The Osteology + Treatment of Laternal Curvature
of the Spine

I declare that the work of this thesis has been done and the thesis composed entirely by myself.

A. A. Kettie...
(X) **Etiology**

The etiology of scoliosis is a subject upon which there has been, and still is, the greatest divergence of opinion. The muscles, ligaments, and bones have each been put forward as the tissue most at fault. Probably the difficulty in assigning a cause for this condition arises from the fact that there is no certainty of lateral curvature, but many exciting causes and many predisposing circumstances; that different types of the deformity are caused by different exciting agents, that in many cases there is a multiplicity of causes. That the exciting causes are, we are not, in the present state of our knowledge, able to define. It is in many cases, but it is beyond doubt that heredity is an important factor. Indeed the exciting cause in a considerable number of instances, the last empyema, various forms of central paralysis, Ritter's disease, miscellaneous causes (such as loss of an arm) directly account for a sprinkling of the cases that are met with.

On approaching this subject one is at once struck by the marked liability to this affection of the female, in comparison with the male, etc.

Adding together the statistics collected by Adams, Kohlerken, Nottel, Rott, Rehbraun, and Holdborg, the affection was found to exist in 1974 girls to 365 boys, or in the proportion of about 5 girls to 1 boy. This circumstance has led certain surgeons to the belief...
belief, that the increased activity of the ovary at the
menstrual period has some influence in the elevation
of the curve. This theory has its chief supporter in
Dr. Benjamin Lee of Philadelphia, who explains its
action in the following way:
He believes that at the menstrual period, the ovary is
thrown into a state of intense excitement, which awakens
the sacral plexus into a condition of sympathetic energy.
In many cases the unusual stimuli is communicated
to the muscles which take their origin from the pelvic
nerve inserted into the spine; the result is backache
due to the contraction of these muscles. The natural
means taken to relieve the pain are suggestive: the girl
lies down with the hand or some other firm body
in the arch formed by the contraction of the muscles,
thus allowing them to relax. Then the flow of blood has
reached the ovaries, if their congestion the excitement
diminishes, and the spasmocic contraction of the pelvic-
spinal muscles subsides, only to be renewed at the
next menstrual epoch. These muscles subjected at
frequent intervals to undue irritation may pass into
a state of abnormal irritability, and, for any reason,
then of one side act more vigorously than their fellows
the result must be a gradual inclination of the spine
to the side of preponderating contraction. The pelvic acts
as a fixed point, and the muscles act upon the spine
as the radius of a circle; it thus follows that for the
maintenance of equilibrium, as small curve is the
Towards the lumbar region intensitates a large dorsal compensating curve. But there is an indirect action upon the equilibrium which must not be overlooked, which throws some light upon the subject. Every time that a vigorous effort is made with the right arm the weight is thrown upon the left leg; this is done with the intention not only of preserving the equilibrium but also of obtaining a firmer basis of support. The result is that in the majority of persons the left leg becomes the stronger and better developed, thus the厮lociparai muscles naturally become. If these muscles are in a state of abnormal irritability it is not difficult to understand that their continued action would soon produce a primary lumbar curve to the left, followed by a dorsal compensating curve to the right.

Kottek in 229 cases of which the cause was not evident, found that 52 per cent began between the ages of 1 to 12

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<thead>
<tr>
<th>Age Range</th>
<th>Percentage</th>
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<tr>
<td>1 to 12</td>
<td>52%</td>
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<tr>
<td>3 to 4</td>
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<td>after 18</td>
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Eulenburg in 1000 cases found

<table>
<thead>
<tr>
<th>Age Range</th>
<th>Number</th>
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<tr>
<td>1/2 time of birth to 6th year</td>
<td>78</td>
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<tr>
<td>6th to 7th year</td>
<td>216</td>
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<tr>
<td>7th to 10th year</td>
<td>564</td>
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<tr>
<td>10th to 14th year</td>
<td>107</td>
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<td>after the 14th year</td>
<td>35</td>
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Thus he found that 85.8 per cent occurred before the 10th year of life.

The consideration of these figures carries us back to a period of life much before puberty in the search for the common causes of scoliosis, and we find that the period most congenial to the disease lies between the 6th and 10th years. It is at this period that the ways of the male and female child begin to diverge. The boy is encouraged in the exercise of athletic games; he is dressed in a loose flowing costume which exercises the least possible control upon the movements of his muscles. His attitudes at school, which are faulty as those of the girl, have their ill effect counteracted by his more vigorous life during play. The girl, on the other hand, is now instructed in the mysteries of needle work; she is developed in stunts simplified with the importance of relieving herself with gentleness; her rate of growth both physically and mentally is also more rapid than that of the boy during this period, while her muscles are restrained in their development by the engraving laid upon all that is considered "rough play." As in the case of the boy, her attitudes in school are faulty; but these faulty attitudes are continued in her letters of leisure which at her needle work. Often the muscles which maintain her equilibrium are still further weakened by the fact that she rests, as it were, upon her elbows as a means of support.

There is still another consideration which must be taken into account not only in the liability of the female sex.
to Scoliosis, but also in the determination of the direction of the curvature. The strict physical training of the boy tends to make him use both hands; in his cricket, football, gym, swimming, & other recreations, both sides of the body are called into increased activity; whilst the girl mainly uses the right hand in her laborsious efforts, and learning to sew or play the piano, thus in her James, this characteristic follows her through her whole life.

What is the result? Her eye posture is arranged to suit the use of the right hand; the muscles of her left leg & pelvis, from which she obtains her joint & apparent, are relatively increased, & so it is little wonder for surprise that these pelvis & spinal muscles so favourably placed, should by gradual degrees obtain a preponderance over those on the right side; & partially by their increased action, partially by the loss of tone in those on the opposite side from straining, should draw the lumbar vertebrae down towards the left side of the pelvis, & in the course of this establish a curvature of the lumbar vertebrae with a convexity to the left. A faulty position having once been established, a new factor in the causation of the curve with rotation comes into play, namely the superincumbent weight.

Bradford & Boston has made experiments on the cadaver for the purpose of ascertaining whether it is possible to produce such changes as are found in Scoliosis by the application of pressure directed upon the spine from above. It was found that when downward pressure
was exerted upon the spinal column in an erect position, a
bending backwards of the spine was first produced, which
after reaching a certain point became a lateral bending
accompanied by the typical rotation. In the course of the
experiments it was found to be impossible to prevent the
weight from coming somewhat obliquely upon the spinal
column, and the more obliquely it came, the more marked
became the kyphosis.

Curvature in the rotation may readily be produced by the
beautiful experiment of Sir Charles Bell. The vertebrae
of a normal spine are strung on a rod which is flexible
lateral, the spinous processes are hinged in the
lateral expansion by elastic spinal rives. The column
thus arranged exhibits rotary lateral curvature when
subject to downward pressure, when the middle of the
column is restrained a compensatory curve with an opposite
rotation is also produced.

The rotation then is a purely mechanical feature, but
is due to the superimposed weight acting upon a
spinal column which is out of plumb.

In the rotation of a single vertebra it is seen, that the
body makes a much wider excursion from the median
line than does the spinous process; the apex upon
which this rotation takes place is found to be at a
point some distance directly behind the spinous process.

(Fig. 1). The anterior parts of the spinal column, namely
the bodies, are first to move laterally in the cavities of
the thorax and abdomen, while the posterior parts of the
Column.
column, namely the processes, are prevented from the same
degree of lateral deviation by being held more securely in
position by the muscles fascia ribs composing the
posterior fascia. This theory will be found to conform
with the phenomena which actually take place in
eclissia. The rotation is greater or less according as
the curvature is greater or less, in the compensating
curve the rotation as well as the curvature is reversed.
In the cervical region there is no rotation as there is
an equal corresponding to that of the thorax and abdomen.
The position of affairs then is as follows — the lumbar
vertebrae are out of plumb being drawn down towards the
left side of the pelvis; the centre of gravity being thus
displaced the superincumbent weight falls obliquely
upon the lumbar vertebrae mechanically producing their
rotation; the inevitable result is that to maintain
the equilibrium a dorsal compensatory curve is reestab-
lished with its convexity to the right.
So far the condition of the long flexor spinal muscles
has alone been considered, there still remains for
examination the condition of the short, intrinsic,
muscles which run from one vertebra to another.
And here it would appear that the condition of things
is reversed. The processes on the convex side of the curve
are found to be separated from one another by a greater
distance than those on the concave side, and hence it
follows that the muscles on the convex side are
continually stretched and thereby being deprived of their
strength.
weakened; select those on the concave side, in contact with the moment of rotation, to produce a compensating curve below so as to retain the body in the erect posture, by the approximation of their two ends. This theory of curve formation, as high an authority as Editor, also supports it, that repeated continuous action of the spinal muscles is necessary for the preservation of the erect posture; in support of this proposition may be mentioned the frequency of occurrence of scoliosis, as well as occurs, in persons: hypertrophic spastic, etc., according to case. An atrophy of certain muscles, particularly those of the back, is commonly observed in conjunction with a consoros of certain others.

In opposition to this theory must be placed the opinion of Adams, who believes that in the early stage of lateral curvature, the muscles are passive, but as the curvature increases the muscles on the convex side of the curve are called into increased action serve the purpose of counteracting the increase of the curve. This, however, does not appear to be borne out by established facts, as a muscle which is unduly stretched does not tend to atrophy, but on the contrary towards loss of tone or ultimately atrophy.

All the phenomena which have so far been described occur in the latitudinal, or, as both terms it, Postural stage of the disease, but in the course of months or it may be years secondary changes take place in the bones. At first the increased pressure checks the growth of the vertebrae on the concave side of the curve, but in time a gradual...
gradual absorption of that side of the bodies occurs causing still further accentuation of the curve.

That faulty position is the determining element in certain cases of lateral curvature is shown by a case reported by a French surgeon. In this instance, two twin sisters were obliged to sit upon the same school bench; they developed lateral curvature in opposite directions. It was found on examination that they were crowded from narrow seats, in order to give each other more room, they leaned upon opposite elbows producing eventually lateral curvature.

It is not uncommon that many cases of scoliosis cannot originate in the way which has just been described. Many begin before the period when faulty positions are assumed for long periods, at the time when the children are without restraint; there is no difference in the treatment of the sexes.

It is in this class of cases that Rickets appears to be the determining agent. In what way does rickets act in producing the scoliosis? Is the change primarily bony, ligamentous, or muscular? It appears to me that it is as a rule mechanical. It is well known that the curvature of the spinal column most commonly produced by rickets is one long gentle hypnosis from the cervical to the sacral vertebrae; that this is caused by the superincumbent weight as in the case of the curves of the long bones. If the results of the experiments before described performed by Bradford be applied
applied to this condition of the spine, it will be seen that if this backward bending is continued beyond a certain point, a lateral bending with rotation must necessarily occur. The softness of the bones, the nature of the ligamenta, the general elasticity of the muscles, and the predisposing circumstances; they place the spine in a favourable condition for the development of the curve, and the primary cause lies in the enervating weight. It depends then entirely upon the degree of hypophysis whether the result is what is usually called a Ricketty Spine, or whether it proceeds to Scoliosis.

A. H. Tagge, however, looks upon the primary change as being bony. He states that in the very early cases that he has examined during the first four or five years of life before any particular dorsal rotation could be observed, when the child was bent forward he has found a deviation at the lumbo-sacral junction as if it were a starting point of a curve which was to develop later on. The external appearance gave him the impression of a softened and distorted lumbar vertebrae.

It appears to me however, that this appearance may be in reality the commencing primary lumbar curve with rotation, and would naturally be increased by bending the child forwards. All the conditions point to the lumbar region as the most likely situation for the development of the primary curve; the lumbar vertebrae are not supported as are the dorsal by the ribs.
ribs, the intervertebral discs are thicker than those in the dorsal region. There is more movement between adjacent bodies, the normal relations of the lumbar vertebrae are more disturbed by the antero-posterior roidity curve than are the dorsal. The normal direction of the lumbar curve, namely with its convexity to the left, is probably determined by the fact that, as Strümpell has shown, the centre of gravity in the upper lumbar region lies in most cases to the right of the median line; therefore would there be a tendency to bring the upper lumbar vertebrae to the left of the median plane in order to place the centre of gravity over the middle of the base line.

Amongst the cases where the cause is evident may be classed those resulting from:

1. Encephalitis
2. Central Paralysis
3. Sympathetic Paralysis e.g. Infarctus Paralysis, Syringomyelia
4. Miscellaneous causes, e.g. the loss of an arm etc.
5. Pseudo-epiphysial Paralysis

Comment upon the obvious manner in which osteitis is produced by the first five of these conditions would be superficial.

The lateral curvature in Pott's disease however deserves some special consideration. It is often to be seen very early in the disease, before it is conceivable that much destruction can possibly have taken place in the bones. In these cases it seems to me that it is probably due to a reflex contraction.
contraction of the intrinsic muscles on the side of the spine on which the disease begins, so that the contraction takes place for the purpose of preventing movement in the vertebral joints.

It is not contended however that the lumbar curve is invariably the primary one in scoliosis. It is evident that in the deformity following injuries the primary curve occurs in the dorsal region, but in infantile paralysis it may occur in any region of the spine; but from the evidence adduced before it would appear that the lumbar region is the most frequent seat of the primary curve.

**Treatment**

The treatment of scoliosis may be defined as consisting of (1) the correction of flexible curves and prevention of bony changes and (2) the limitation of severe curves, preventing an increase or relieving the symptoms in the severest forms. Keeping this definition in mind, it is obvious that the treatment must be varied to suit individual cases, that the exclusive use of one method of treatment is unscientific. In many cases of us avoid that, like all treatment, it has its limitations.

Before proceeding to the treatment it is well to take an accurate measurement of the deformity so that the result of the treatment may be easily followed. For this purpose, the method of Pearson or the method of Ewerd Blasch seems to be the most convenient.

The patient standing without shoes is placed in front of the surgeon with the clothes removed to a point well below
the side erect, so that the greatest extent is visible. Any
difference in length of the legs is notified by placing a
suitable block under the shorter limb. The trunk is then
folded as far as possible, the knees kept extended, and
the arms allowed to hang down loosely so that the
scapular muscles are thoroughly relaxed. The end of a
pliable extensible tape is then fixed by the left hand at
the lower angle of the left shoulder blade, the tape is
carefully wounded close to the ribs across the spine to
the lower angle of the right shoulder blade. Having
marked the tape at the point where it crosses the dorsal
gniss, it is placed upper edge downwards onto a sheet
of paper and tracing taken on its inside, marking
especially the spot representing the spine.
Similarly a tracing is taken of the trunks underlay on each
side between the last ribs and spine erect.
In cases of extreme severe deformity it is desirable to
take the tracing of the ribs from the top of the left
apex to the corresponding place on the right side.
The rational treatment of any given case of scoliosis
naturally depends upon the discovery of the cause.
Constitutional treatment may or may not be necessary
according to the condition of the individual case; any
evident defect such as short sight must be rectified.
The first step in the treatment then is to search for
the cause, after that purpose it is well at once to
place the patient in the best possible position
after the manner of Roth (figo. 3 74). This simple
procedure...
proceeding at once gives important information as to four points, namely—
1. If the curvature is due to paralysis of the spinal muscles, no voluntary effort of the patient can improve the position.
2. If the curvature is in the forward or non-paralytic stage, the best feasible position is the normal position.
3. If the curvature is in the backward stage, it can voluntarily be improved but cannot utterly be rectified.
4. It is a good index to the amount of improvement which can be gained by treatment in the non-paralytic cases.

In the first of these classes, the Paralytic cases, it is obvious that exercises and gymnastics would be useless at first; it is here necessary to use some form of support to relieve the spine from the injurious weight pressing upon it, to prevent any change whatever of the curve. The best form of apparatus is that to which individual surgeons are most accustomed, but to be efficient it should comply with certain conditions—
(a) It must take its bearing from a fixed point, namely the pelvis.
(b) It must take the injurious weight off the spine.
(c) It must not press upon the paralyzed muscles, thus hinder their growth.
(d) It must be easily removable to allow of local treatment to the paralyzed muscles.
(e) It must be easy of accurate application by the friends.
(f) It is well that it should draw the shoulders backward, so as to produce a slight amount of lordosis.
It will be seen from the foregoing conditions that plaster of Paris jackets are by no means approved of in these cases, even when applied with the supine position being removed by extension.

The apparatus should be worn day and night at first, only removed two or three times a day so that local treatment can be applied to the muscles. This local treatment should consist in massage, electricity, injections of strychnine in solution, or the use of the analgesic muscles, if desired. All these applications should be carried on while the patient lies in the prone position or at Bradford's board (Fig. 546) or some such apparatus.

The apparatus should be removed and reapplied while the patient is in this position, the spine should not once be allowed to assume the faulty posture.

When it is apparent that the muscles are recovering from their paralysis, the apparatus should be removed by the surgeon with the patient in the standing position, for the purpose of testing the muscles.

Drawings of the neck, chest, and other regions are again taken, the patient is directed to assume the best possible position. If there has been no worse change, the patient is able to assume the normal position of only for a few seconds by a great effort, the apparatus may be removed during the night or soon afterwards for the greater part of the day. No other postural method with exercises should be carried out, the apparatus only being reapplied when the pain and fatigue are excessive.
exercises. As the pain and fatigue become less the apparatus may be gradually discontinued for longer and longer periods and at last entirely given up, the patient then distanced making use of Bradford's board, either lying in the prone position or using the roller to stretch the antero-posterior curves of the spine, at the same time apply a kind of massage to the muscles. (Figs. 7 & 8.)

Remembering however should not be maintained for a longer period than is necessary for the relief of pain and fatigue, after which it will not usually exceed one hour. The apparatus should be discontinued with as early as is comfortable with safety from relapse, and can only be determined by experience and the degree of frequent training of the deformity.

Exercises for the muscles of the spine can readily be devised by the surgeon; they should be easy of comprehension and period as to keep up the interest of the patient and friends, so it is to them that the surgeon must look for efficiency in carrying them out. The treatment should be continued until the patient is able to remain in the normal posture without any effort during the whole day.

Then there has been obvious change, the treatment of first aims at prevention of increase in the curves recovery of the muscles. When the muscles have recovered from their paralysis the apparatus should still be worn during the day until the best possible position can be maintained with comparatively little effort, but may be left off at night at first by gradual degrees for longer periods.
During the day, frequent exercises of the deformity being taken through postural treatment with exercises carried out. The exercises in these cases can be carried to a large extent of movements designed to straighten the curves, at first performed with assistance but finally against assistance.

Are there any means by which the various curves can be reduced? Within recent years during the Vienna, Kussell, Hoffer, and Badland, have advocated the employment of force for the purpose of stretching the contracted ligaments, fascia, and muscles which hold the spine in the deformed position. They have shown that much may be gained by the daily application of properly directed force.

The simplest method, therefore, the most generally useful, appears to be that devised by Bradford of Boston. The superincumbent weight is removed by the recumbent position of the force is gradually increased, so that at first but little strain is used, but the amount can daily be increased as the patient becomes accustomed to it. The apparatus consists of a board at one end of which there is attached a firmly padded roller, 8 inches high. At one side of the board is fastened a wooden bar, padded about its middle, which is used as a lever (Fig. 5). If the curves in the ordinary case, the patient lies with the left shoulder resting upon the roller, a firm pad is placed beneath the ribs on the left side. Pressure is made with the lever upon the projecting ribs (Fig. 4). The rollers can also be used for stretching the anterior posterior curves.
amours of the spleen (Fig. 3), as a means for the firm position during recumbency (Fig. 7).

In the absence of this apparatus, simpler means can be used. The patient is placed upon the floor or a hard couch, the hips or shoulders raised by placing a firm cushion underneath without manual pressure, or pressure by weights e.g. sandbags, exerted upon the projection. Flexible corset can also be applied by means of lateral traction. The patient is suspended to remove the superimposed weight. The traction shall be applied by means of straps as the case may indicate.

As soon as it is perceived that a gain is being made upon the deformity, the special support should be so altered from time to time as to retain the column in the corrected position and prevent relapse.

In those advanced paralytic cases the treatment should be continued to a greater or less extent, during the whole period of bony growth. It must be confessed, however, that the treatment in many of these cases is not very satisfactory in its results.

In the Bectley cases, the treatment is similar to that used in the ordinary paralytic cases. The indication is to remove the superimposed weight by means of an apparatus. The support should extend from the pelvis to the upper limit of the shoulders, and should tend to produce slight lordosis. Appropriate constitutional treatment should be carried out, and the local treatment should be persisted in, until all active constitutional symptoms of relapse have subsided.
In the cases due to Pott's disease, a similar local treatment should be followed. In these cases, however, a plaster of Paris jacket may be applied with advantage provided that the bony disease is not situated above the 7th or 8th dorsal vertebra. When the disease is situated above that point, if plaster is used a jury count should be added, as the jacket alone is not able to remove the superincumbent weight. The appropriate treatment of Pott's disease in these cases acts as a prophylactic to the deformity.

In the large class of cases which may be termed Pott's disease, it will be found convenient for the purposes of treatment to arrange them into groups as follows:

1. Cases in Initial stage. No serious deformity.
2. Cases in stage of Development. Occasional deformity.
3. Cases in stage of Arrest.

A determination of the stage is made upon the result obtained by placing the patient in the best possible position, and the treatment must be varied in accordance with the stage of the deformity.

1. Initial stage. In this stage the curve is a flexible one entirely disappears during recumbency, suspension, or while the patient is in the best possible position.

No contraction of the intervertebral ligaments has been established and there is no change in the shape of the bodies of the vertebrae.

The indication is to correct faulty attitudes and reeducate the muscles to their proper action in maintaining the normal
normal equilibrium of the spinal column. For this purpose
attention must be directed to the use of proper seats and
docks, the wearing of suitable clothing, and the performance
of exercises deemed to throw into action all the muscles
which assist in preserving the normal equilibrium.

The exercises which will be found most suitable are:

(a) Deep respiration lying on supine position, for the
purpose of exercising the muscles of respiration expanding
the chest.

(b) Extension motions of the limbs as made use of in
army drill, but lying in supine position.

(c) Rotation motions against resistance (1) of the
shoulders with the pelvis fixed, and (2) of the pelvis with
the shoulders fixed, in the standing position.

(d) Flexion and extension movements of the spine against
resistance lying (1) in prone position, and (2) in supine position.

The patient should count aloud during the performance
of these movements.

In many cases when there is great debility it is necessary
that the simpler movements should alone be carried
out at first with assistance, but the more complex
movements may gradually be added as resistance applied
as the muscles gain in strength.

The development of the muscles is materially assisted
by the application of massage. This is carried out by
percussion along each side of the spinal column, but
principally directed to the stretched muscles on the
convexity of the curves, at first applied lightly but
but by degrees more vigorously as the patient becomes accustomed to it. A record of the progress should be obtained by taking occasional tracings of the deformity. Supports prolonged recumbency are not only useless but actually injurious in these cases, as they tend to produce weakness of the muscles through disuse.

The treatment should be persisted in until the actual position becomes the habitual one, an average of about one year altogether, according to Beth, unless must be guarded against by a healthy, rational course of physical education.

Stage of Development. In this stage it is impossible to correct the organic changes which have already taken place in the bones. The best possible position gives the prognosis of the amount of benefit which may be expected to result from treatment.

In the less severe cases in this stage, the treatment to be pursued is exactly similar to that used in the initial stage, with the addition of methods of feasible correction for the purpose of stretching contractions. The effect of treatment should be carefully followed by the taking of frequent tracings of the deformity and the exercises modified accordingly. If in spite of treatment the deformity progresses, a dorsal support should be applied to restrain its further development, of the exercises persevered with in the intervals since the support is removed. The support is, however, rarely requisite in these lighter cases.
if the postural treatment is carried out efficiently.
In the more severe cases in this stage the spinal support becomes proportionately more requisite. It should never be applied, however, unless the deformity is found to be steadily progressing under the postural treatment, and should be dispensed with as soon as is comfortable with safety. The time when it is safe to leave off the support must in each case be determined by experiment. A tracing of the deformity is taken weekly, the result obtained acts as a guide to the future treatment. If the deformity improves or does not progress the support is unnecessary, but if the deformity again progresses the support must be resumed, and future experiment made to determine its continuance.

To sum up—In each case the postural treatment with possible methods of correction should be efficiently carried out at first, but if the deformity is found to be progressing a support should be applied, to be removed at the earliest possible time.

Stages of Arrest. Roughly it may be said that a curve cannot be regarded as having reached the stage of arrest until ossification has been completely established. There are some exceptions to this rule. In some cases the curve will be found in some instances to increase even in adult life. These cases are rare. On the other hand there are cases, they are not very uncommon, in which curves...
formed in early childhood remain unchanged through life. Spontaneous correction of the curve has never been observed.

Ordinary as treatment is requisite in this stage, but in some cases it is necessary to alleviate symptoms. Stiffened corset, light appliances, reassurance, self-suggestion, massage and electricity will sometimes be found of assistance in alleviating the distress and discomfort caused by the superimposed weight falling unequally; much relief may be obtained by thorough Portrait treatment.

The duration of the treatment in these encore cases is necessarily longer than that of cases in the corrected stage, the liability to relapse is greater. Roughly it may be said that the treatment should extend over the whole period of bodily growth.

The treatment of scoliosis is not a subject in which brilliant results may be obtained. It is only by painstaking efforts for care of duty on the part of the surgeon, with the heartiest cooperation on the part of the patient and his friends that their trouble some deformity may be alleviated, so that the treatment will not end in disappointment.

D. A. Kelle

April 1893