increased energy of the will.

I had for many years acted on the principle of raising the will-energy for the purpose of curing certain forms of paralysis, and long ago published, in my monograph on *Paralysis in Infancy, Childhood, and Youth*, my mode of inducing the patient to use the will. I believe a great part of my success in the treatment of spinal deformities is due to the use of the will as a substitute for all the so-called spinal machines, supports, apparatus, steel corsets, &c.

I heard that a Norwegian physician, Dr. Kjoelstad

had fifty years ago begun to treat spinal curvatures by the so called *self-straightening* method—a method in which the will of the patient had to counteract bad positions of the body. My endeavours to get some *detailed* information had been for many years in vain, when about six years ago I received a Norwegian pamphlet—*Om Distriktslaege Kjoelstads Selvretenings orthopaeds tilligemed en Berelining omdens Udoevelse of A. Tidemann. Christiania Tryckt hos. Chr. Schibsted,* 1876—which is a description of the *self-straightening* orthopædics of Dr. Kjoelstad, in which the patient himself has to perform the principle part, by Dr. Tiedemann, of Christiania. With the help of a teacher of Norwegian, and of a Norwegian dictionary, I finally obtained some idea of the details of the treatment which I had wished to know for years. Being anxious to see and to learn how this method is applied in practice, I made a special journey to Christiania, where I was very kindly received by Dr. Tiedemann, who fully answered all my scientific inquiries. He is the only medical man who at that time still pursued Kjoelstad's treatment in his own house, where the patients are received as boarders. It is therefore my duty as well as my pleasure to thank Dr. Tiedemann publicly for all the information he has given me, as well as for his readiness to supply me with some mechanical contrivances which are used as accessories in the treatment. I think the best mode of expressing my gratitude is to publish the following notes which I partly dotted down in Christiania, partly extracted from the pamphlet I have named, and from a second pamphlet in French, which Dr. Tiedemann gave me—"*De la methode orthopedique de Monsieur le Docteur Kjoelstad ;* redressement par soi-même, ou le malade joue le plus grand rôle, par A. Tiedemann, Docteur a Christiania."

Dr. Kjoelstad, the son of a Norwegian peasant, was for several years schoolmaster in his own parish before he studied medicine. He afterwards held several Government employments. In 1830 one of his relatives, a young girl, was staying in his house, and began to be scoliotic; wishing to prevent the further development of this

deformity, he was struck with the idea that such patients could do much for themselves, and could counteract their infirmity by trying to diminish, by an effort of the will, the disproportions of their form ; he believed that many scolioses are caused by fatigue and relaxation of the muscles, by inattention to the normal position, by want of will-energy in retaining the normal form ; he thought that the return into the normal form might be accomplished by the patient if the energy of the will, the judgment, and other mental qualities could be brought to bear and to act on the body. He advised his scoliotic cousin to imagine as distinctly as possible two straight lines being drawn in front of her, one of which was vertical and of the length of her body, while the other was horizontally crossing the vertical at a right angle and at the height of her shoulders ; she was directed to place the body in the direction of the vertical line of the imaginary cross, while the arms had to be placed in the direction of the imaginary horizontal line. This was the beginning of Kjoelstad's treatment.

I much regret that I am not able to enter here into the history of this treatment, and into the philosophical reflections which preceded before Kjoelstad imagined fixed lines for the standing and lying positions, in which the patients had to exert the utmost powers of their will and body in order to remain for a few minutes, as far as it was possible, in the prescribed and imagined normal position ; it took years before he perfected his original idea by inducing his patients to imagine certain points through which they had to move their arms and legs.

We must also remember that fifty years ago the treatment of spinal curvatures consisted in *mechanically stretching the patients in a horizontal position*, assisted by means of pressure applied in various ways ; that the patients were obliged to remain for years in a lying position, that nobody thought of the scientific application of special movements in each individual case of spinal curvature, that Ling's system was not known to Kjoelstad. Tiedemann says : "The idea of this self-straightening method is quite characteristic of Kjoelstad. He did not build a new doc-

trine on old foundations, or give a new form to an old branch of science. His idea was quite new, and, as far as it is known, not suggested by anybody else. In trying to explain what is the real meaning of the idea, that people can have a correcting influence on the proportions of the form of their body through the efforts of the mind, we must fall back on the general experience that every thought, sensation, and act of the mind has its corresponding expression and outward bodily appearance in the human form. It cannot be denied that not only the face —which usually shows the external expression of the condition and activity of mind and soul—but the whole body participates through its forms, positions, and movement in the external expression of the mental conviction."

"If we look at a faint-hearted and despondent person depressed by sorrow and grief, we find that not only the features of the face but the whole tenure of the body express the state of mind." "Bowed by sorrow, depressed by grief," is not a mere mode of speech, but is a figurative expression really taken from the form of the body in a similar state. It is a fact that the body sinks together, and is in reality bent or bowed down in a higher or lower degree because the sufferings of the mind deprive the muscular system of its elasticity."

"In observing a contrary state of mind, in which happiness, hope, self-reliance, and courage prevail, a corresponding expression is shown by the whole person, by the face, attitude, and all the movements. Weakness and indolence, want of energy, are shown by a special bodily expression, just as firmness and an energetic will cause their corresponding bodily expression."

"The fact that we cannot always and quite easily understand which state of mind and soul is expressed by the outward appearance is explained partly by our incapability of observing the less marked attitudes and movements of the body, partly by our ignorance of finding out the internal mental conditions through the bodily appearance; another cause of our inability of judging of the condition of the mind is that people intentionally hide their state of

mind, and prevent both their face and body from showing those features, forms, positions, and movements which would take place in consequence of the mental state being reflected in the body."

The innate mutual influence of mind and body is the cause that the body has the aptitude and power of receiving from the mind and soul impressions expressed by special attitudes and movements of the body, and that the will, used in a manner suitable for the purpose, gives the body another expression, and an attitude different from the usual, in which no endeavour is made for changing the appearance of the body.

Kjoelstad had the merit of making use of the power of the mind, in order to act with full intention on the body, and thus to enable the patient to keep as much as possible the normal position and to correct the abnormal form, even after the mind has ceased to influence the body intentionally. For years he tried to improve his method, as he was most anxious to remove the pernicious effects of the mechanical stretching system, which was still the most prevalent during his time. In 1844 he resigned his medical appointment, and devoted himself until his death in 1860, entirely to the practical development of his treatment. Kjoelstad was very energetic, and had many talents; although much given to philosophical researches, he was not clear in the exposition of his ideas, and has been frequently misunderstood.

In 1856, at the meeting of the Association of Scandinavian Physicians and Naturalists, Kjoelstad read a paper on his method, which was published in the transactions of the same year. He is also the author of several pamphlets published under the name of "Orthopædic Ephemerides," in which the details of the self-straightening method are described. I am sorry that I have not had an opportunity of reading these publications; but I have given an account of all the papers on Kjoelstad's method for the benefit of my colleagues and their patients, because the practical method of using the brain or will-power for the cure of many complaints is still in its infancy, and not yet sufficiently appreciated.

After these long introductory remarks I will finish with a few notes on the treatment as I have seen it carried out by Dr. Tiedemann, who was for three years Kjoelstad's assistant, and after his death established an institution, which, at the recommendation of the medical faculty of Christiania, has been subsidised by the Norwegian Storthing (Parliament). Hitherto I have only named that part of the treatment which I consider the most important—and have to add that various mechanical contrivances are used as accessory means for carrying out the principal idea, namely, of using to the fullest extent, and with very great exertion, the will-power of the patient, who is induced most strenuously to stretch the whole body, from the head down to the heels. This self-stretching action is considerably assisted by various mechanical means.

Although I am in favour of the most important part of the treatment, namely, where the patient's own powers are brought into action for the purpose of improving his figure by stretching all the parts which are under the control of the will, I cannot well recommend during *eight hours every day*, the various stretching operations, which are very, fatiguing both to patients and the medical men.

At any rate it is desirable that Kjoelstad's self-straighting method should be well known to all surgeons, that they should know the *injurious* effects of the usual orthopædic appliances, which *never* can cure spinal curvature; that they should not consider the human body as a mere mechanical body, which can be shaped by steel pieces, bands, or supports, which under the names of spinal supports, spinal machines, spinal repressors, spinal orthopragms, are advertised by orthopædic instrument makers. If a medical man in exceptional cases requires a support, he should know how it is to be constructed, and not send patients to an orthopædic instrument maker without giving precise instructions what kind of support he wishes to be made for the patient. Physiological action should be used for the purpose of counteracting the pathological changes, and the idea of treating the majority of spinal curvatures by so-called orthopædic instruments must be given up, and sub-

stituted, whenever and wherever it is possible, by improving the energy of the will, and thus straightening as far as possible the spine. The time will and must come for the reform of the still prevailing and most injurious treatment by spinal machines, even when called "orthopragms," which prevent the free action of the human body, interfere with the nutrition of precisely those parts which should be used, and do good merely where absolute rest is required, which is better and more easily obtained by a suitable plaster jacket; lately also the application of this jacket has been abused because it has been applied in many spinal deformities curable by suitable medical movements, both passive and active, specially adapted and chosen according to each individual case.

APPENDIX II.

NOTES ON SAYRE'S TREATMENT OF ANGULAR CURVATURE OR POTT'S DISEASE.*

A FEW days ago I received from a colleague the following lines: "As so much is being written and said about Dr. Sayre's treatment for curing spinal deformities, would you give me an explanation of what it is. For myself, I know little or nothing about it, save that one seems to begin with hanging a man, and then bandaging him." These lines must be my apology for complying with my friend's wishes, and for publishing the following notes, written in haste, and while more than usually engaged with my professional duties.

1. The idea of stretching a curved spine for the purpose of curing it is very old. The well-known French surgeon, Petit, two centuries ago, employed for this purpose *horizontal extension;* a copy of the engraving representing this mode of extension of the body, viz., by two strong men pulling the body in opposite directions, is to be found in many treatises advocating the merely mechanical treatment of spinal curvatures.

2. Dr. Glisson, an English physician, the author of the book *De Rachitide* (the 2nd edition published in London in 1660) applied the gallows for the extension of the spine in an upright position. On page 368 he gives an illustration and description of his apparatus, which is still extensively used in Germany, under the name of *Glissonische Schwebe*, or Glisson's swing. Mr. Bernard Roth, in a letter to the *British Medical Journal*, of February 9th, 1878, page 215, and *Lancet*, of February 2nd, 1878, page 187, mentions that he saw, in 1877, this apparatus, which is *identical* with Sayre's gallows, used by Dr. Kloptsch, Professor of Surgery at the University of Breslau, and by Dr. Schildbach, of the Orthopædic Institution at Leipzig,

* First published in 1878.

and in several Orthopædic Institutions on the Continent, where it has been used for many years. The patient's head is fastened in a kind of gallows, exactly like that of Sayre, fixed in a strong horizontal beam, supported at its middle on a vertical mast fixed in the ground, the patient being raised by shortening and pulling the cord attached to the apparatus, until the big toe can just touch the ground; he is then told to walk round on tip toe as the horizontal beam is turning on the vertical mast, which serves as a pivot. According to the number of horizontal beams, four, six, or eight patients can be seen walking simultaneously on tip toes, while their spines are extended by the weight of the body. Complete suspension in the air from the head and arm-pits is also frequently employed.*

3. Baron Seutin, a well-known surgeon at Brussels, was the first who applied the starch bandage *(le bandage amidonne)*, about forty years ago, for the purpose of making fractured limbs *immovable*, and thus enabling the patient to move about as soon as the starch bandage was completely dry; later, plaster of Paris was substituted for the starch by Seutin, and last year I saw in Hungary a kind of cream cheese used for the same purpose, and was told that it answered as well as the plaster of Paris, with the advantage of being much lighter.

4. Several professional men, myself among the number, have found it necessary to support patients suffering from paralytic spinal curvatures, and from Pott's disease, when the spine was stretched; for this purpose casts have been taken during the stretching, and steel supports made fitting the casts.

About twenty-four years ago I ordered a kind of leather

* A detailed description, with drawings of Glisson's swing, and its mode of application, can be seen in several German orthopædic works; those interested in the subject will find in *Die Orthopædie*, by Dr. Hirsch, published at Prague in 1845, pp. 137 and 150, figs. 15 and 22, on the 4th and 6th lithographic plates, a minute description of Glisson's swing, of the mode of fixing the patient's head, &c., while the illustrations show at a glance the application and use of the apparatus. In Prof. Delpech's atlas to his work on Orthopædics, is an engraving representing a woman sitting in a cart with her head suspended in a similar way.

box to be exactly moulded to the cast of a patient with curvature, combined with an antero-posterior one. The young lady, who was unable to support herself at all in an upright position, was first stretched by placing her hands on the shoulders of an assistant, standing in a stooping position opposite to her on a higher level; the assistant raised himself from the stooping position, till the patient was almost lifted from the ground; whilst in this position the cast of her back was taken. This leather box enabled her to walk more erectly, but, although the instrument maker tried his utmost to carry out my idea, and although the patient's spine was raised in the leather box—which being open in front was fastened with buckles—she could not without inconvenience remain in this leather support more than two hours at a time. A few years later Mr. Ernst made, under my instructions, a spinal support on a cast taken while the patient, a paraplegic young man, was lying with the upper part of his body across a broad table. his arms being stretched and fixed by an assistant, and his paraplegic legs hanging down; in this position the spine, previously very much curved, was considerably stretched. This support, which admitted of the perfectly free use of the arms, succeeded in so far that the patient was able to wear it constantly; it has not only prevented further increase of the curvature, but has, to some extent, improved his condition.

5. From the preceding notes the reader will observe that many practitioners have tried to improve patients suffering from Pott's disease, and paralytic curvatures, partly by stretching the spine, and partly by retaining the stretched condition by mechanical supports. The combination of such extension, with the maintenance of immoveability by the plaster of Paris jacket, is the basis of Sayre's treatment.

6. The so-called Sayre's treatment of Pott's disease, or angular curvature, consists in the combination of suspension of the body—by the apparatus first invented by the English physician, Dr. Glisson—and the application of Seutin's plaster of Paris bandage. The head and chin collar

and the axillary supports having been carefully adjusted, the patient is gradually drawn up until the feet just swing clear; previous to suspension the surface of the skin is protected by an elastic but closely fitting shirt or vest, without armlets, but with tabs to tie over the shoulder, and composed of some soft woven or knitted material. While the patient is suspended, bandages of loosely woven material, torn in strips three yards long and from two and a half to three inches wide, saturated with freshly ground plaster of Paris, are applied round the smallest part of the body and carried round and round the trunk downwards to the crest of the ilium and a little beyond it, and afterwards from below upwards in a spiral direction, until the entire trunk, from the pelvis to the axilla, has been encased. After one or two thicknesses of bandages have been placed round the body, narrow strips of roughened tin are placed, parallel to each other, on either side of the spine, with intervals of two or three inches, and in numbers sufficient to surround the body. Over these strips of tin another bandage is applied. The plaster sets in a very short time, and the patient is removed from the suspending apparatus and laid upon his face or back on a hair mattress or an air bed. Before the plaster sets completely the pads which have been previously placed under the vest, partly for the protection of the mammæ, partly for giving additional space on the lower part of the chest and the abdomen, are removed, while those parts which serve for the protection of projecting parts are allowed to remain. For further details I must refer the reader to Sayre's book, from which I have extracted my description.

7. In the report of a meeting of the Clinical Society, at which Mr. Berkley Hill read a paper on the use of Sayre's plaster of Paris jackets in spinal disease, several improvements are mentioned in the mode of applying the bandage, which—after the setting of the plaster—forms the tightly fitting and supporting jacket; of these one is a table contrived by Mr. Hill, swinging at its middle like a toilet looking-glass, to receive adult or heavy patients from the gallows without risk of bending the plaster before it had set.

As Mr. T. Smith mentioned that he used air pads with stop-cocks for the protection of the mammæ and of the abdomen, neither of the speakers at the Clinical Society—according to the published report—mentioned (or perhaps knew) the merits of the real inventor of the suspension treatment—the old English physician, Dr. Glisson, of 1660—while all spoke very favourably of their treatment of about sixty cases by suspension and the plaster jacket, I might be permitted to mention the case of a young man suffering from an advanced lateral curvature, who applied at my Institution while Dr. Sayre was in London; being absent from town my assistant examined him carefully, and told him his curvature could be neither improved nor cured, and that excepting an increase of power of breathing and the strengthening of some muscles nothing could be done for him. He, therefore, applied to Dr. Sayre, who advised his plaster jacket, which during the last eight months has been twice or three times renewed by a well-known surgeon. After this I have seen a letter from the patient, in which he mentions that he *has not received any benefit* from Sayre's treatment, and asks whether he should still continue with it.

8. To the credit of Dr. Sayre, it must be mentioned that he does not claim to be the first who applied Seutin's bandages in angular curvature, but only priority in bringing this method of treatment before the profession and into more general use; the following quotation is from Sayre's book on spinal disease: "Dr. Joseph Bryan, of Lexington, Kentucky, has used the plaster of Paris splint some time during the months of July or August, 1874, to the back, for Pott's disease of the spine; he has never published an account of his splint, and although Drs. Erskine Mason, Stephen Smith, W. B. Libney, and B. I. Haslan have seen the case, and were much pleased with it, they have not been sufficiently impressed with the importance of this treatment to adopt it in practice."

9. *The advantages* of the plaster-jacket treatment are that in *angular curvature, or rather in Pott's disease,* the patient is able to walk about without catching hold of his

knees, or of a chair or table, or whatever might be within his reach. Where a kind of paralysis is caused by the pressure of the angular state of the spine, it soon disappears, and the patient is able to walk erect; pain is immediately relieved, and does not return as long as the bandage is correctly adjusted; where indigestion or difficulty of breathing has resulted from the abnormal position of the spine, these symptoms cease.

Mr. Hill states that he finds, after six months' experience of this treatment, 1—that the pain is at once arrested; 2—that the patient is able to sit upright and walk about, so far as the spine is concerned; 3—control of the lower extremities when lost or diminished, is rapidly improved or restored; 4—abscesses steadily closed; 5—the spinal column lost most of its abnormal curve, and consolidated in the improved position; 6—in lateral curvature a permanent increase of stature was often obtained; 7—finally the cure was more rapid and less irksome than by any other method. Further and very important advantages of the treatment are—

(*a*) That the patient is able from the beginning to the end of the course of treatment, to remain under the sole care of him who is best fitted to apply remedial means, namely, the properly educated general practitioner.

(*b*) That the—for many poor patients—very heavy expense for orthopædic spinal supports is saved.

(*c*) That the screwing up practice of orthopædic surgeons must cease, as no conscientious and educated medical man can in future have a pretext for adjusting once or twice weekly the mechanical supports of the unhappy victims who, while wearing these iron supports, continue to be more deformed than before. I am able to prove this grave accusation against so-called eminent orthopædic and other surgeons, who advocate the iron spinal supports or spinal corsets with crutches, and a quantity of vertical steels hidden in the material, by a few cases I had under my care. One, suffering from an incurable lateral curvature—a boy of sixteen years—has been for six years compressed in such an iron and canvas case, and during the last of the

six years was ordered by the same well-known orthopædic surgeon to remain, with the exception of two hours daily, always in a lying position ; at the first examination I found his projecting ribs and several parts of the back covered with deeply coloured large erythematous spots, and bleeding abrasions of the skin, which the boy, having been promised a cure, bore with much patience. In another case, a girl of fourteen, who had worn for two years a similar contrivance for the treatment of an incurable double lateral curvature, with projecting and deformed ribs, had not less than nine large deeply coloured erythematous patches, caused by the pressure of the spinal instrument. These two cases are specimens of the still prevalent and so-called orthodox old school treatment.

(*d*) Another advantage of the plaster jacket treatment will be to put an end to the practice of orthopædic instrument makers, who, without physiological and pathological knowledge, give consultations, and always advise a spinal support, which they themselves, of course, supply to the patients. That a manufacturer of spinal supports should wish to sell as many as possible is quite natural : but when we inquire into the causes why the public go to the instrument maker without consulting a medical man, we find that surgeons really eminent in certain branches of surgery, pay very little attention to spinal curvatures, and send patients to the instrument maker without giving him any definite instructions. Hence the maker manufactures a spinal support according to his own ideas, and the eminent surgeon has frequently no opportunity of seeing whether the instrument is suitable or not. Many general practitioners know very little of the nature or treatment of spinal curvatures, because the professors of surgery, not having paid much attention to the subject, do not, and cannot, teach their pupils much concerning them ; as every hospital has its instrument maker, they restrict themselves to ordering a " spinal support." The natural consequence is that the general practitioner also sends his patients to the instrument maker who advertises most, or who most widely circulates catalogues of his instruments.

10. Having said so much in favour of the plaster jacket treatment in angular and paralytic deformities, I must correct Dr. Sayre's statement (p. 96 of his book), that Dr. Benjamin Lee, of Philadelphia, was the first who used self-suspension in curvatures; this is an old practice, and may be seen in all the older German and French Orthopædic Institutions.

I must observe with regret that Sayre seems to see in the plaster jacket and suspension a *panacea* for *all* curvatures, one which he would have used "to the *exclusion of all other methods.*" (See Preface, pp. viii.) In spinal curvatures complicated with uterine disease, the patient cannot be suspended—she is unable to be in an upright position without increase of uterine symptoms. Again, there are *many forms of lateral curvature* produced by the weak state following many acute and chronic diseases, where the patient cannot bear immovability of the trunk, and has no power to raise the arms, still less the weight of the body. Further, there are hypochondrial and hysterical patients with lateral curvatures, whose sufferings would be increased by absolute inactivity of the trunk, and who have neither the power nor the will to suspend themselves. The importance of respiratory and other movements in various positions of the body, in the treatment of many spinal curvatures, although not yet sufficiently appreciated, is very great; so, also, are the various bending and turning movements of the spine. Sayre admits (p. 92) "that want of energy on the part of the patient, a deficiency of will to sit upright, and the indulgence of careless apathetic persons in sitting with their backs twisted in a half-curved position, are sufficient causes for producing rotary-lateral curvatures." But can we really believe that the plaster jacket will improve the want of energy or deficiency of will, or remove the habit of indulgence? Such patients' power of will must, by degrees, be brought to a higher standard. They must be trained to use their own powers; their minds must be directed to the necessity of straightening themselves by the effort of their will; many must be taught to see and to feel when they are straight, because their curved position

is felt by them as a straight one, and they believe themselves crooked when placed in the straight position.

Is the plaster jacket to produce all these mental changes? Swimming, bathing, douches, assist in the cure of the majority of lateral curvatures, but all these are excluded by the plaster jacket, except it is used as a temporary support.

We all desire to cure our patients as quickly as possible; therefore, the reader will, as I hope, agree with me that it is our duty to make use of all the means at our disposal which can contribute to the attainment of this great end, and hence we will not advocate the plaster jacket and suspension to the *exclusion* of, but in addition to, all other suitable means. At any rate it is a fact that in the usual scolioses Sayre's bandage is as *injurious* as any other spinal support interfering with the movements of the trunk.

P.S.—After having written the previous notes I went to the British Museum, and found that Dr. Francis Glisson was a Fellow of the College of Physicians of London, and of the Royal Society, and a Professor at Cambridge; his treatise *De Rhachitide* was published with the assistance of several other physicians, and he must be considered rather as the editor than the author of this work, of which the first edition was published in London, in 1650, the second, in 1660, the third at Lugdunum Batavorum (Liége) in 1671, all three in Latin. An English translation by Culpepper was published in London, 1650. I could not find the illustration of the gallows in the editions I have examined. Amongst the gentle exercises, lying down on the back and sides, rocking in a cradle or on the arms are named; amongst the stronger are recommended, friction, rubbing, "contrectation of the hypochondries and abdomen, and *artificial hanging of the body*," "which is performed by the help of an Instrument usually made with swathing Bands, first crossing the Breast and swung under the armpits, then above the Head and under the chin, and then receiving the hands by two handles, so that it is a pleasure to see the Child hanging pendulous, and moved to and fro by the spectators. This kind of Exercise is thought in

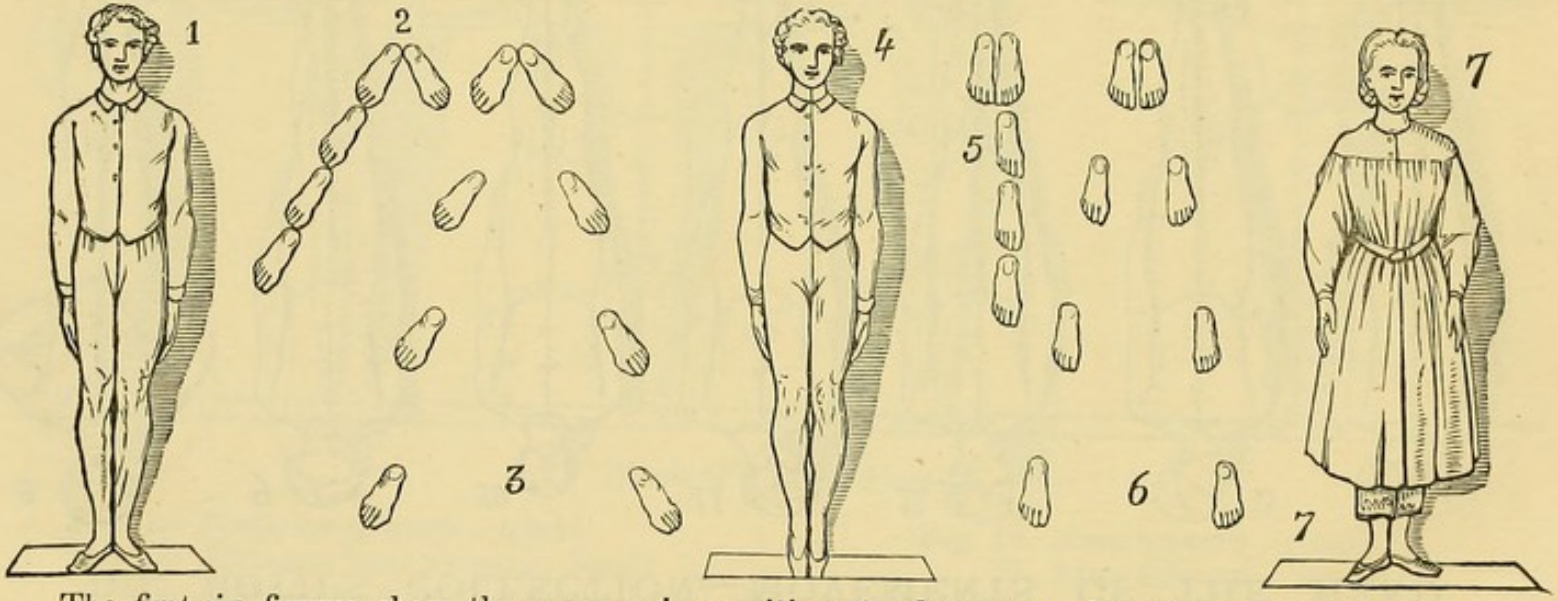
many waies conducible in this effect, for it helpes to restore the crooked Bone, to erect the bended Joynts, and to lengthen the short stature of the body; it is rather a pleasure than a trouble to the child. Some, that the part may be more stretched, hang leaden shoes upon the Feet, and fasten Weights to the Body, that the parts may the more easily be extended to an equal length." This is copied *literally* from the English translation of 1651. Dr. Glisson was born in 1597, as he was 75 years old when his book, *Tractalus de natura substantia energetica,* was published in 1672, where his portrait is engraved at the age of 75. He was also author of a work *De ventriculo am intestinis,* London, 1667, two editions, Liége, 1691.

APPENDIX III.

LING'S ELEMENTARY FREE EXERCISE.

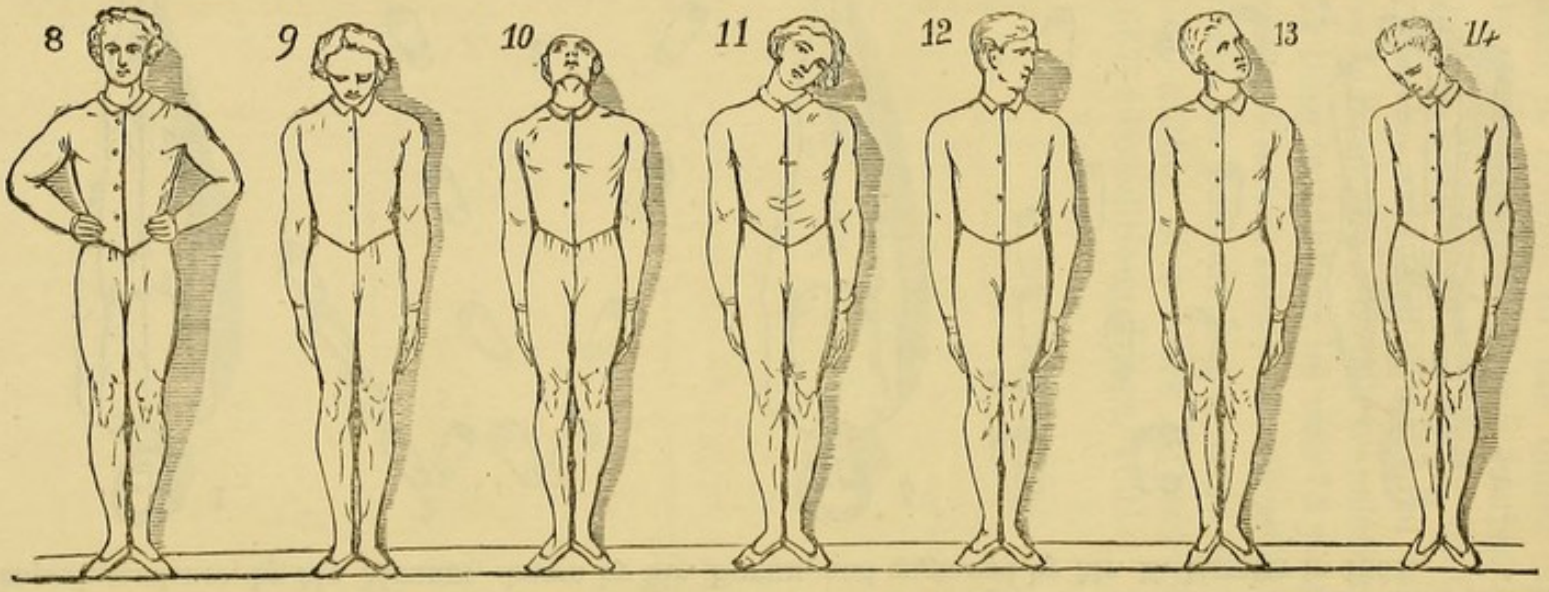
DR. ROTH'S COLLECTION

Of original high-relief models of gymnastic positions and movements for educational, sanitary, and military purposes, as well as for the physical development of the blind, deaf, and dumb. Modelled under Dr. ROTH's superintendence, by Mr. MEGRET, drawn by Mr. BOEHM, and engraved by Mr. E. HEWITT in 1861.



The first six figures show the commencing positions (to be compared to the various keys in music) in which the elementary free exercises are done. No 7 is a girl with suitable dress for exercise. Fig 1, feet: open! fig. 4, feet: close!

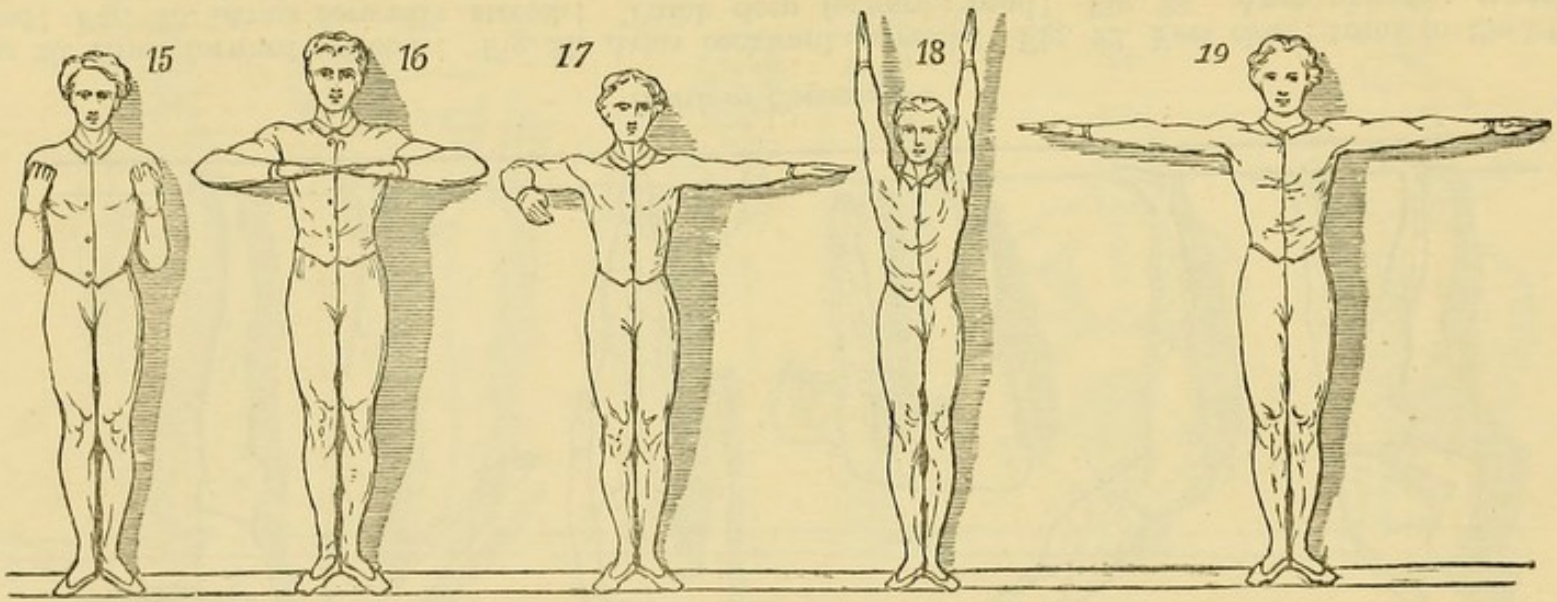
DR. ROTH'S COLLECTION.—MOVEMENTS OF THE HEAD.



Words of Command are—

Fig. 8. Hips: firm! 9, 10, 11. Head forwards, backwards, to the left: bend! 12. Head to the left: turn! 13 and 14 are combinations of two movements in 13, Head to the right: bend! and to the left: turn! in 14 head forwards: bend! and to the right: turn!

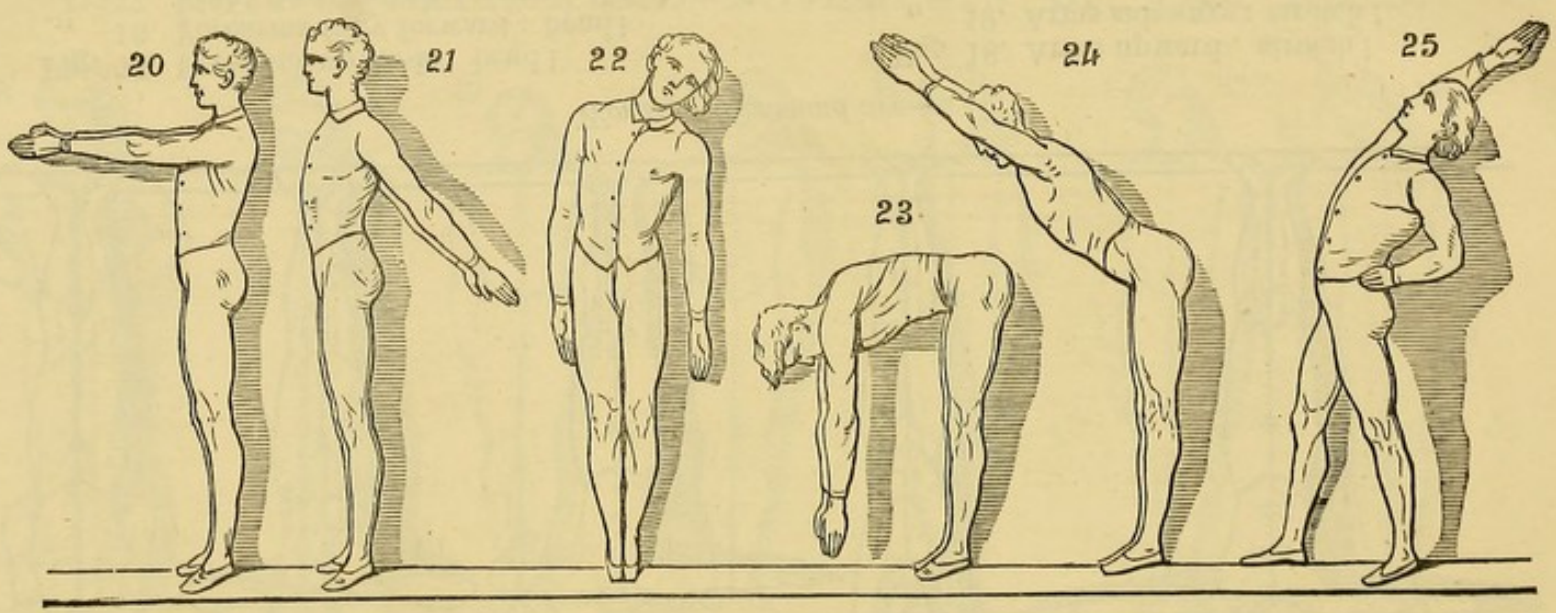
DR. ROTH'S COLLECTION.—MOVEMENTS OF THE ARMS.



Words of Command are—

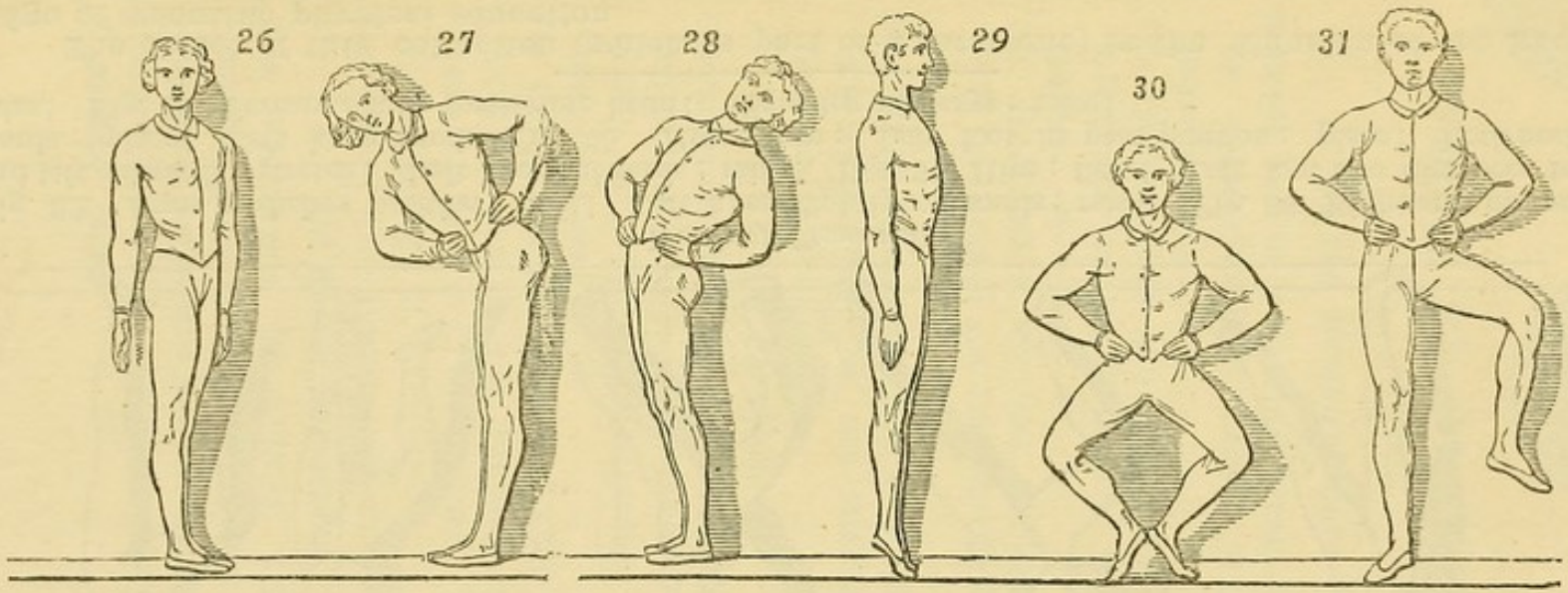
Fig. 15. Forearms upwards: bend!
„ 16. Forearms fully forward: bend!
„ 17. Right forearm half forward: bend! and right arm sideways: stretch!
Fig. 18. Arms upward. stretch!
„ 19. Arms sideways: stretch!

DR. ROTH'S COLLECTION.—MOVEMENTS OF THE ARMS AND TRUNK.



Words of Command—

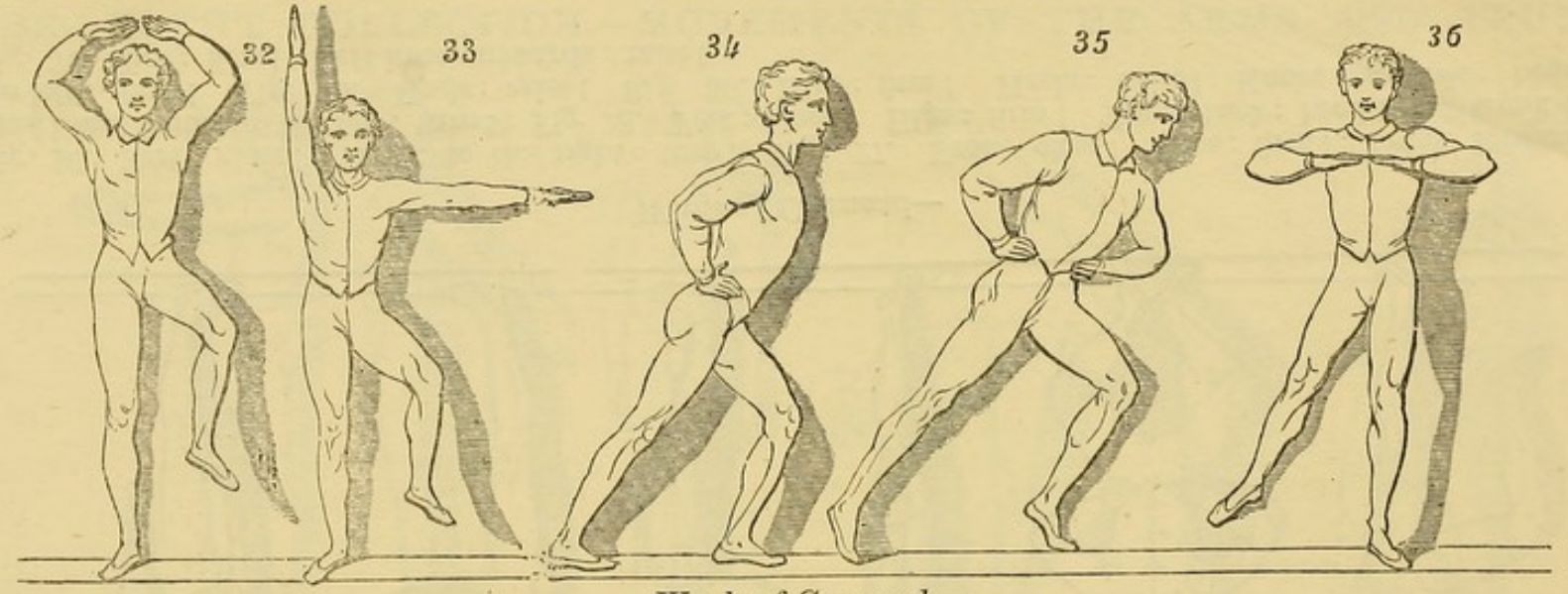
Fig. 20. Arms forward : stretch ! Fig. 21. Arms backward : stretch ! Fig. 22. Feet close ! trunk to the left : bend ! Fig. 23. Arms forward : stretch ! Trunk deep forward : bend ! Fig. 24. Arms upward : stretch ! Trunk : incline forward ! Fig. 25. Right foot forward : place ! left hand on the hip : place ! right arm upward : stretch ! trunk backward : bend !



Words of Command—

Fig. 26. Feet: close! Trunk to the right: turn! Fig. 27. Feet: close! Hips: firm! Trunk forward: bend! and trunk to the left. turn! Fig. 28. Feet: close! Hips: firm! Trunk back: bend! and trunk to the left: turn! Fig. 29. Heels: raise! Fig. 30. Hips: firm! Heels: raise! Knees outwards: bend! Fig. 31. Hips: firm! Left knee outwards: raise!

DR. ROTH'S COLLECTION.—COMBINED ARM, LEG, AND TRUNK MOVEMENTS.



Words of Command—

Fig. 32. Arms in shelter position : raise ! Left knee slightly outwards : raise ! Fig. 33. Right arm upwards and left outwards : stretch ! Left knee outwards : raise ! Fig. 34. Hips : firm ! Left foot two distances forwards : place ! Left knee bend. Fig. 35. Hips : firm ; Left foot in pass position : place ! Both heels : raise ! Fig. 36. Forearms fully forwards : bend ! Right leg sideways : raise !

The object of this collection (which is part of a larer one) is the diffusion of the knowledge of scientific physical education.

Copies of these figures in plaster, terra-cotta, papier-maché, stearin, and other materials, might be distributed at the cost price when wanted for asylums for the blind, deaf-and-dumb, for ragged, national, parish, and training-schools, or for any philanthropic institution. Every child above the age of seven might be provided with a copy of these drawings of Ling's Exercises at the cost price of a penny each.



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Prize Medals have been awarded at the International Exhibitions of London in 1862, and Paris, 1867, for Dr. Roth's Works on Physical Education, Models, &c.

Gold Medal, Health Exhibition, 1884.

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