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THE PREVENTION OF SPINAL DEFORMITIES

DR. ROTH

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NOTES

ON

THE MOVEMENT-CURE,

OR

RATIONAL MEDICAL GYMNASTICS,

THE DISEASES IN WHICH IT IS USED,

AND ON

Scientific Educational Gymnastics.

BY

M. ROTH, M.D.,

PHYSICIAN TO THE PRIVATE INSTITUTION FOR THE TREATMENT OF DEFORMITIES AND CHRONIC DISEASES BY MOVEMENTS AND THE RUSSIAN BATH, IN OLD CAVENDISH STREET, LONDON, AND TO THE INSTITUTION IN GLOUCESTER PLACE, BRIGHTON.

LONDON:
GROOMBRIDGE & SONS, 5, PATERNOSTER ROW.

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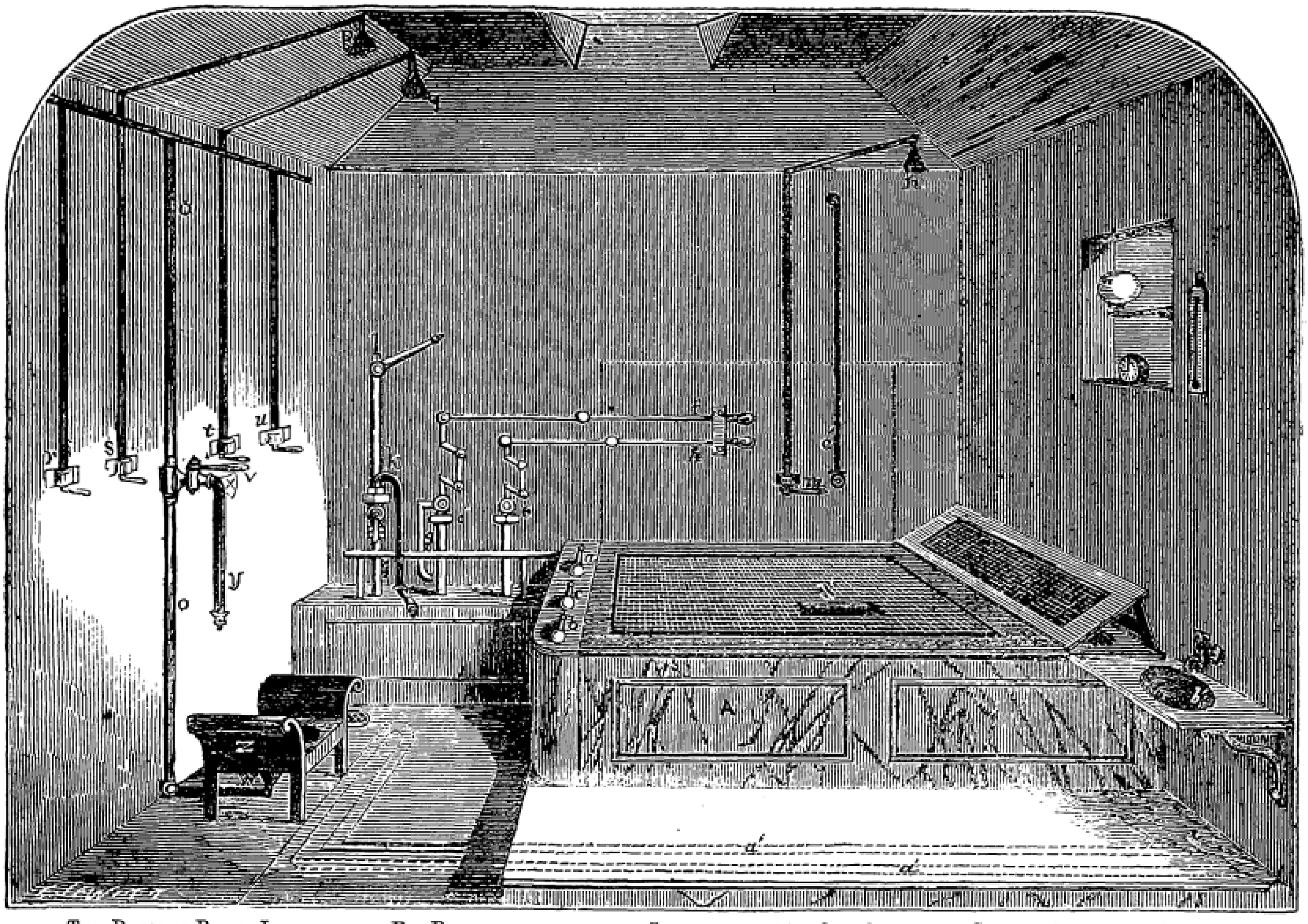

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THE MOVEMENT-CURE.

THE following few observations on this treatment, which has been introduced in several countries on the Continent,* are published with the view of calling the attention of medical men to its study, and to induce patients to avail themselves of a mode of treatment which, although based on simple principles, is remarkably efficacious in its results.

The first Institution for the Cure of Disease by Physiological Movements.

For the last thirty-eight years there has been an Institution at Stockholm, established and kept up at the expense of the Swedish Government, in which many thousands of persons, of every age, sex, and rank, afflicted by diseases, which in many instances were considered incurable, have been treated by Movements, and for the most part successfully. Ling, an eminent member of the Royal Swedish Academy (born 1777, died 1839), who first introduced the curative Movements now made use of, was appointed as Director and Professor at this Institution, at the head of which he remained for twenty-six years.

Difference of the Movements, according to Ling's system, from those used in common Gymnastics.

The Movements of Ling differ entirely from those generally used in our gymnastic and orthopœdic institutions, to which they have scarcely any resemblance; they are based on the most accurate knowledge of anatomy, physiology, and pathology, and are used either for the prevention or cure of disease; the hygienic and educational movements are used for the strengthening of the healthy adult, and for the development of the human frame during its growth; they combine mental with bodily development, and act through the mind on the body. The ordinary medical gymnastic treatment is applied only for the cure

* See, at page 12, the list of Institutions established during the last few years.

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of malformations, and not for the cure of internal complaints, as Ling's movements are.

The Aim of Ling's Movements.

The aim of these movements is, in the healthy state, to develope in the growing person and to preserve in the adult, the harmony between mind and body, and to restore such a harmony in the diseased organism.

The treatment by Movements aims at an increase and development of the vital and nervous power, which can be directed to any part of the body; it serves to draw the blood from one set of organs and bring it to others; to develope the strength in one part and to diminish it in another; to remove congestion from internal organs, and to make the circulation more uniform throughout the body; to increase absorption in one part and nutrition in another; to relax the contracted muscular fibre, and to contract it when relaxed; to restore the disordered muscular, tendinous, elastic, and cellular tissues to their normal condition—in short, to substitute health for disease.

Number and Selection of Movements for Curative Purposes.

The number of curative movements suitable to every individual case varies from eight to twelve, which are selected according to the cause and symptoms of the disease, and according to the general state of the patient and the local state of the affected part. The movements are set down in the form of a prescription, according to certain rules, regulating the quantity and intensity of the single operations. The prescription or only some of the movements are changed, as the case requires, every fortnight or month. The patient is placed by the medical man and his assistants in the prescribed positions, which may vary for each movement, and may be lying, half-lying, sitting, kneeling, etc. The assistants (generally called *gymnasts*), instructed in the elements of anatomy and physiology, are well skilled in the movements and manipulations, and aid the patient in the execution of those which are requisite.

The various Classes of Movements.

These are—1. *Active;* that is, executed by the patient alone, or with the help of the assistant. 2. *Passive;* that is, executed

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by the assistant only on the patient, and comprising frictions, kneading, pressure, vibration, percussion, sawing, fulling, etc. 3. Movements in which the gymnast, to the extent, and in the direction specified in the prescription, resists the patient's effort, or in which the patient resists the gymnast's effort of making a certain and determined form of movement.

In the gymnastics in common use, only active movements are known; we find none either of the second or third class of movements, although there is the greatest curative power in the two latter classes, which fact is abundantly proved by the vivifying effects and increased strength experienced by the patient himself.

Want of space will not allow me to enter into the details of Ling's ingenious system, which has been more perfected since his death, by his disciples and other zealous advocates of his ideas; and I may observe that those interested in the subject, will find information in the books which I have published on the Movement-cure, and which are, hitherto, the only ones in which the English student can find any practical information—the titles are to be found at the end of this pamphlet.*

Although I am very zealous in my advocacy of the treatment by Movements (which is also called Kinesitherapy, Kinesiatric, Swedish medical gymnastics, and must not be confounded with the old medical gymnastics), I wish it clearly to be understood that I do not recommend it as a panacea in all diseases. It will be useful in one stage or in one form of a disease, and not in another; it will suffice in one case, and will not help in another, without other remedial agents, which it does not exclude, except they are physiologically opposed to the effect to be produced by the Movements.

Among the Ailments in which the Movements have been successfully applied I will mention the following:—

1. Those Diseases of the Chest which, under the form of consumption and asthma, destroy so large a proportion of the human family, and are known to receive but little benefit from

* With the exception of some fragments on scientific gymnastics which have been left by Ling, in the Swedish language (translated by Dr. Massman into German), and the German works of M. Rothstein and Dr. Newman, no guide or handbook of the Movement-cure has been published in any language.

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any kind of medicine as yet employed. The statistics of the Stockholm and other Institutions abundantly prove, on the other hand, that this dreadful malady is frequently under control, and is, in many instances, radically cured by the mode of treatment I am advocating.

Daily experience proves, that the formation of the chest in consumptive people is, for the most part, such as would predispose to the development of the disorder; the shoulders are brought forwards, the anterior of the chest is contracted and flat, while the posterior surface is constantly found rounded and larger than the anterior, and this mischief is brought about by the muscles not acting uniformly over the whole surface of the chest. It is self-evident that this state cannot be changed by the internal administration of medicine, the use of mineral waters, or change of air alone. By the second and third class of movements, however, it is possible to strengthen such muscles, to remove congestion of the blood, to restore, by degrees, the capacity of the chest to a healthy standard, and thus to bring the organs, particularly the lungs, to a condition in which they may perform their functions in a normal way.

It may perhaps be objected to this assertion—how is it, then, that common gymnastic exercises are found to be so often prejudicial to consumptive patients? But gymnastics, as now usually practised, embrace only active movements, which, by bringing into play the greater part of the muscles of the whole body, increase the circulation of the blood to an inordinate degree, and oblige the lungs to act more frequently than in the natural state, and thus obviously tend to hurry on the disease.

2. That class of diseases generally known as NERVOUS DEBILITY, combined with disordered nutrition and irregular formation of blood, as they appear frequently in young females, under the form of chlorosis; too much or too little periodical secretions, nervousness, spasms, bad digestion, etc.,—all of which have been removed by this system of treatment, while medicine alone rarely contributes to their cure.

3. HEADACHE, CONGESTION TO THE HEAD, CONSTIPATION, CONGESTION OF THE LIVER, etc., accompanied with a state of weakness, are another class of ailments from which many persons labour, they are only palliatively treated and only temporarily re-

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lieved by medicines; these are frequently and permanently removed by the method under consideration and a suitable regimen.

4. For Curvatures or Distortions of the Spine, exercises have been prescribed as a remedy, and would, no doubt, act beneficially, if the right movements were applied on the right place. By movements of the second and third class, and by knowledge of the diseased structure, a certain set of muscles can be acted on as the case requires, and thus antagonistic effects on the spinal column may be neutralized. This mode of treatment by Movements will be hailed as the greatest of blessings by those afflicted by spinal disease, who have undergone the tedious process of lying in bed for years, and whose general health has thus been more or less undermined—to say nothing of the tortures of pitch plasters, issues, setons, moxas, etc., applied from one end of the backbone to the other. I may observe that all deformities of the spine or limbs are treated by this system, without the aid of any of the machines as at present used in the so-called orthopœdic institutions, and, in general, without any machine at all. In the cure of distortions, deformities, and curvatures of the spine, the Movements have this advantage over any other treatment—that the improvement is not merely apparent, like that produced by a steel corset or any other machine, by which a deformed person is suddenly made to appear straight. A cure of spinal deformity by Movements is a gradual one; because the parts which contribute to hold the spine upright must be made strong, in order to obtain support from the increased strength of these parts, and not from an external mechanical contrivance. This explains also why no relapse of the curvature takes place, if actually cured by the Movements; and I agree entirely with the following advice given to the parents and friends of those who suffer from deviation of the spine:—

"*a.* Seek the cure at the very onset of the disease, but do not use half measures, such as supporting stays and machines, or the lying-down system, on prone couches or extension beds. If the disease is taken in time, it may in all cases be completely cured by Ling's specific movements.

"*b.* Do not expect that an already established curvature will disappear of itself; you lose valuable time, during which the evil increases, and at last becomes incurable.

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"*c.* Do not interrupt the cure as long as any amelioration is apparent or is still possible. The same rules apply to children or youths of consumptive tendency, and to those threatened with apoplectic fulness of the brain.

"5. PARALYTIC AFFECTIONS are a class of diseases in which the usual remedies have, in general, no prominent effect, and in the majority of inveterate cases nothing is even attempted for restoring the patient's power of movement. The passive movements, by acting on the part which cannot be moved by the patient himself, improve a large number of cases, and the instances of radical cure are also not rare.*

"6. In CONTRACTIONS OF THE LIMBS, STIFFNESS, and other AFFECTIONS OF THE JOINTS, of a chronic nature, the Movements are most beneficial.

"7. RUPTURES. Many cases, not only of considerable improvement but of radical cure, of umbilical and inguinal ruptures by the Movement-cure have been recorded. This important discovery will save many ruptured persons not only the inconvenience of wearing a truss during their whole life, but also the danger of undergoing a perilous operation.

"8. GOITRE, TUMOURS, and SWELLING OF THE GLANDS, SCROFULA, RICKETS, HYPOCHONDRIASIS, HYSTERIA, and several MENTAL and MANY OTHER DISEASES, may be alleviated or cured by these Movements alone, or in conjunction with other curative agents. The history of numerous cases, and the prescriptions of the Movements applied in each individual case, are to be found in the "Handbook of the Movement-cure," "Cure of Chronic Diseases by Movements."

Scientific Educational Gymnastics.

Those interested in matters of education will find in Ling's system the most complete and most scientific practical system of training the body, which is the only way of counteracting the effects of the now so fashionable practice of cramming to the utmost degree the brains of our children and youths; a practice which, unhappily, the parents themselves encourage in the

* For further information on these complaints, see "Contributions to the Hygienic Treatment of Paralysis and Paralytic Deformities," by Dr. Roth. Groombridge and Sons, 1860.

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majority of cases, in order to shorten as much as possible the time of education, and thus to save a sum of money, very small in comparison to what is afterwards expended in attempting to restore health, when *too late*.

Bad Gymnastics.

At present, the majority of teachers, principals of educational establishments, directors of institutions for the education of the blind, the deaf and dumb, and idiots, head masters of colleges, tutors, parents, medical and even military men, are generally unacquainted with rational or scientific gymnastics, or the art of simultaneous and harmonious development of body and mind; and the few who do think about physical education at all separate mind from body, and believe that climbing poles, ascending ropes, leaping, flinging the body round and round a bar, and other feats of strength, as practised in the majority of the so-called gymnasia, constitute gymnastics. "They forget that it is a soul, not a body only which we must educate; it is a man, of whom we must not make two; we must not train the one without the other, but must guide and lead them like a pair of horses harnessed to one shaft" (*Monteigne*).

The consequence of this erroneous idea of gymnastics is, that drill sergeants, teachers of calisthenic movements and of common gymnastics, and dancing and fencing masters, are intrusted with the management of what is called *physical* education. Apparatus of various kinds—masts, poles, bars, ropes, vaulting-horses, etc.—are provided, on which the pupils may hang, climb, swing, or make any other exercise at their option; and thus all rational instruction in this branch is neglected, and indeed impossible, because the teachers themselves have not been taught the elements of anatomy and physiology, so indispensable in this branch of education. Their aim is only to produce brute muscular strength. So that a being endowed with reason is worse trained than even the lower animals. "It is very singular that we would not confide the care and training of a valuable horse to a man who had not the knowledge of the animal's anatomy and physiology, while the man who is intrusted with the development of the human body is not expected to possess any knowledge whatever of such sciences" (*Rothstein*).

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With regard to the advantages to be derived from scientific gymnastic training, I refer to a letter which I have addressed to Earl Granville, as President of the Council on Education, under the title, "On the Importance of Rational Gymnastics as a Branch of National Education," etc.

List of Continental Institutions for the Treatment of Diseases by the Movement-cure, with the names of their Medical Superintendents.

Berlin (three), Drs. Neuman, Eulenburg, Löwenstein. Bonn, Dr. Budge. Breslau, Professor Remer. Christiania, Dr. Fugelli. Cassel, Dr. Becker. Dresden (two), Professor Richter, Dr. Flemming, and Dr. Friedrich. Freiberg, Mr. Nitzsche. Giessen, Drs. Weber (father and son). Hamburg, Mr. Scheerer. Heringsdorf, Dr. Wallenstadt. Königsberg (two), Dr. Vogelgesang and Dr. Münchenberg. Königsbrunn, Mr. Wilbold and Dr. Putzar. Leipzig, Dr. Schreber. Lago di Como, Dr. Mayer. Liebenstein, Dr. Martini. Misdroy, Dr. Oswaldt. Prague, Dr. Spott. Stuttgardt, Dr. Steudel. Stockholm (two), Professor Branting and Dr. Sätherberg. Petersburg, Dr. Berglind. Vienna (two), Dr. Melicher and Dr. Streintz. Wiesbaden, Dr. Genth. Würzburg, Dr. Confeld. Also Bromberg, Crefeld, Graudenz, and Posen, and many other towns have such Institutions.*

Scientific Gymnastics in Lunatic Asylums.

In the Lunatic Asylum of Vienna, at Sonnenstein, in Saxony, Rational Gymnastics are introduced; and Dr. Laehr has introduced the treatment in his private asylum near Berlin.

Government Institutions for Scientific Educational Gymnastics.

Sweden, Russia, Prussia, Saxony, Austria, and Hesse-Darmstadt have *normal training Institutions for educational and military gymnastics*, supported by the Government, where anatomy, physiology, and hygiene are taught; the knowledge of these sciences being considered indispensable for the teacher of scientific gymnastics. Professor Branting at Stockholm, M. Rothstein at Berlin, M. de Ron at St. Petersburg, Mr. Spiess at Darmstadt, and Mr. Kloss at Dresden, are at the head of these Institutions, in which thousands of pupils have been trained in a rational way.

* The Institutions at Stockholm and St. Petersburg are partly supported by the Government.

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Patients are not received as inmates, but there are many establishments in the immediate neighbourhood where Board and Lodging may be conveniently procured.

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First professional consultation, One Guinea. Weekly charge for professional advice and daily treatment, either by Movements, or the Russian Bath, or the Water Cure, or all in combination as may be required, varies from One to Six Guineas, according to the amount of time and attention demanded by the individual cases. For the Bath or Water Cure alone, One to Two Guineas Weekly.

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THE

PREVENTION

OF

SPINAL DEFORMITIES,

ESPECIALLY OF

LATERAL CURVATURES,

WITH NOTES

ON THE CAUSES, THE ARTIFICIAL PRODUCTION & THE INJURIOUS MODES OF TREATMENT OF THESE COMPLAINTS,

With Numerous Illustrations.

BY

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INTRODUCTION.

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 as long as the hygienic means suffice to attain this aim.

Having acted, and I may say not unsuccessfully, on this principle for twenty 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 dietetic regimen in general, 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; and although not every young 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,

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in a number of cases, either prevent them entirely, or at least arrest at the beginning their further progress. He should have some notion of the treatment adopted by those who have paid more attention to the subject.

These few remarks must serve as an apology for the reprint of an incomplete paper, written 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 and other complaints by hygienic means in general, but especially by prophylactic and 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 fifteen or twenty 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 ten years, placed many of their patients, and members of their own families, under my treatment, and who have thus given me an opportunity for proving practically the truth of the views I advocate regarding the prevention and cure of many chronic ailments by hygienic means and medical gymnastics.

M. ROTH.

April, 1861.
16A, Old Cavendish 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

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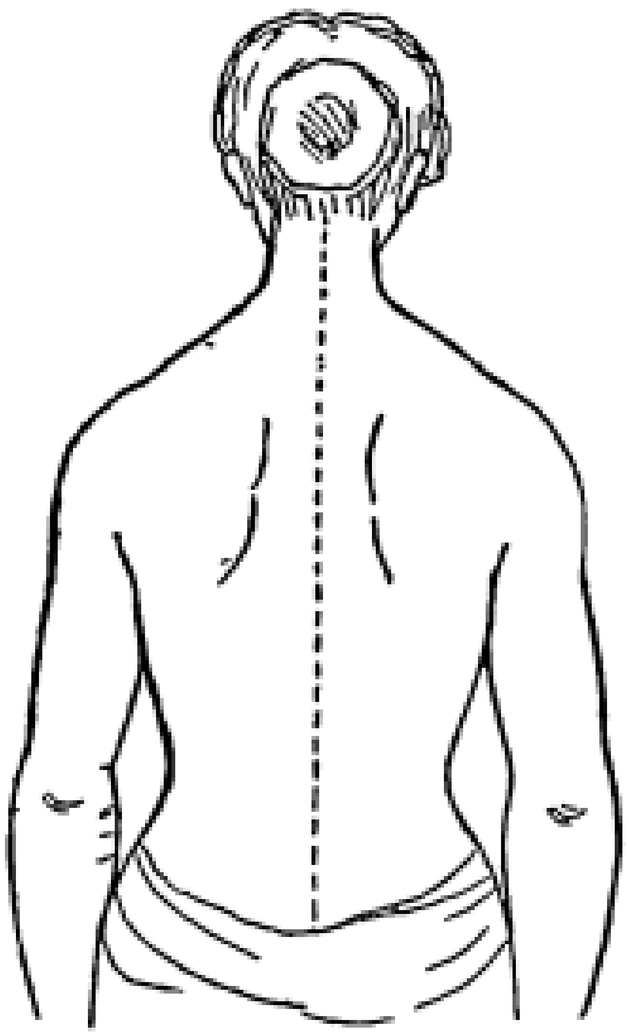
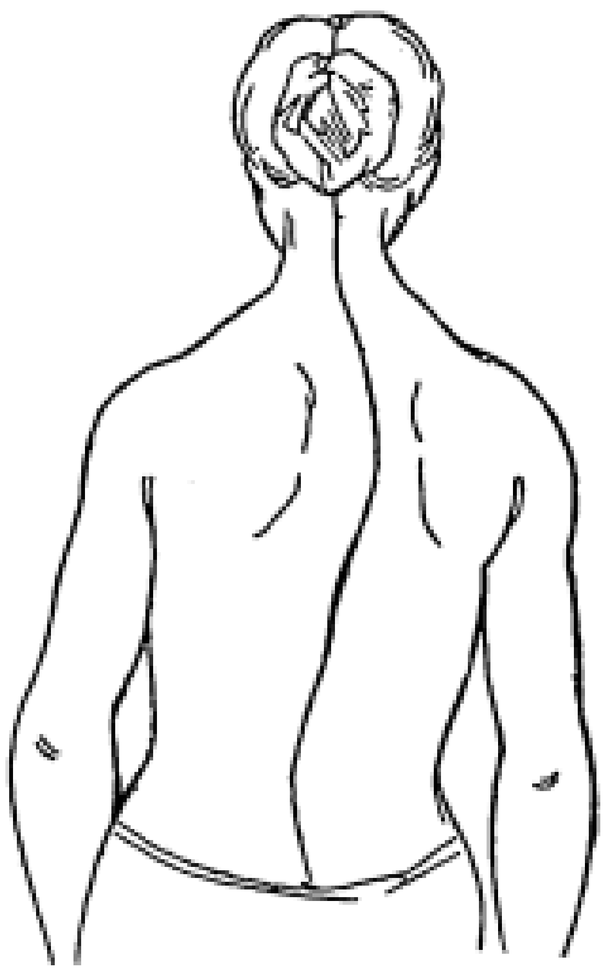
that two or more dorsal vertebræ are permanently (not momentarily as in a physiological flexion of the spine) removed from each other on the right side, they must approach each other on the other side, and form a curve as seen in *fig.* 2,



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.

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4. SECONDARY OR COMPENSATORY CURVATURE.

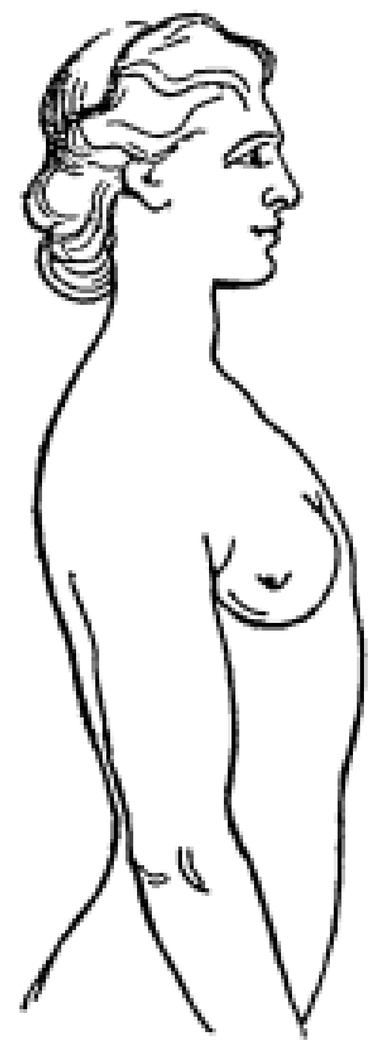
An upper or dorsal lateral curvature does not, and cannot, remain for a long time stationary without being compensated by a second curve in the lumbar vertebræ; the convexity of the secondary curve is always on the side opposite to the convexity of the upper dorsal curve, in order to keep up the balance 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.

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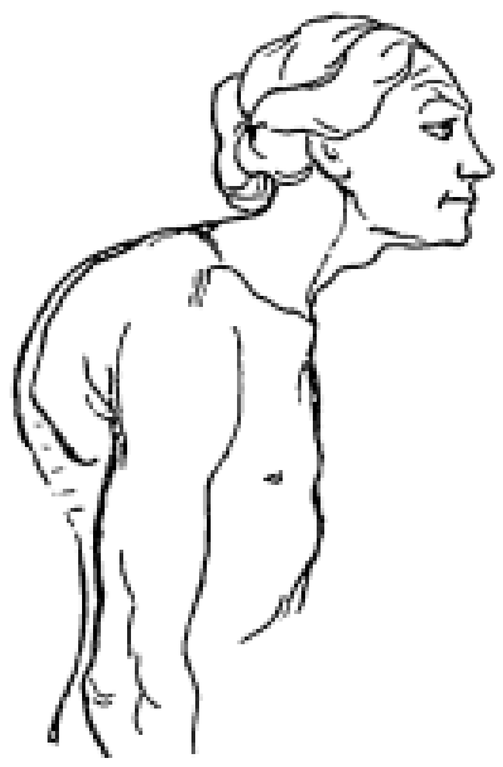
Fig. 6 and 7 show the prominent characters of an anterior

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

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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

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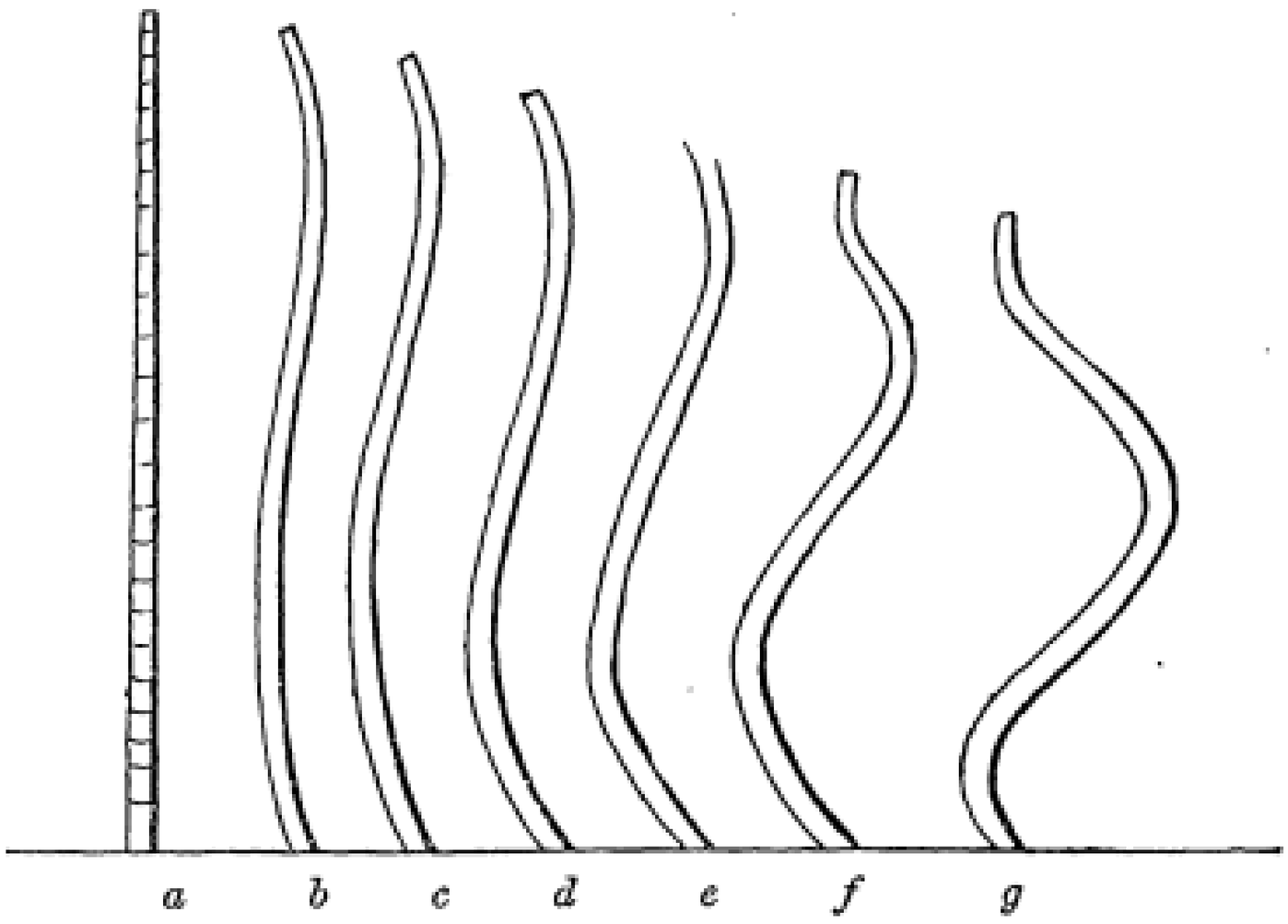
inflammation of the knee or hip joint), mechanical injuries, rickets, tuberculosis, scrofula, and other constitutional diseases.

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;

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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.

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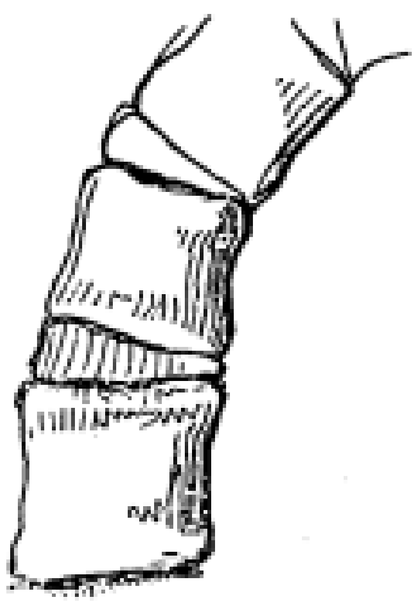
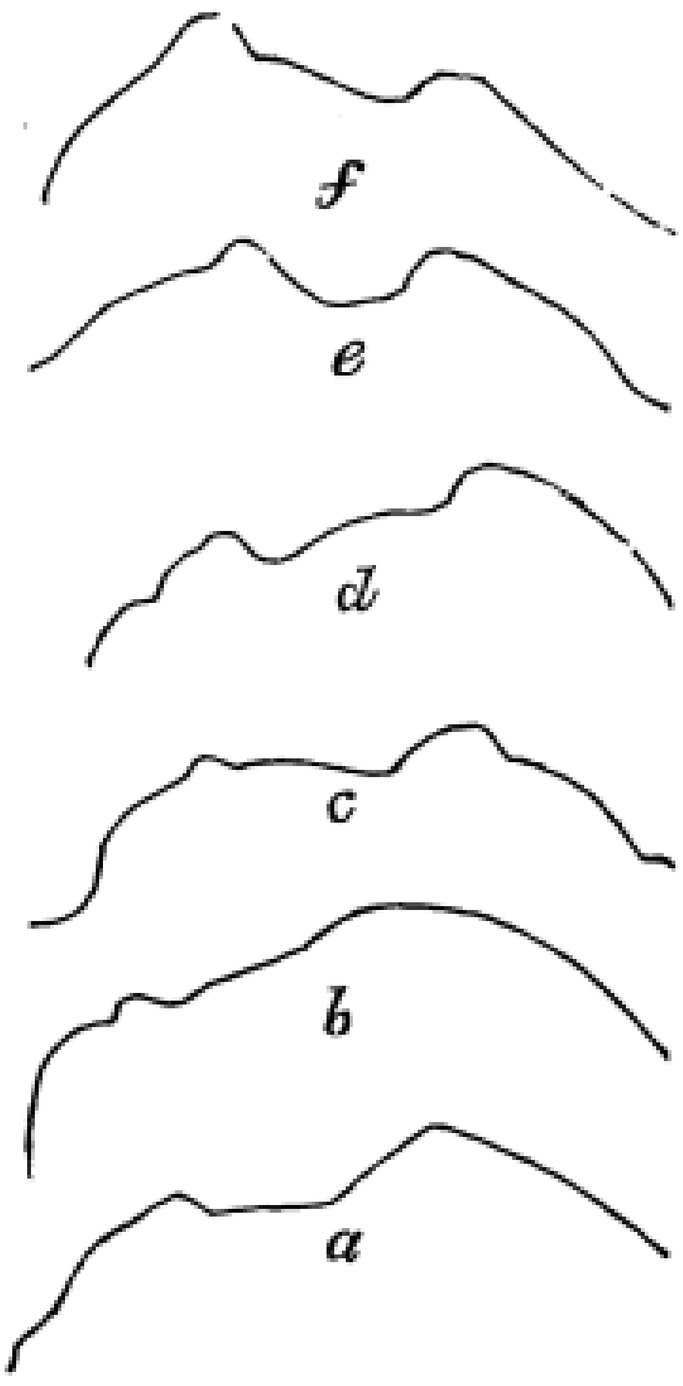
12. SECOND STAGE OF LATERAL CURVATURE.

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

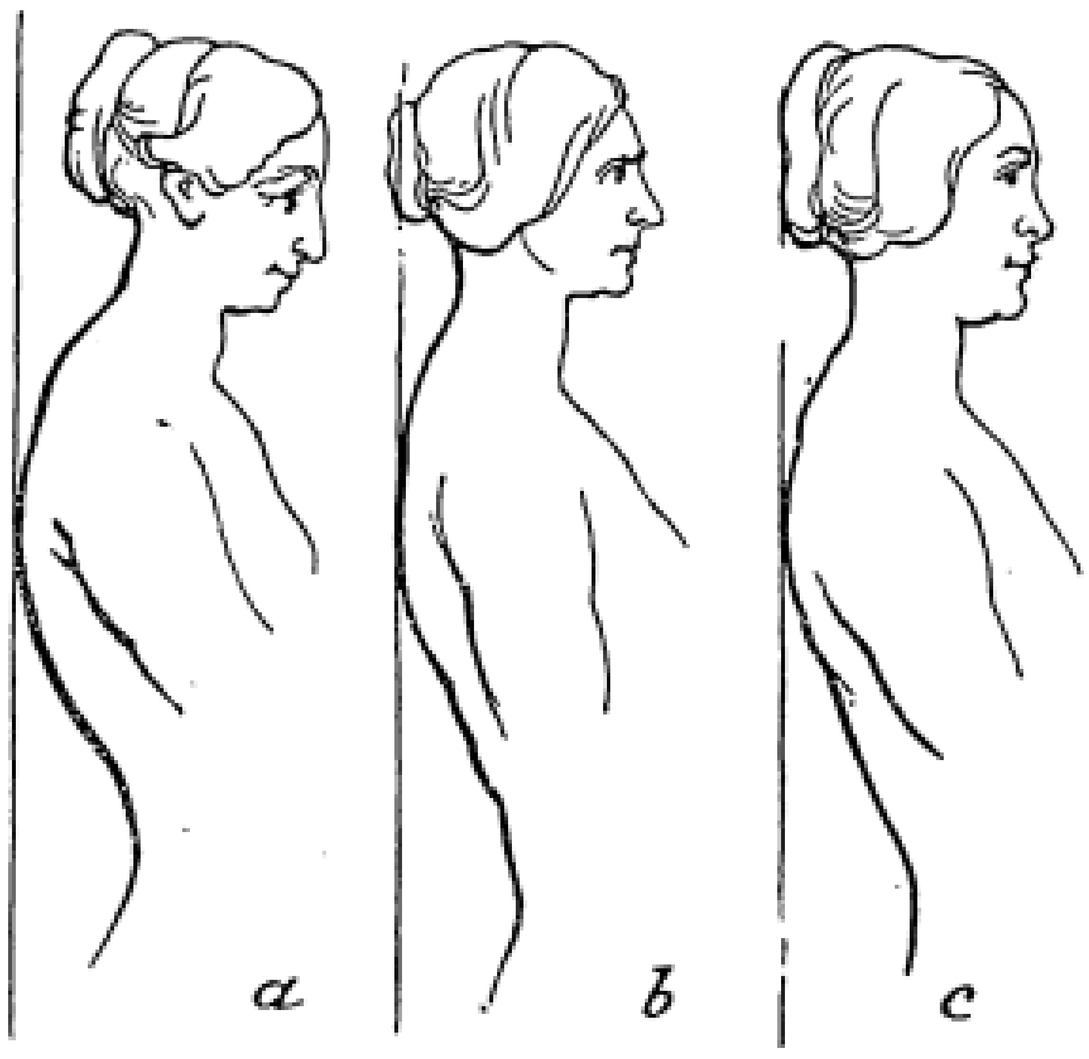
Fig. 9 represents a part of a curved spine in its anterior aspect; the cartilages have the wedge form, which is most distinctly seen at the deepest point of the concavity; the transversal processes and ribs on the convex side of the curve (in its second stage) are more distant from each other; the ribs 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.



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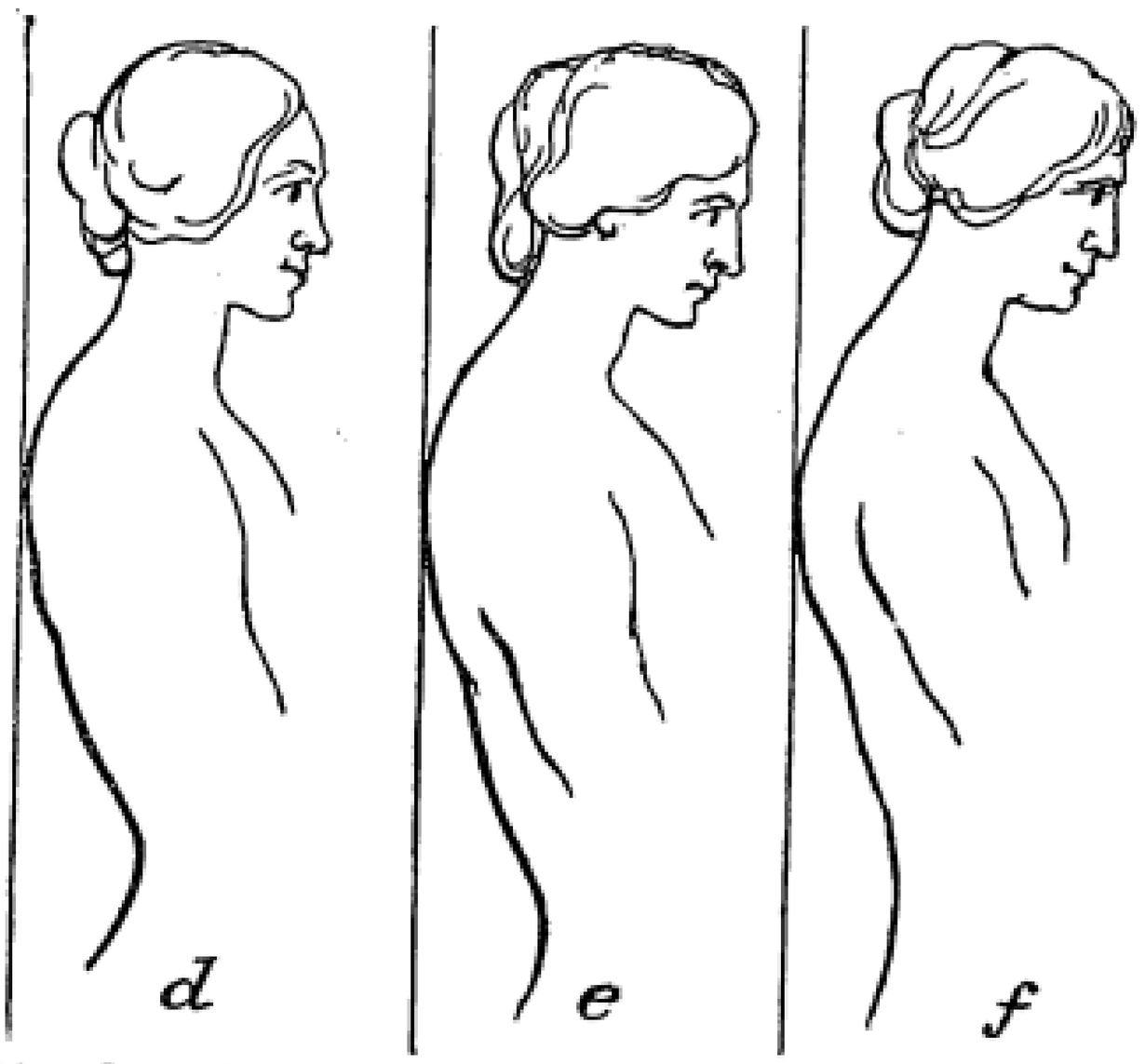
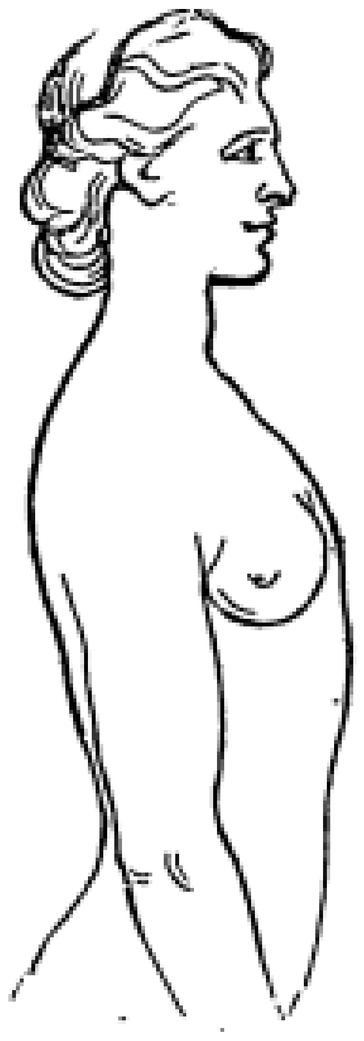


11 and 12. Longitudinal section of six lateral curvatures.

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-

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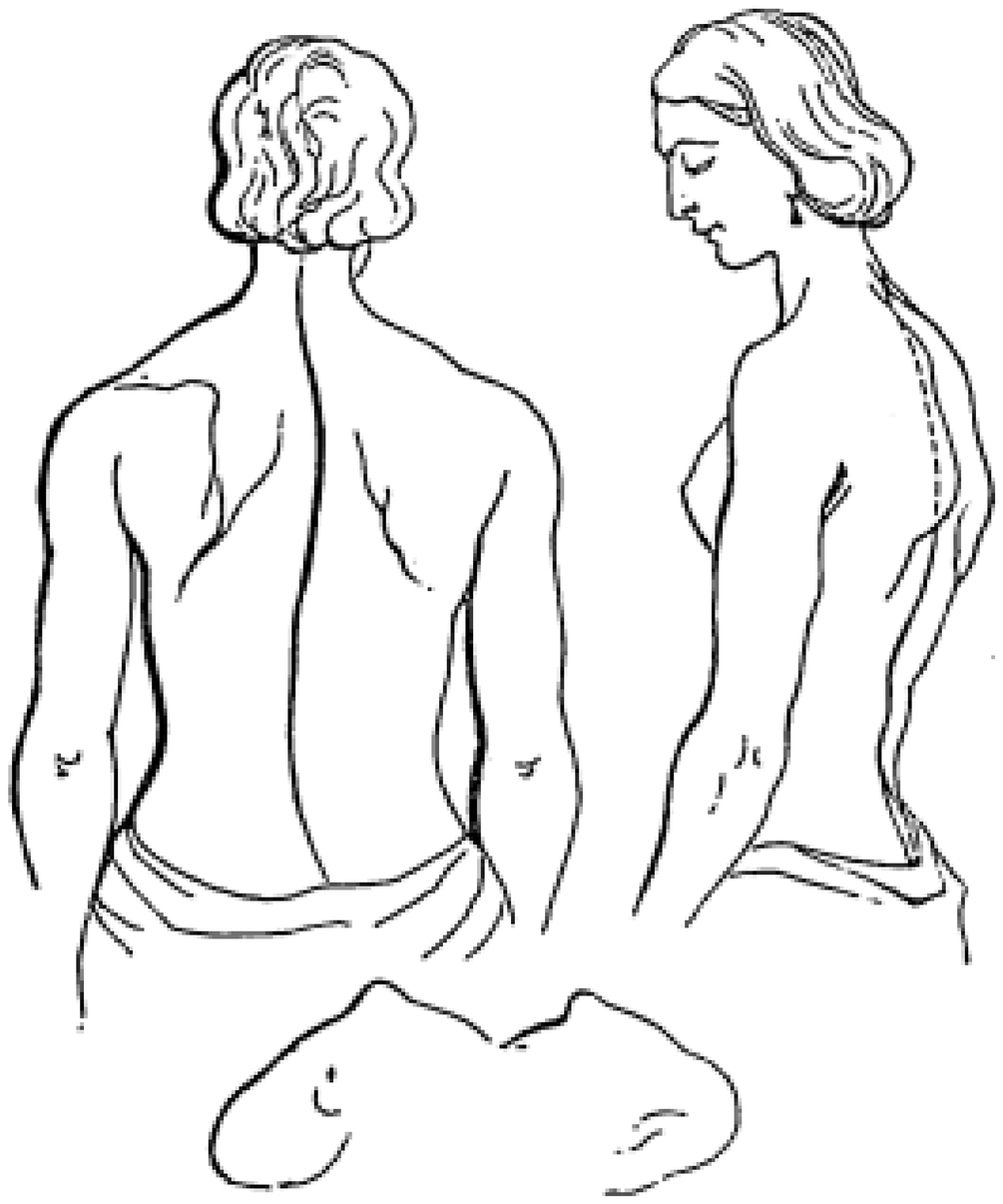
ments in the respiration, circulation, and digestion are more frequent in this stage.

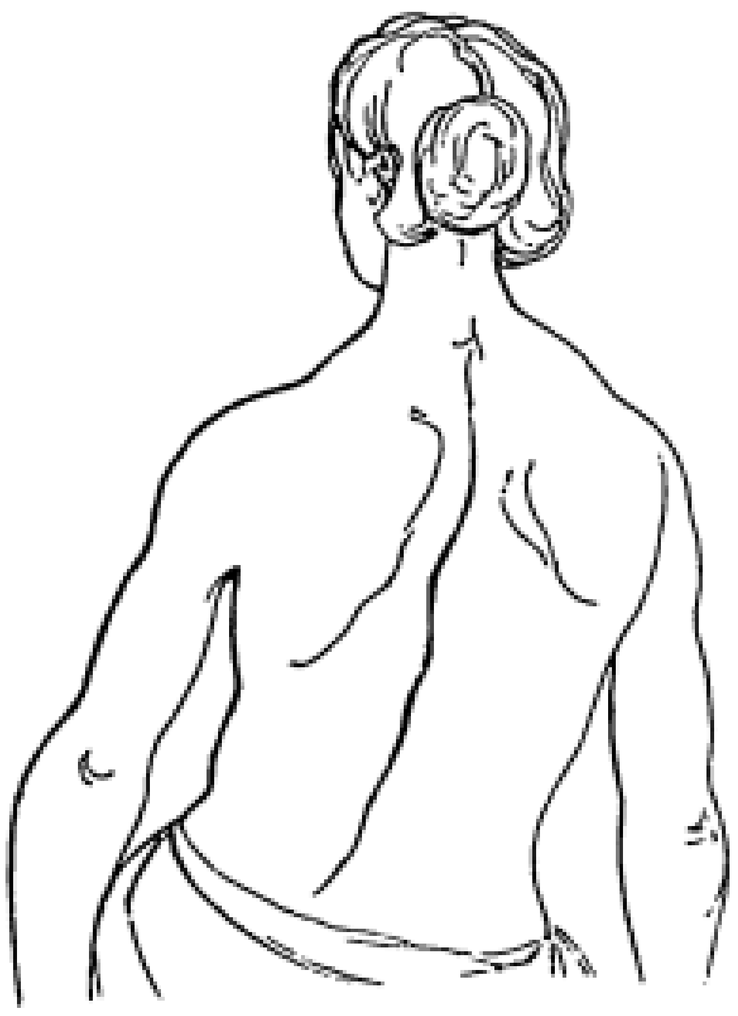
The following figures represent various stages of lateral curvature, the transversal section of the projection of the shoulder blades, with lateral outlines of the corresponding curves.

15 16



17

18 19



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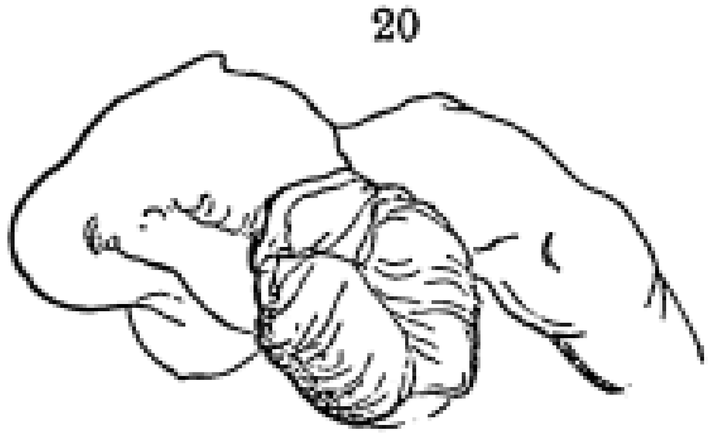

15, 16, 17, 18, 19 and 20. Lateral curvatures in the beginning and end of second stage, with posterior aspect, lateral and bird's-eye view.

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.

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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

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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.*

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eases, 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.

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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.

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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

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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

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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

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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

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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.

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"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.

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" *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

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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

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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 ou 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

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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

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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.

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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,

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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.

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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.

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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

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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

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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

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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

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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

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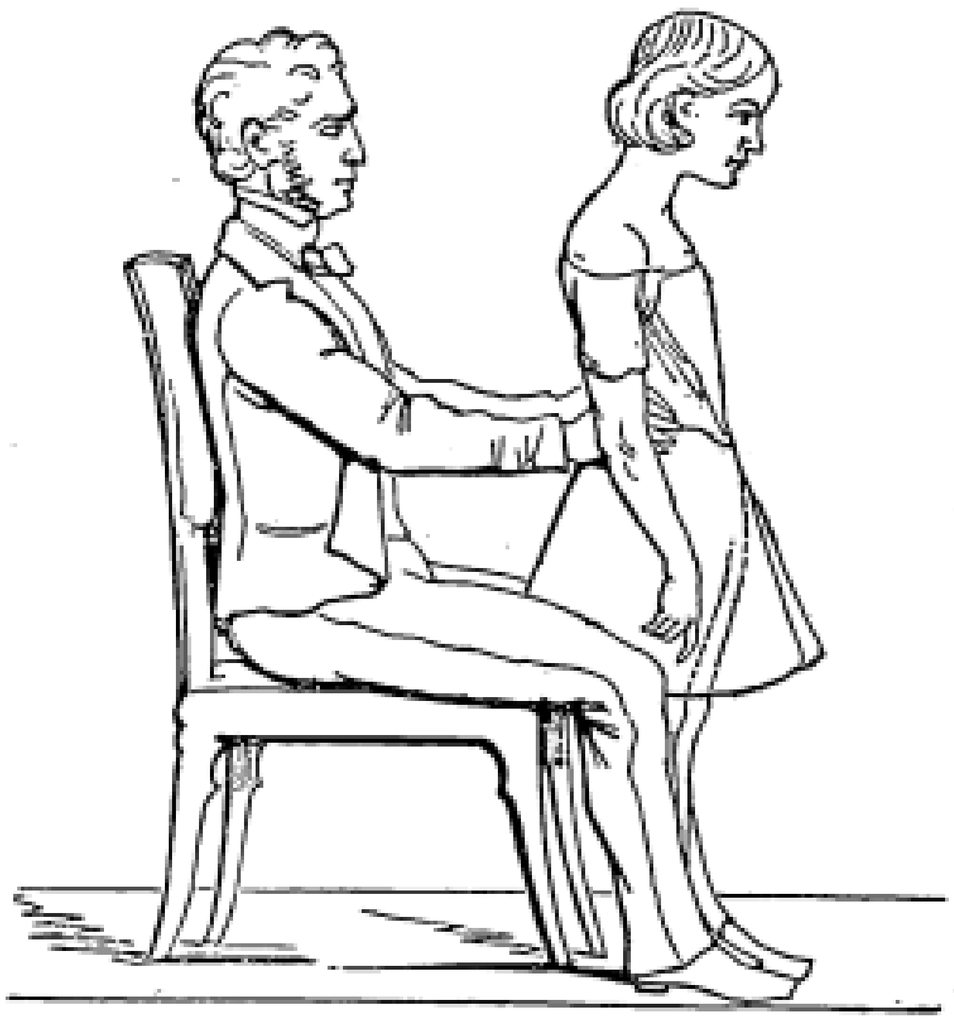
round the neck and hangs loosely down the chest); the examiner places his feet along the external edge of the patient's feet, and fixes with his knees those of the patient, *fig.* 20*a*,



20*a*. Inspection of spine.

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.

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.

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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.

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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

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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

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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

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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

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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,

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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.

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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.*

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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.

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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-

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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

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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.

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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,

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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

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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

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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.

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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.

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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.

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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

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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,

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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*

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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.*

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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.

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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.

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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.

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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

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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

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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.

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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.

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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.

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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

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

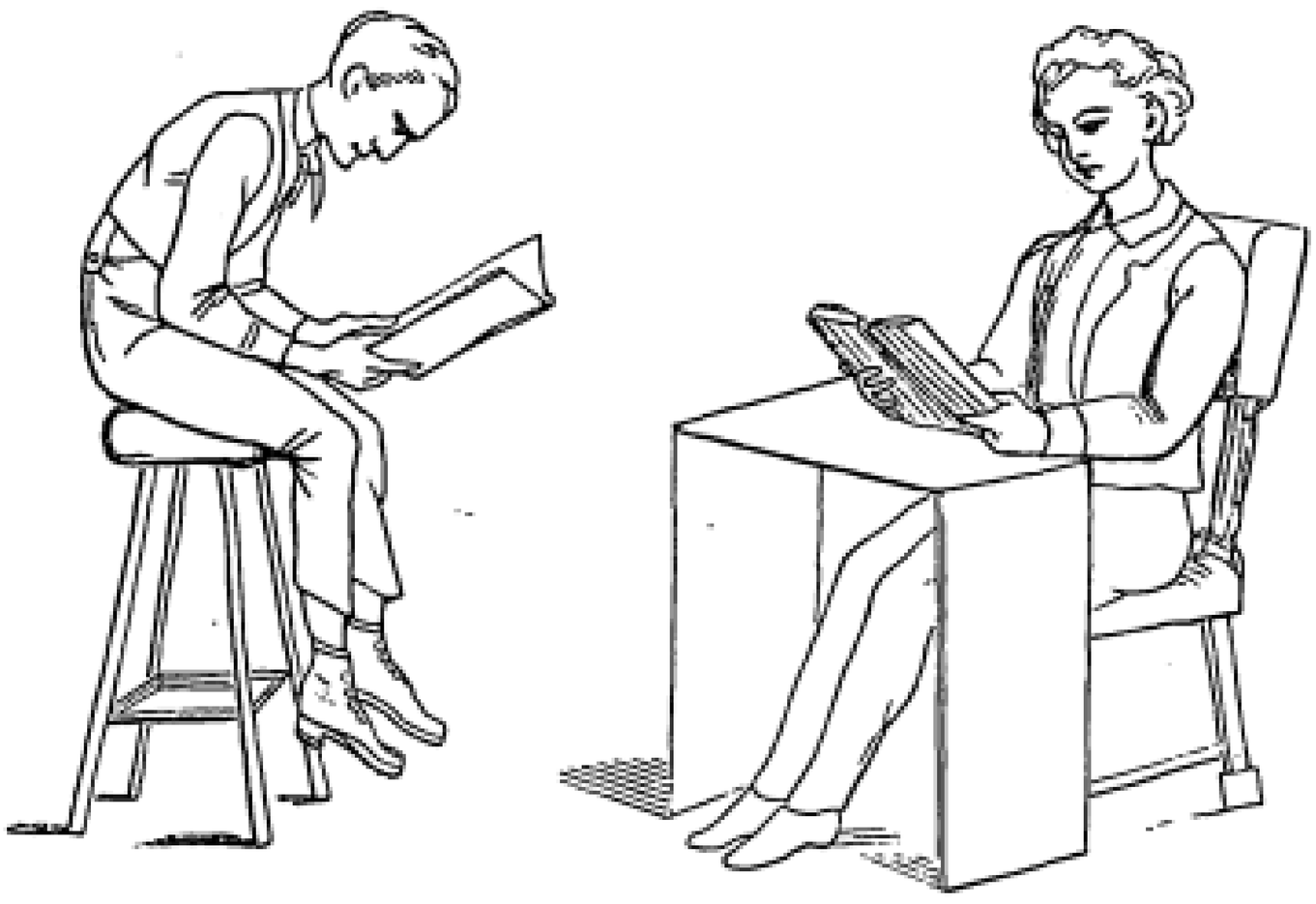

Fig. 30 and 31.

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.

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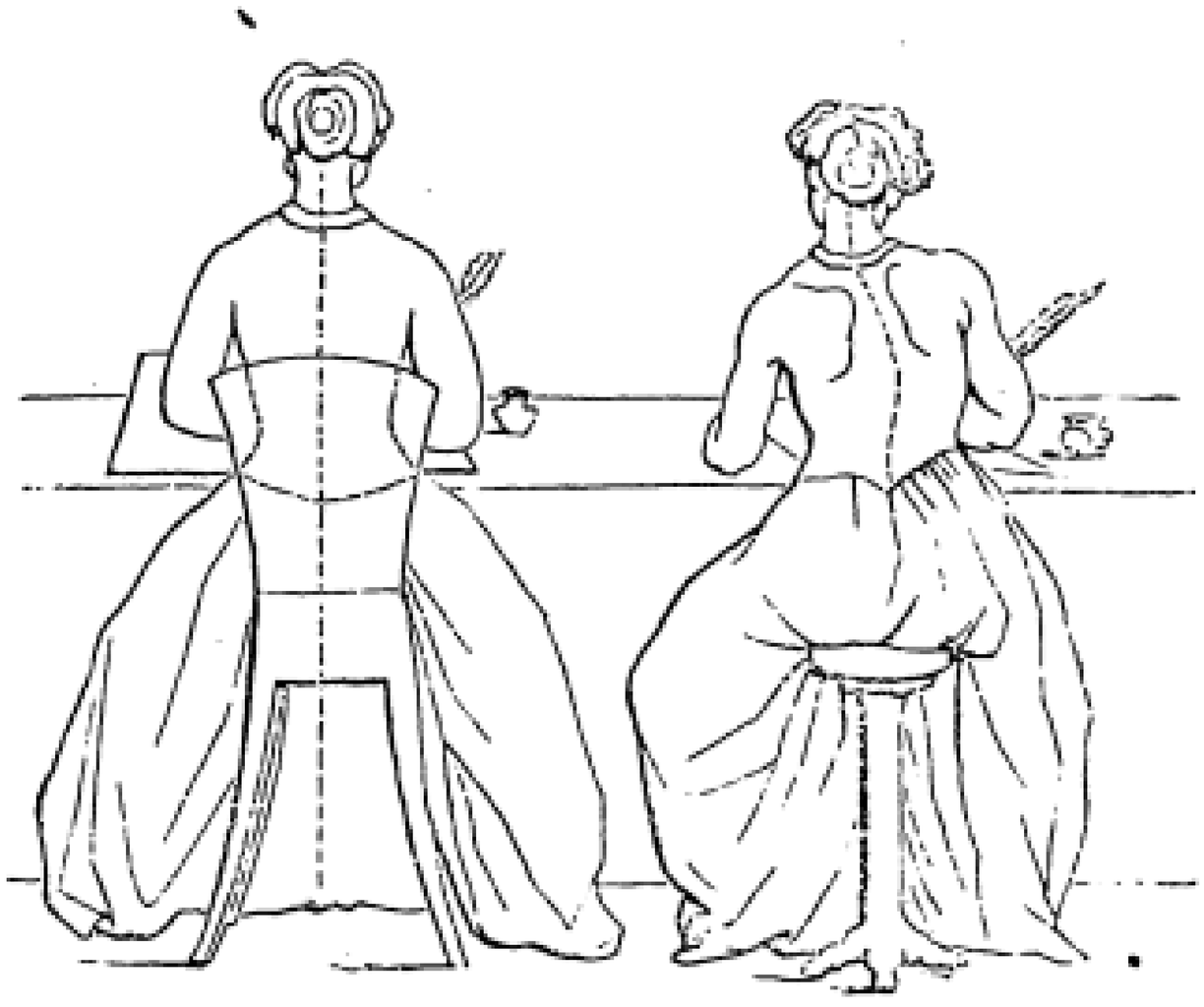
77. WRITING.

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.

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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-

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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

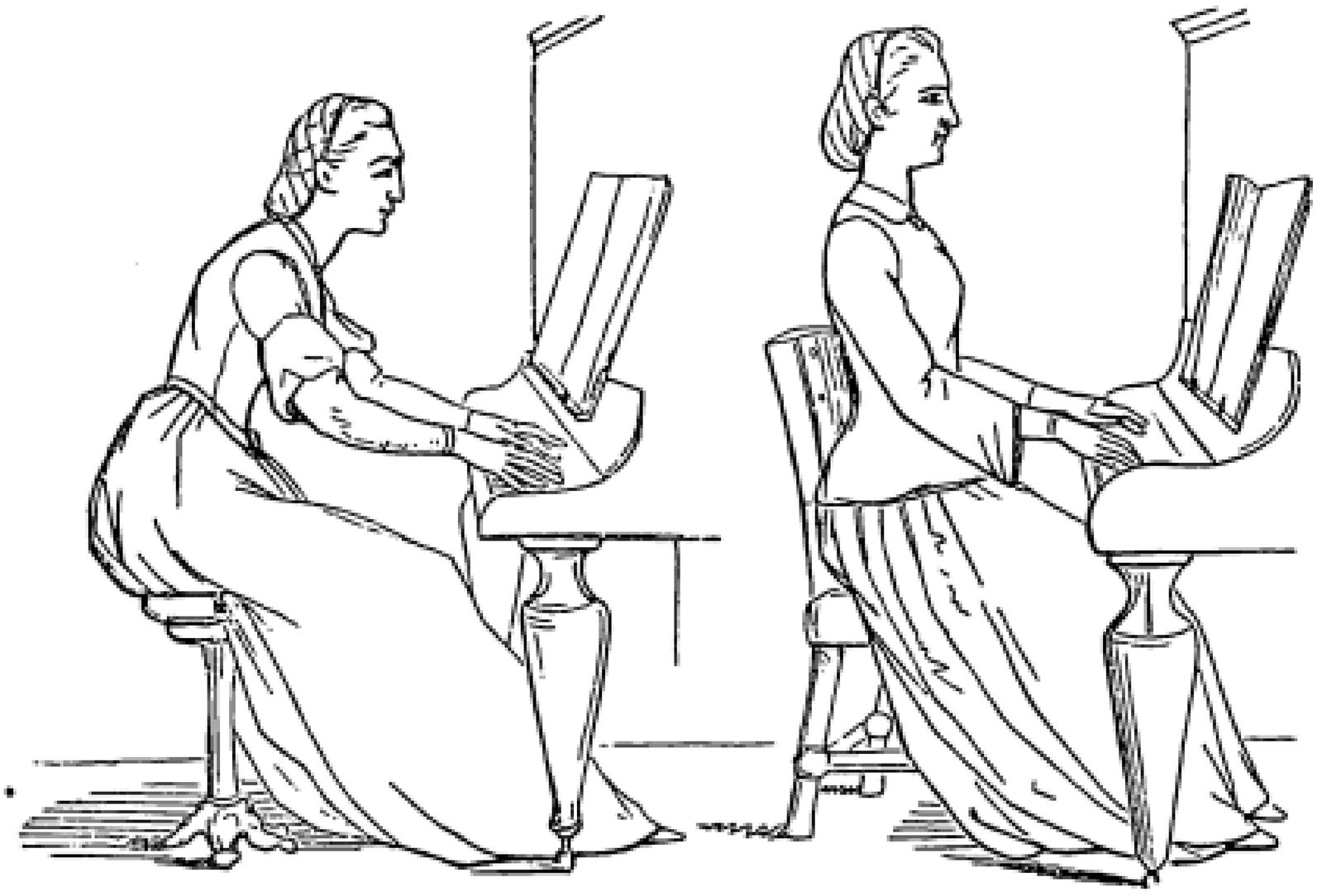

Fig. 38 and 39.

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

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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.

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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.

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82. LYING POSITION.

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

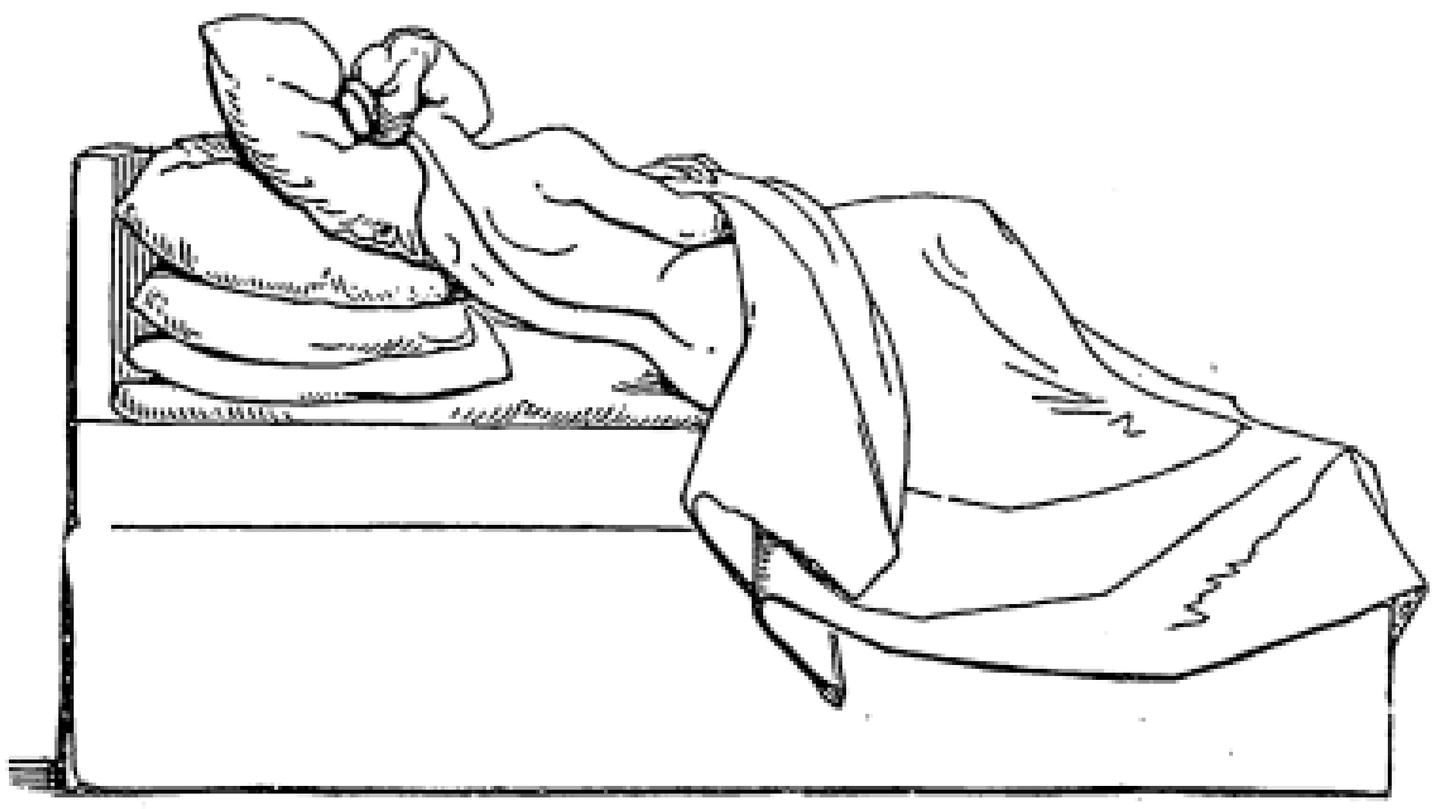

Fig. 44.

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

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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.

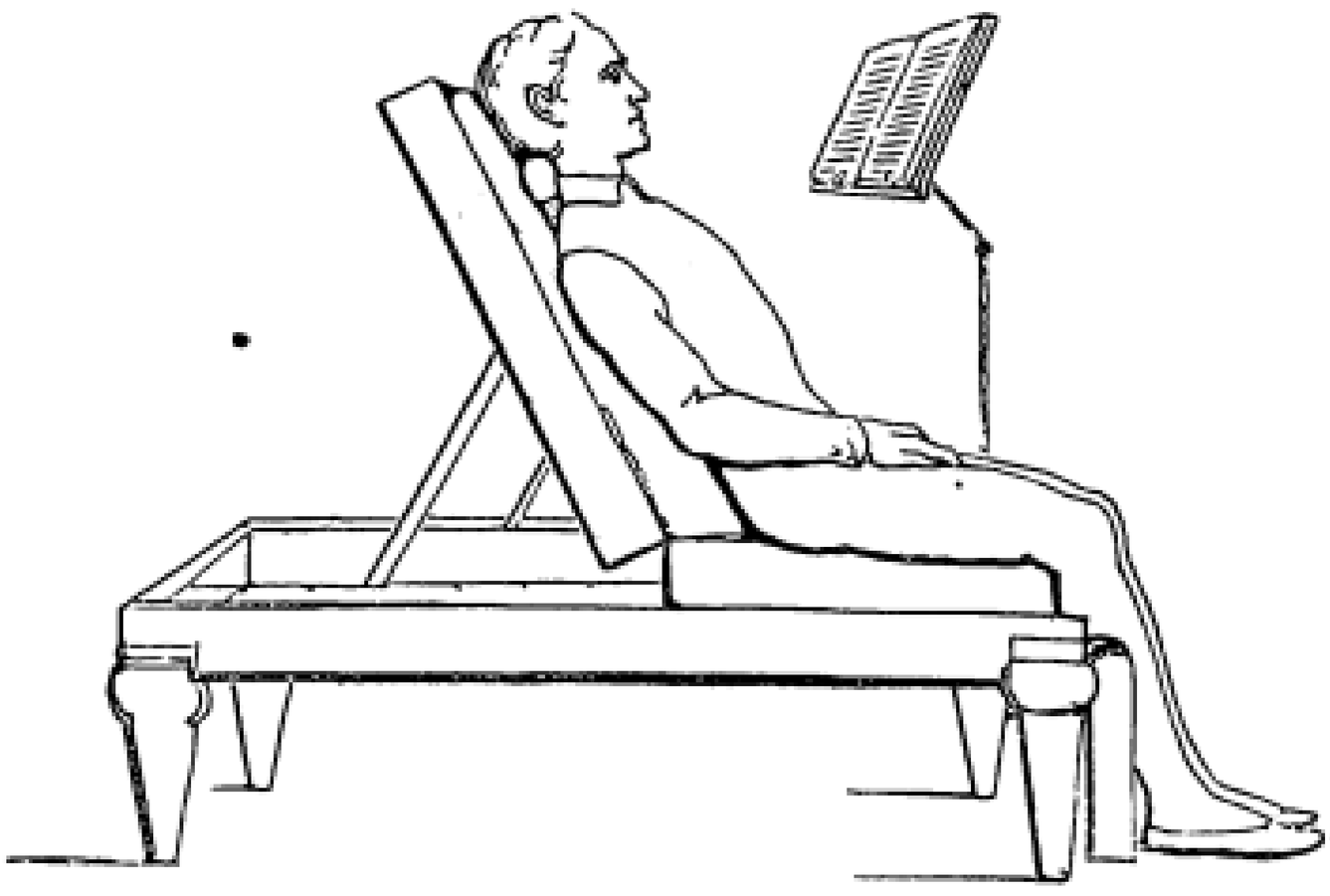

Fig. 46. Chair with reading desk.

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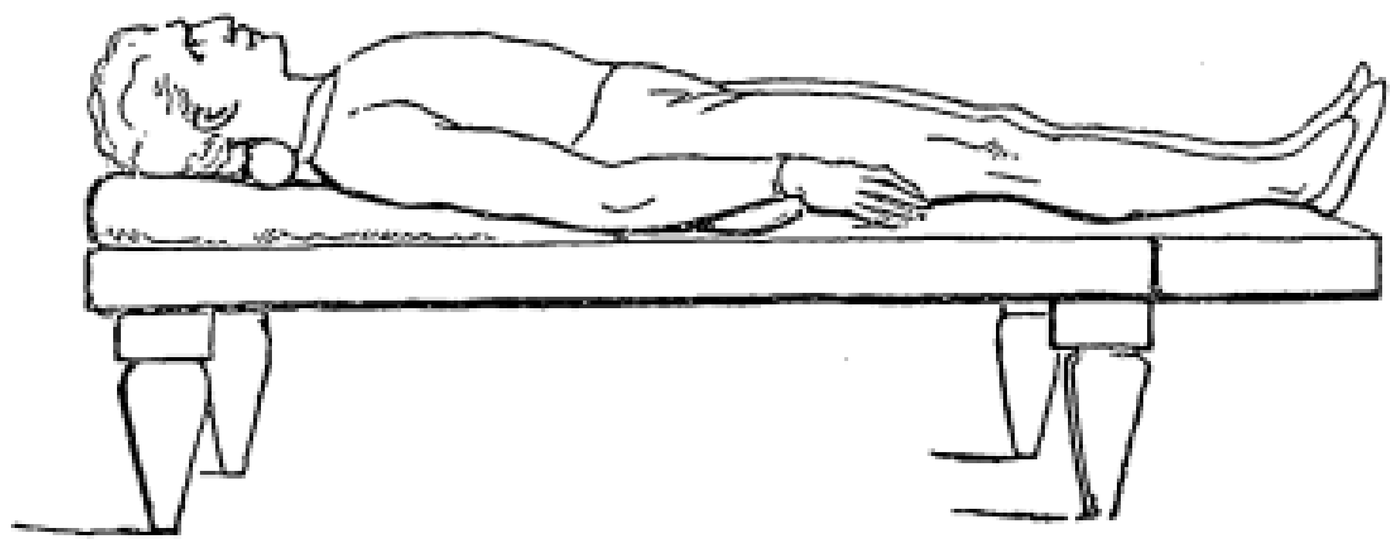
The foregoing figure shews the construction of this chair: the middle part serves as a seat; the upper part can be more or less inclined, or placed horizontally, in the same manner as the flap, which serves as a support for the legs and feet; the whole couch is padded in order not to hurt the prominent 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

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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.

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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

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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.

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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

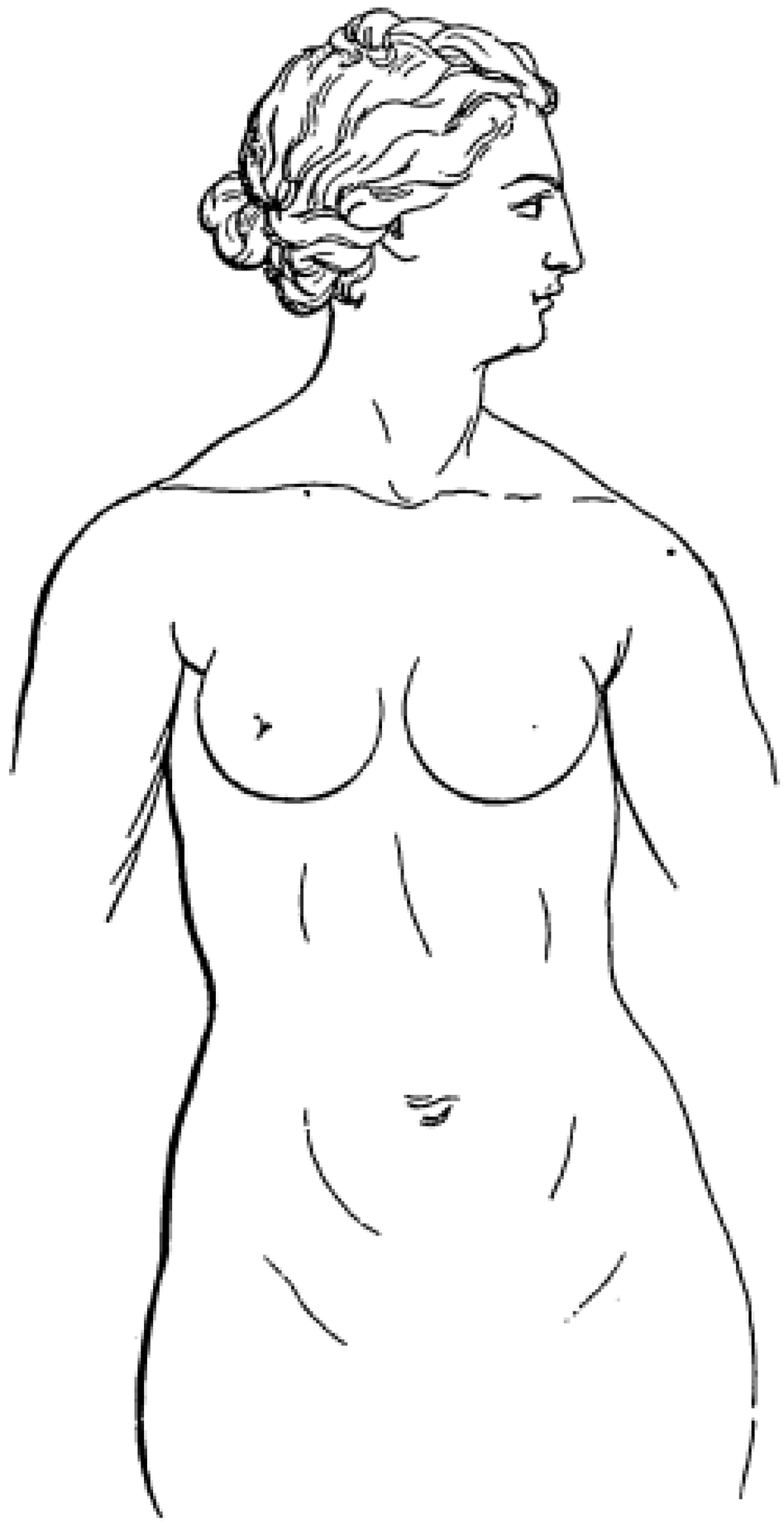

Fig. 48. Outline of the Venus of Medicis.

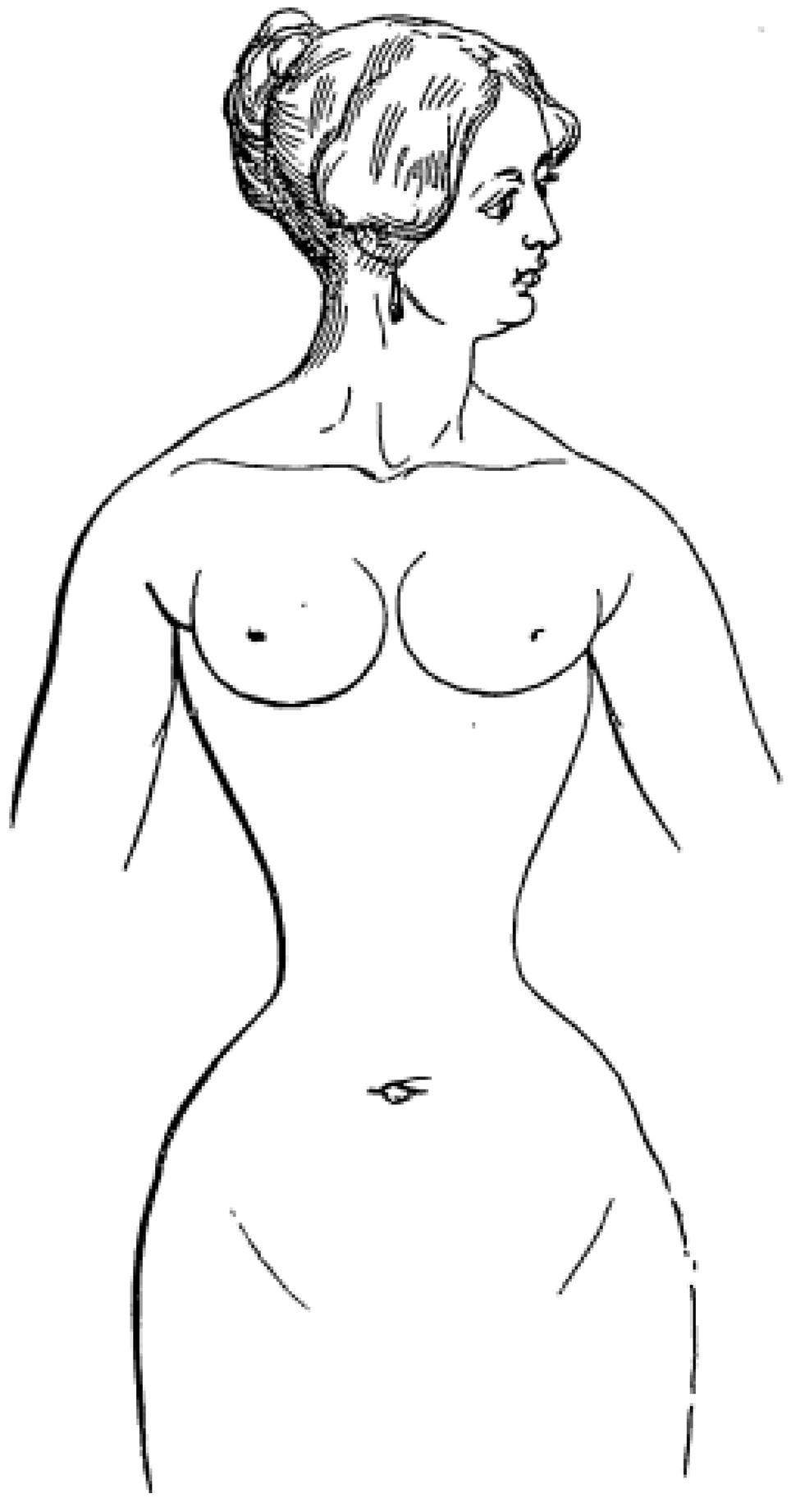

Fig. 49. Outline of a woman as compressed by stays.

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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

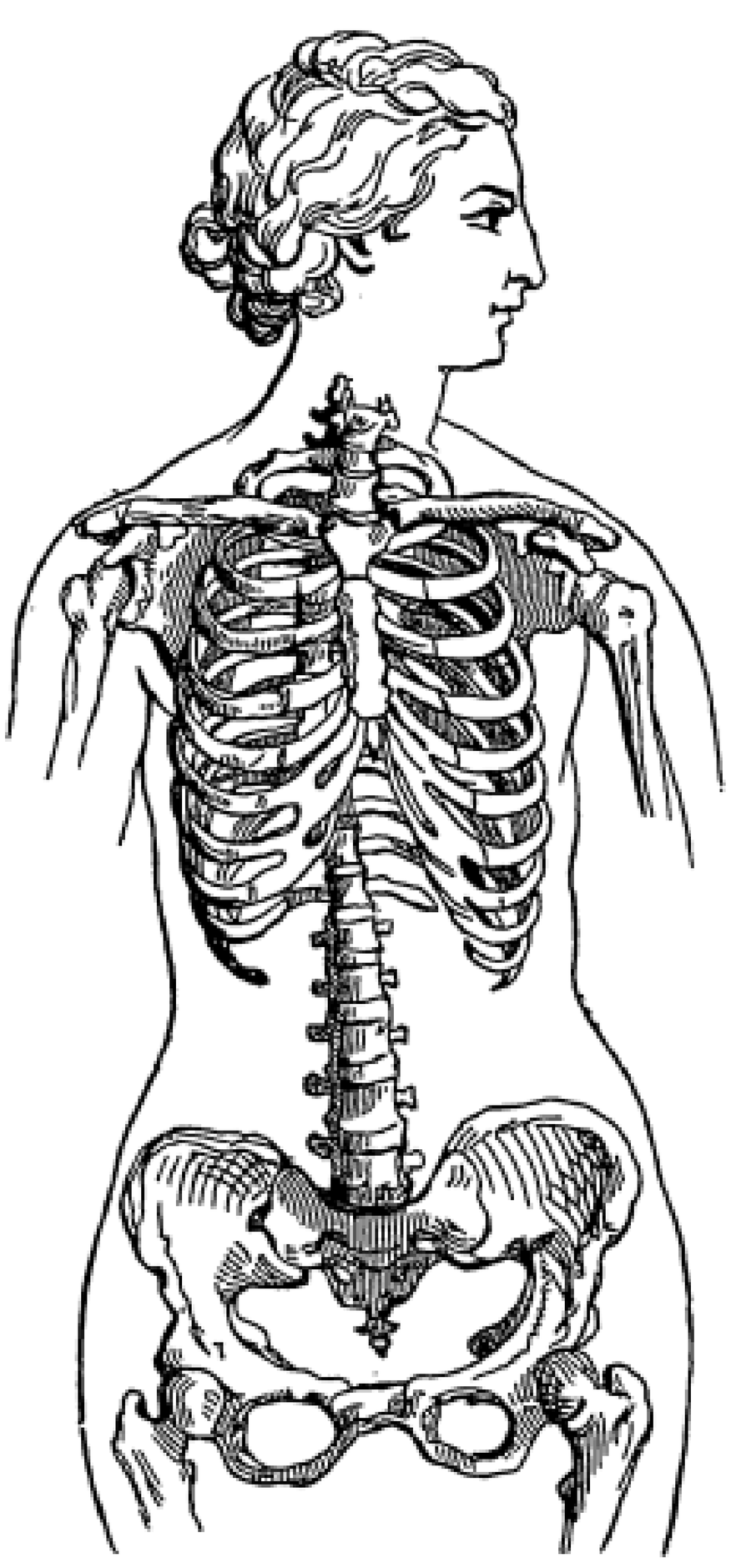

Fig. 50. The natural form of the chest of the Venus.

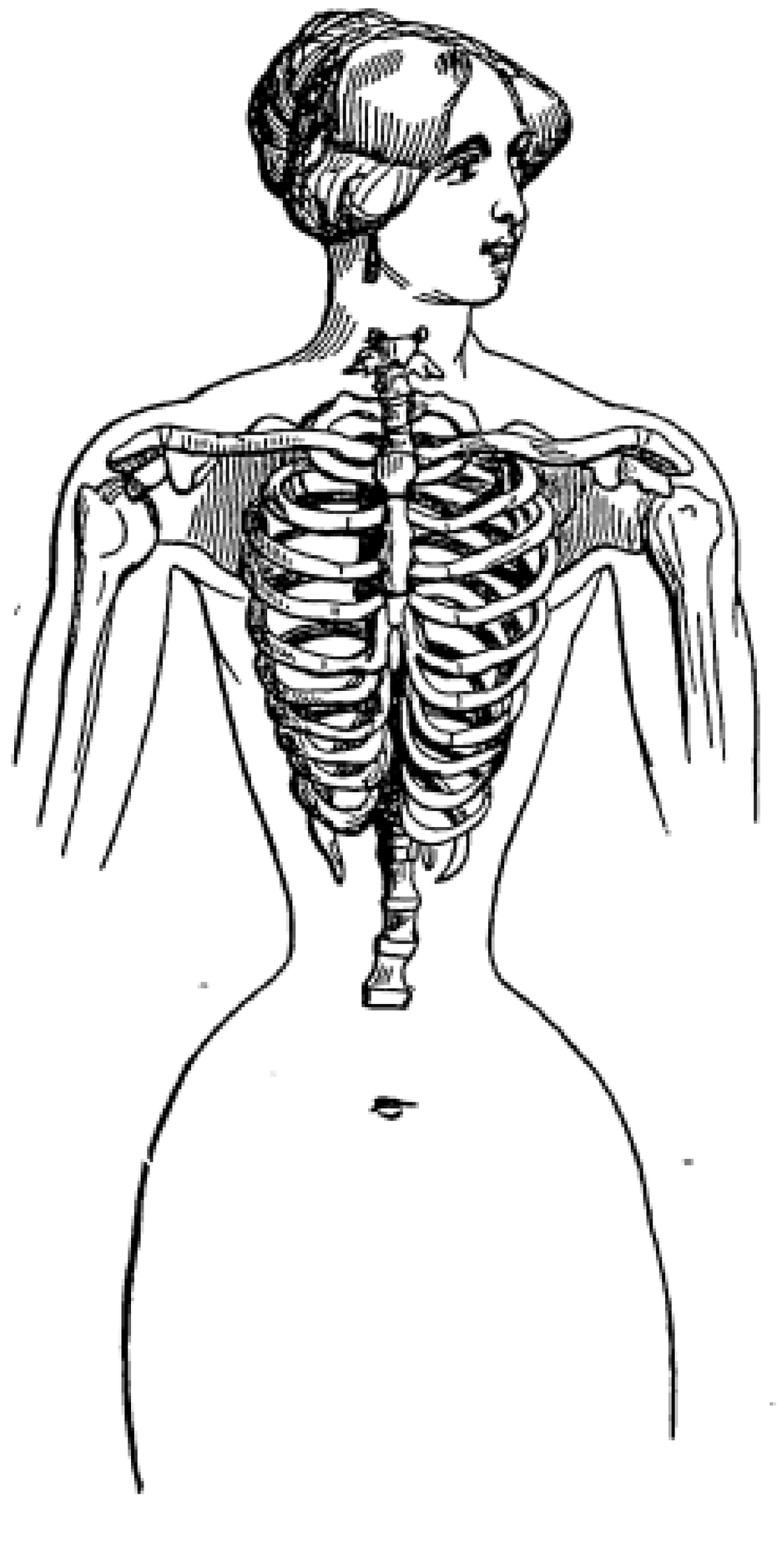

Fig. 51. Deformity of the chest caused by stays.

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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."

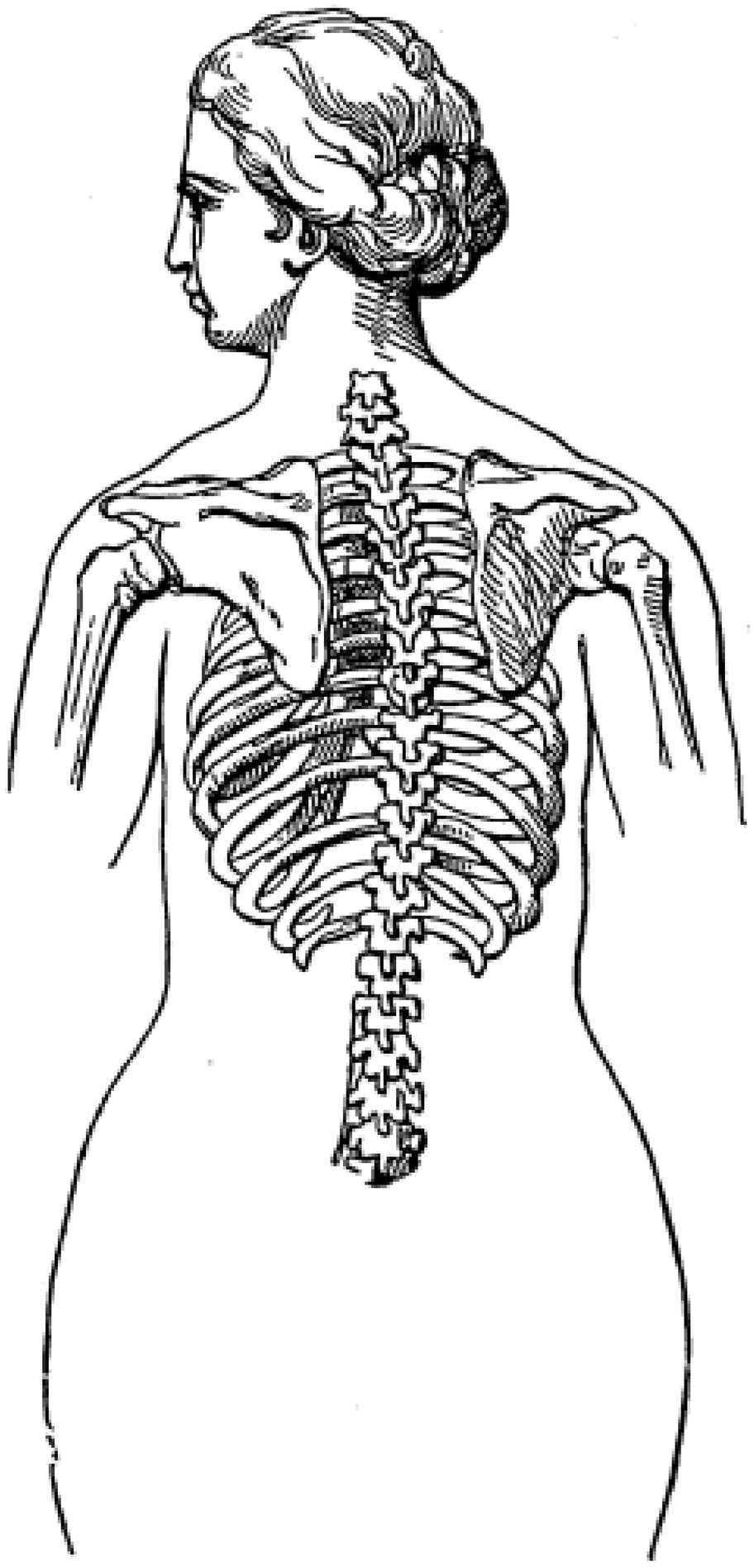

Fig. 52. The natural form of the spine.

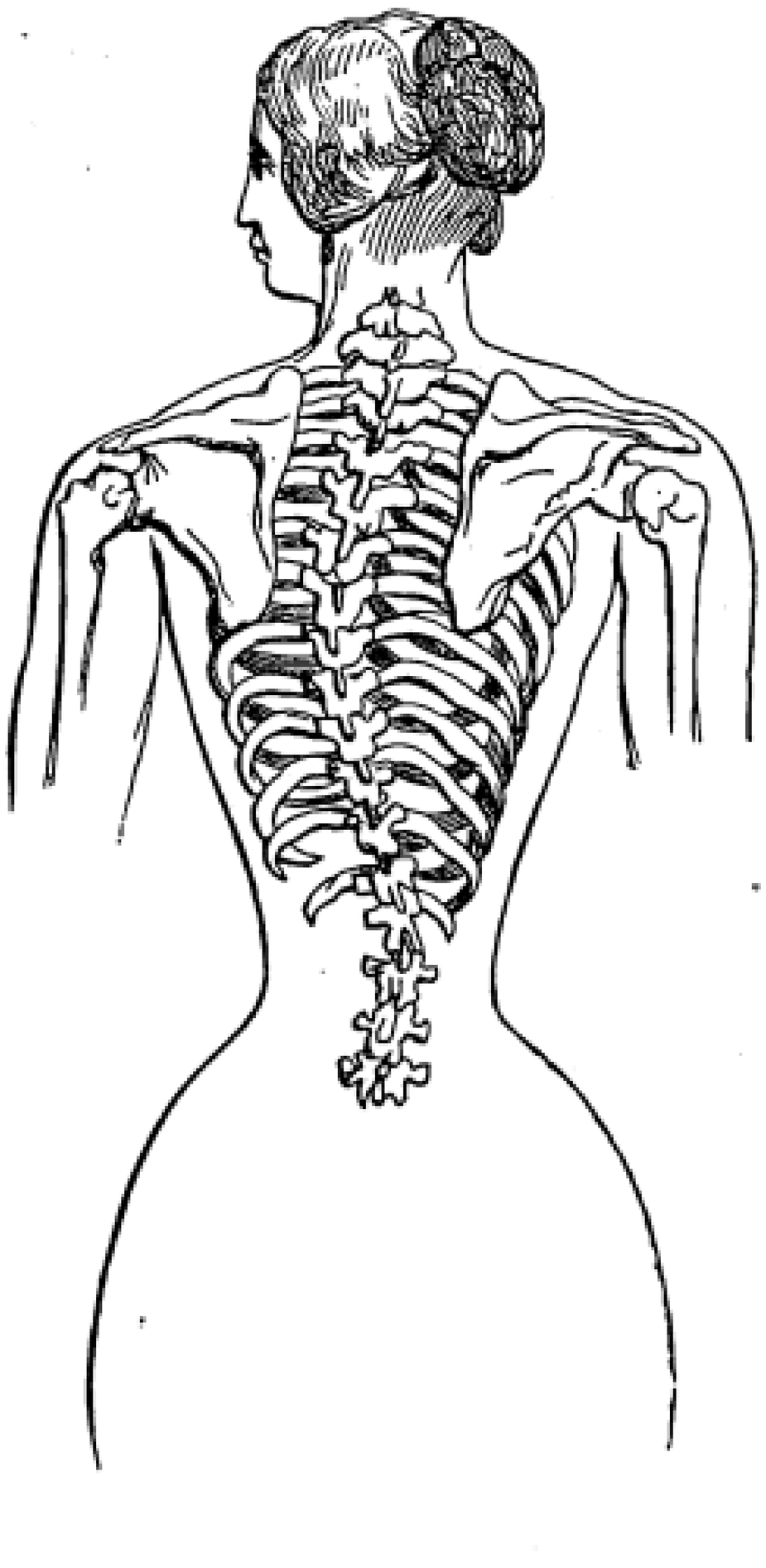

Fig. 53. Spine deformed by stays.

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.

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PHYSICIAN TO THE PRIVATE INSTITUTION FOR THE TREATMENT OF DEFORMITIES AND CHRONIC DISEASES BY MOVEMENTS AND THE RUSSIAN BATH, IN OLD CAVENDISH STREET, LONDON, AND TO THE INSTITUTION IN GLOUCESTER PLACE, BRIGHTON.

LONDON:
GROOMBRIDGE & SONS, 5, PATERNOSTER ROW.

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NOTES

ON

THE MOVEMENT-CURE,

OR

RATIONAL MEDICAL GYMNASTICS,

THE DISEASES IN WHICH IT IS USED,

AND ON

Scientific Educational Gymnastics.

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