THE ELEMENTS

OF

KELLGREN'S MANUAL TREATMENT.

Being a Thesis for the Degree of M.D. of

Edinburgh University,

by

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April, 1901.

I N D E X.

CHAPTER I.

I N T R O D U C T O R Y.

Although massage and medical gymnastics seem to have been in use as far back as authentic records of history can lead us, the first to attempt a movement cure on a scientific basis was the Swede, P. H. Ling.

Ling was born in Ljunga in the south of Sweden in 1776. Having matriculated at the University of Lund in 1793, he commenced the study of divinity, intending to follow in the footsteps of his father. He graduated in 1797, but his restless spirit rebelled against a sedentary life; he wished to travel and accordingly left his native country for the Continent. He first visited Copenhagen; but after that his movements are not very clear; it is believed that he in turn visited Germany, France and even England.

Suffice it to say that a few years afterwards he/

he acquired a reputation as a master in the art of fencing and gymnastics.

The many privations which Ling had to undergo while on the Continent in consequence of pecuniary difficulties had resulted in serious damage to his health. In 1804 we find him with a debilitated constitution, a constant martyr to rheumatism. His bodily ailments, however, did not keep him from pursuing an active life, and in the beginning of last century on returning to Sweden he was soon engaged in giving fencing lessons.

Ling found that the movement and exercise which he got in his daily work soon improved his condition and shortly after his appointment in 1805 as fencing master to the University of Lund, he found that his rheumatism had left him and he had regained his usual strength and vigour. The beneficial results he had obtained in the exercise of his art turned his thoughts in a new direction. What had been beneficial for himself might be beneficial for others, and he came to the conclusion that it ought to be possible to devise various movements with different physiological effects for the treatment of different ailments. He likewise argued that another series of movements could be invented which would tend to keep healthy persons in that/

that condition and strengthen them by developing their bodies equally in all directions.

To organise and carry out these views on a scientific basis, he saw that it would be necessary to study anatomy and physiology. Accordingly, he requested permission from the Senatus of the University of Lund. This was readily granted and in 1806 he commenced the systematic study of these subjects; in the course of a few years he was able in addition to go through almost the entire medical curriculum, without, however, taking any degree.

Armed with the extensive knowledge thus obtained Ling by adapting and modifying some of the movements that he had learnt on the Continent, and by inventing new ones, at last produced a practically new system of gymnastics, which is called after him.

This system is divided into four branches:--

1. Pedagogical, in which the individual learns to bring his body under his own control.
2. Medical, the purpose of which is to alleviate or cure diseased conditions.
3. Military, in which the individual learns to bring an external object, such as a weapon, under his will and control.
4. AEsthetic, in which the individual learns to express his thoughts and feelings.

For my purpose, here, we have only to do with the medical branch of the system; but in order to fully/

fully understand it, it is necessary to have an accurate knowledge of pedagogical gymnastics, as the former is to a great extent built upon and evolved from the latter.

Ling's system soon awoke public interest, though his attempts to get the Swedish Government to assist him in founding an institution were at first futile. However, in 1813 the Royal Central Gymnastic Institute, subsidized by State, was opened for him in Stockholm and he was appointed at the head of it.

The medical part of his system the profession did not take to readily at first and did all it could to prevent its gaining ground. Ling and his pupils, however, persisted in their efforts to get a recognition from them, by showing them practically what they could do - and finally attained success, although this took many years to effect.

Ling died in 1839 and according to his own words, left behind him only two men who really understood his system and who were capable of furthering its progress and aiding in its development. These were Gabriel Branting and Augustus Georgii.

Branting, already installed at the Institute as one of the head instructors, stepped into the chair rendered vacant by Ling's death. When Branting/

ing resigned in 1862, Georgii was invited to succeed him, but declined, chiefly because he was attempting to introduce Ling's system into England and did not wish to leave the field of his labour.

Both Branting and Georgii were assisted in their work by Hjalmar Ling (son of P. H. Ling) who was as energetic as either in trying to get his father's system known and in developing it. He was teacher in anatomy from 1851-64 when he was appointed Professor in Pedagogical Gymnastics at the Institute and retained that position until 1882. Together with Thure Brandt, who specialised in the gymnastic treatment of female diseases, all the aforementioned must be regarded as the pioneers of the system and as those who did most for it.

None of them, however, were medically qualified, although, of course, they had minutely studied anatomy, physiology, pathology, etc., without which knowledge they could never have made any progress. Though the results of the system had been recognised by the medical profession, but few of them thoroughly studied it with a view to practising it personally. One of the few who did so was T. J. Hartelius, M.D. who made a speciality of it and who was appointed head of the medical department at the Institute, with the title of Professor in 1865; he retained his/

his post there until 1887, when he was succeeded by Robert Murray, M.D., who holds it to the present day.

To graduate as a giver of Ling's medical gymnastics, the complete course at the Central Gymnastic Institute must be gone through. The time of study is 3 years in the case of laymen, and 1 year for medical men. The complete course for the latter, such as I attended in 1898-1899, consists of practical and theoretical instruction in pedagogical and medical gymnastics; the abbreviation of time as compared with the course for ordinary persons, is due to the fact that military gymnastics are not deemed essential for a medical man and he need not, of course, attend the classes in anatomy, physiology, pathology, and symptomatology. At the end of the time, after duly passing all examinations, etc., the candidate receives the title of Gymnastic Director, which legally entitled him to practise as a medical gymnast and places him under the jurisdiction of the General Medical Council.

In spite of the fact that there is a special course for medical men of much shorter duration than for laymen, very few avail themselves of this, and continually there have been complaints that doctors come from various parts of the world to Stockholm

Stockholm and pay casual visits to the Institute varying from a few hours to a few weeks, and then return home and pose as authorities on the subject. Thus we read in Hjalmar Ling's preface to Branting's "Efterlemnade Skrifter", 1882, pp. 46 and 47, that many countries "have in the course of years every now and then sent here so-called competent persons, who have stayed in Stockholm a few days, eaten stately dinners, looked on at the gymnastics, without taking part in them practically, and who understood nothing - neither the language, nor the subject." Such complaints are to be heard even to-day and Professor Törngren (now head of the Institute) and Professor Murray have frequently been heard to deplore the fact that such flying visits are the rule and not the exception.

According to competent persons, the minimum time in which medical men can acquire a proper knowledge of the system is one year, a fact shown by the length of the special course for them at the Institute. In consequence of the above mentioned casual and hurried visits from various persons, the literature of the system has suffered a good deal; for in the absence of knowledge of it and of the Swedish language, many authors desirous of writing about it, have been compelled to fall back on former works published/

published by persons similarly badly informed. In this way we find that there is a very extensive literature about Ling's system, but from it one can only pick out very few works which have any real value. Even in Sweden itself, some authors, relying on the fact that they were Swedes, and that Swedish gymnastics are held in high esteem, have taken it upon themselves to produce handbooks of medical gymnastics and other smaller productions, without however their knowledge of the subject justifying them in so doing.

From the very nature of Swedish medical gymnastics, various persons have argued that one might invent machines, which would replace the manual method of giving the movements, as the latter requires much time and energy in order to be learnt properly. And during the last fifty years the machine method has been largely developed and even proferred by some. This is due in a great extent to the fact that no manual skill is required, that the gymnast saves himself much fatigue and expenditure of time, and that he can have a great many more persons under treatment at the same time. All these are advantageous to the gymnast, but not to the patient, for the following reasons:

(1) Machines cannot well adapt themselves to differences/

differences in height, adiposity, temperament, etc., of different patients. This can be done manually.

(2) Neither can they adapt themselves to the daily variations in individual patients, as the hand and mind of a skilled operator are able to do.

(3) Constant admonition from the operator is needed to keep the patient up to the mark, and this machines of course cannot do. In some machine establishments I have even seen no control at all exercised over the patients, who might do the exercises in any way they pleased! If any pain be caused in doing an exercise, the patient will instinctively restrict his movement, or do it quite wrongly, to diminish this.

(4) Only a limited number of movements can be given with machines.

(5) In addition, the manual method has this great advantage, that by it we can note the changes in size, consistence, position, tenderness, etc., of the different parts or regions, and act accordingly.

The Central Gymnastic Institution never uses any machines to take the place of manual method which/

which is the only one used by them - and the heads of it, Hartelius, Branting, Georgii, etc., have in their writings frequently pointed out the superiority of the latter and condemned the former. Kellgren's treatment, about which I intend to write, likewise rigidly excludes all such mechanical appliances. (See Dr Arvid Kellgren, "Technic of Manual Treatment," 1890, p.5.)

Henrik Kellgren, born in 1837, entered the Central Gymnastic Institute at Stockholm, 1863, and worked there under Professors Branting, Hartelius and Hjalmar Ling until 1865. After leaving, he commenced to practise as a Gymnastic Director. He soon found many shortcomings in Ling's system, which he corrected; and he likewise improved many of the manipulations and added some practically new ones, without however attempting to make these known by writing about them. Not only this, but he brought his treatment into quite new spheres with great success; for he was able to apply it, for example, in the treatment of acute conditions - not merely in such cases as acute joint inflammations, but in those like scarlet fever, pneumonia, typhoid, etc. Among his additions and inventions we must first mention his direct nerve treatment. Although a kind of nerve pressing had been used before to a small/

small extent, he replaced this by nerve frictions and nerve vibrations - infinitely superior methods. These have been able to accomplish so much that could not be done before, that all the medical profession in course of time have had their attention drawn to them; and the name of "Kellgren's nerve frictions and vibrations" is one which is well known to them all.

In the course of 36 years continued practice, Kellgren has been able to introduce improvements into all the exercises he had taken from Ling's original system; he has modified some, discarded others, and invented new ones. These improvements have drawn a well-marked line bwteeen Ling's methods and his, and we can thus regard his system as standing alone, as one complete in itself, and as such it stands ripe and mature for the medical profession generally to adopt. Until now, however, very few medical men have taken an interest in it and the literature on the subject is of the most scanty. The only writings which treat of Kellgren's method, exclusive of a few brief articles in various periodicals, are those of Dr Arvid Kellgren, Gymnastic Director, Stockholm, 1879, M.B., C.M., Edin., 1886 who for many years studied under his brother, Henrik Kellgren, and whose"Technic of Manual Treatment"

was accepted in 1889 by the University of Edinburgh as a thesis for his degree of M.D. with recommendation. No one, however, has as yet endeavoured to give anything like a systematic description.

Neither have the practical results of Kellgren's treatment awakened much interest amongst his own gymnastic colleagues, although some of them have come to him to study this method. Professor Hartelius was one of them; after visiting Mr Kellgren's institute, he wrote a very favourable opinion in "Tidskrift I Gymnastik" (the bi-annual journal of the Central Gymnastic Institute) for 1886, part VII, p.444. Dr Levin, now head of the department for female students in the Institute, did the same in the second number for 1892, page 687, and not only that, but endeavoured to learn some of the manipulations of Kellgren's method that were new to him and introduced them with success into his clinique on his return to Stockholm. See pages 150 , and 304.

In my opinion, the time has come when Kellgren's treatment should be recognised and receive the place it deserves in the world of modern therapeutics. This little work is only meant to try and give an impulse in this direction and to interest the medical profession in its workings. I sincerely trust that it may fulfil its aim and that this treatment will receive the acknowledgement it so richly deserves.

CHAPTER II.

GENERAL CLASSIFICATION AND DEFINITIONS.

As Kellgren's system is founded upon Ling's original system, I shall, wherever possible, follow a similar order to the one employed by text-books on the latter as regards the classification, description, arrangement, etc., of the various positions, exercises and manipulations.

By a gymnastic position is meant that position which must be correctly assumed before a gymnastic movement, whether active or passive, can be gone through, and which must be strictly maintained (with the exception of course of that part of the body that actually executes the movement) throughout its performance from beginning to end. This rule is only relaxed in the case of the patient being in a position of complete rest, when one may allow slight change of posture if it does not interfere with the proper application of the manipulations (See pages 226-227).

To define a gymnastic movement is not easy, be-

cause the word "movement" includes all degrees from the most powerful active exercises to the most lightly applied passive manipulations. The meaning of the word can best be understood from the following classification and description.

Gymnastic movements are divided into:

I. Active, which are of two kinds -

1. Without resistance, called purely active.
2. With resistance, called duplicate.

Duplicate movements are further divided into:

(1) Concentric.
(2) Eccentric.

II. Passive, which are of two kinds -

1. Where a joint or joints are moved.
2. Where no joint is moved.

I. Active movements are such as are performed by an individual with his own strength and by his own free will. As mentioned above,

1. they may be purely active, i.e. where no resistance is offered to the patient's efforts. In this case we have a further subdivision into "free" and "bound"; in the latter steadiness and isolation are secured by means of apparatus or external assistance; in the former no such means are employed.

2. They may be duplicate, which movements are active/

active ones where another individual, henceforth called the assistant, resists the efforts of the patient, or vice versa.

(1) In a duplicate concentric movement the assistant resists while the patient causes his own contracting muscles to shorten; (2) In a duplicate eccentric movement, the patient resists while the assistant causes the former's contracting muscles to become longer.

In rare cases duplicate movements are given so that the assistant offers just so much resistance that the patient cannot overcome it but not so much as to overpower the patient's efforts; no movement at joint actually takes place although the muscles that are called into action work very hard.

II. Passive movements are those executed by the assistant on the patient without the latter offering any resistance or assistance. They may be such that a joint or joints are moved, i.e. they imitate the corresponding active movements, or they may consist in the giving of manipulations such as kneading, vibration, etc., where the joints are kept at rest.

As an extra group, we may add active movements with/

with assistance. By these we mean that in case of a patient not being able to do any movement by himself in consequence of muscular contraction, partial paralysis, adhesion, etc., we can by lending a little assistance, give just so much help that he can perform that movement.

This comes to be of special importance in the treatment of paralyzed conditions.

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CHAPTER III.

G Y M N A S T I C P O S I T I O N S.

I shall now proceed to a brief description of the most important gymnastic positions as they are found in Kellgren's treatment, although between them and the corresponding ones in Ling's system, there is in many cases slight, if any, difference.

I have previously defined what is meant by gymnastic positions and wish again to emphasize the fact that correctness in them is of almost as great importance as is the correct performance of the movements done from them.

Gymnastic positions are divided into

I. Fundamental;

II. Secondary or derived.

The fundamental positions are 5 in number:

1. Standing.
2. Sitting.
3. Lying.
4. Kneeling.
5. Hanging.

1. Standing fundamental position: This is the position which is assumed in pedagogical and military gymnastics when "attention" is commanded. The heels are together, the feet at right angles, the knees straight, the trunk erect and well stretched, the chest well forward, the shoulders drawn back, and down, the head well up and chin in; the arms hang by their own weight, the palms resting against the thighs.

Fig. 1.

2. Sitting fundamental position: The arms, trunk and head are in the same relative positions as in the foregoing; the knees and thighs are flexed to a right angle and the patient sits on a chair or stool; the feet rest on the ground.

Fig. 2.

3. Lying fundamental position: The individual rests from head to heels on a horizontal bench with the various parts of the body in practically the same relative positions to one another as in the standing position. In pedagogical gymnastics, where the individual has to stretch himself as much as possible, this is not quite a position of rest; but in medical gymnastics, where no such stretchings are required, it is one of absolute rest, more so than any other position.

Fig. 3.

4. Kneeling fundamental position: The lower legs are flexed to somewhat less than a right angle with the thighs, and the patient rests with the knees and toes on a horizontal bench. The rest of the body is as in the standing fundamental position.

Fig. 4.

5. Hanging fundamental position: The arms of the individual are stretched vertically upwards; the palms look forward and grasp a horizontal beam or pole above his head, fixed at such a height that when thus suspended the feet do not touch the ground. The rest of the body is as in the fundamental standing position, excepting that the ankle-joints are fully extended. (Fig 5.)

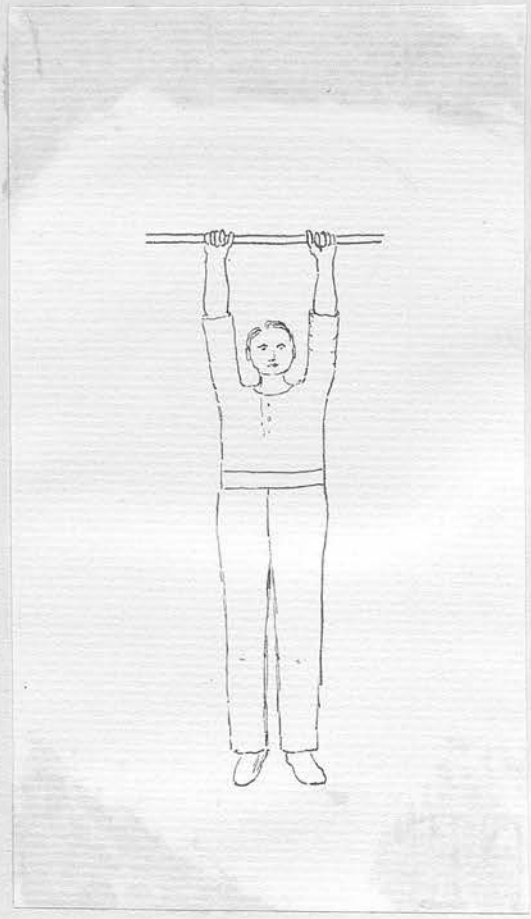

Fig. 5.

The foregoing may be described simply as "standing" or "sitting" positions, the word "fundamental" being omitted.

II. Secondary Positions.

By these we mean positions derived from the fundamental ones or from one another by causing the arms, legs, head or trunk, either one or several, in whole or in part, to assume certain new positions, the rest of the body being kept in its original posture.

Terminology: It is of course necessary to have some brief method of naming these new positions. It would be obviously clumsy and highly unpractical to say the "arm-stretched vertically upwards, feet two foot-lengths apart sideways trunk and head as before position". To abbreviate as much as possible and yet give a clear idea of the position, the following is the plan used. Firstly, the change(if any) in the arms is indicated; in the example just given the word "stretch" would suffice, as that has be taken to mean that position of the upper extremities. Secondly, the change (if any) in the legs is added, in this case "stride"; thirdly, the change (if any) in the position of the head/

head; fourthly, the change (if any) of the trunk; and, lastly, the original position in which the body was placed before these changes were brought about. Thus the above would be expressed clearly and concisely by the term "stretch stride standing".

Any such terminology must sound a little strange and cumbersome at first, but it is the best yet discovered and has been in use for at least 50 years.

In the following description of derived or secondary positions, it is to be taken for granted that the position of the rest of the body is strictly the same as it was in the original one from which the new one is derived.

A. Positions derived from the standing position:

I. By moving the arms..

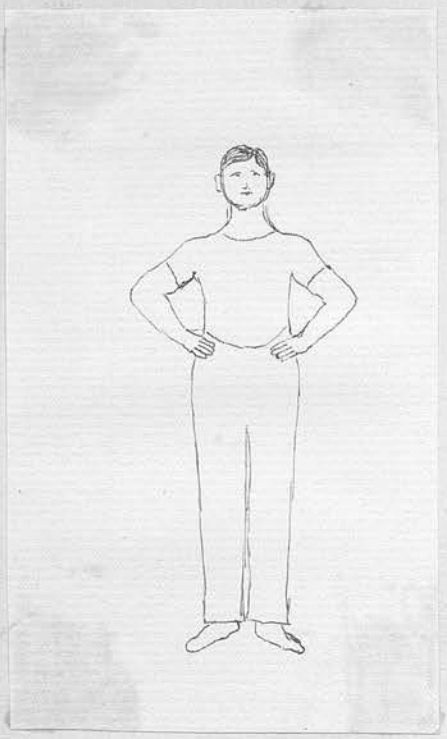

Fig. 6.

1. Hips firm standing.

The hands are placed over the crests of the ilia with the fingers anteriorly and the thumbs posteriorly, the hands and forearms being in a straight line, while the elbows are flexed and both they and the shoulders well drawn back.

(Fig. 6.)

Fig. 7.

2. Bend Standing.

The upper arms are slightly rotated outwards but are kept vertical; the forearms are in extreme flexion and supinated; the wrist and fingers are somewhat flexed and the latter touch the upper arms in front of the head of the humerus.

(Fig. 7.)

Fig. 8

3. Swim standing.

The upper arms are stretched horizontally outwards, the forearms are in extreme flexion and also horizontal; the palms of the hands look directly downwards.

(Fig. 8.)

Fig. 9.

4. Heave standing.

The upper arms are stretched horizontally outwards; the forearms are flexed to a right angle and lie vertically; the palms of the hands either look directly towards one another (supination), directly forwards (mid position) or directly away from one another (pronation).

(Fig. 9 ; See also figs. 45 to 47 for other positions of the forearm.)

Heave lean standing

"Lean" means that some part of the body rests against some fixed apparatus for support. In this position the support is obtained by two vertical poles against which the forearms and palms lie; to allow of this being done, the former must be in the mid-position.

Fig. 10

Heave grasp standing

"Grasp"means that the patient takes hold of some fixed apparatus with his hands in order to support himself. This position is therefore the same as the last one excepting that the hands grasp the poles instead of merely resting against them. (Fig. 10.)

In both heave lean and heave grasp standing the individual may often lean forward a little so as to expand his chest better.

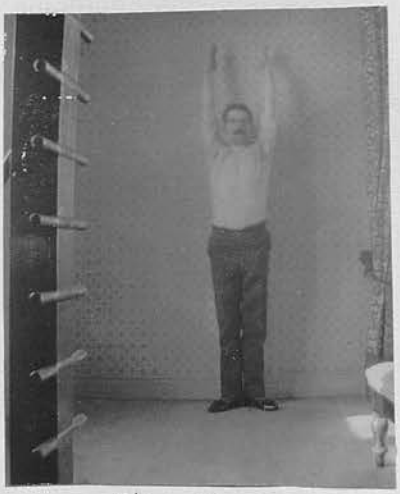

Fig. 11.

5. Stretch standing

The arms kept parallel are stretched vertically upwards, or even a little backwards, with the palms of the hands looking towards one another.

(Fig. 11.)

Fig. 12.

Stretch grasp standing

Here the palms of the hands look forwards and grasp either the step of a ladder placed at a convenient height, or else two vertical poles. (Fig. 12.)

This position may also be called stretch span standing.

Fig. 12A.

Stretch side grasp standing.

(also called side span standing)

The patient stands sideways against a ladder; the arm nearest to it is stretched vertically downwards and grasps one of the steps. The outer arm is stretched upwards and a little inwards, so that its hand can also grasp a step.

(Fig. 12A.)

Fig. 13.

6. Reach standing

The arms are stretched horizontally forwards and are parallel; the palms of the hands look directly toward one another.

(Fig. 13.)

Reach grasp standing.

The palms look downwards and grasp a suitable support.

(Fig. 20, 8c)

Fig. 14.

7. Yard standing

The arms are stretched horizontally outwards, or even a little backwards; the palms look either directly downwards (fig. 14), directly forwards or directly upwards.

8. Neck firm standing

Fig. 15.

The upper arms are stretched outwards and slightly upwards; the forearms are in extreme flexion and pronated; the fingers may either clasp or merely touch each other and rest with their palmar aspect over the lower part of the occipital bone, just about the protruberance. The elbows are kept well back.

(Fig. 15.)

Fig. 16.

In many duplicate movements this position is difficult to maintain, the head and elbows having a tendency to come forward. This can often be obviated by letting the patient place his fingers over the posterior part of the parietal bones; much of the exertion which was necessary before is eliminated by so doing.

(Fig. 16.)

II. By moving the legs.

1. Toe standing: The heels are kept together, and lifted high from the ground, so that the patient stands on his toes. The trunk and legs as a whole must come a little forward in order to preserve the equilibrium.

2. Knee bend standing: The thighs are externally rotated, abducted and flexed to an angle of 135° with the trunk; the knee joints flexed to an angle of 90°, and the ankles to an angle of 45°.

3. Knee bend toe standing: Is a combination of the last two. (Fig. 17.)

Fig. 17.

4. Walk standing. One foot is placed two foot lengths directly forwards, the trunk passes forwards to be able to rest equally on both feet. (Fig. 18.)

Hip lean walk standing: Is the same as the last, but support is granted to one side between the great trochanter and crest of the ilium by means of a bar placed horizontally and parallel to the sagittal plane. This support should be on that side on which the foot is anterior. (Fig 77).

Fig. 18.

5. Stride standing: Each foot is moved one foot length sideways, the trunk resting equally on both. (Fig. 19.).

Loin lean stride standing is the same as the last, but support is granted to the upper sacral region by means of a bar placed horizontally and parallel to the coronal plane. (Fig. 130)

Fig. 19.

Leg lean stride standing The patient is in stride standing position his heels are fixed and the front of the upper thirds of his thighs rest against a bar also placed horizontally and parallel to the coronal plane. (Figs.82&83).

Fig. 20.

6. Step standing: One foot is placed on the step of a ladder (or chair) situated one arm's length from the patient; the hip and knee joint of that side being somewhat flexed to allow of this. The step should be at such a height that the thigh lies about horizontal when the angle at the knee joint is 135°. (Fig. 20.)

This may be given with external rotation and abduction of the femur in addition to the flexion.

III. By moving the trunk.

Fig. 21.

1. Arch standing:

The spinal column in its dorsal and cervical regions is arched backwards on itself; the pelvis is carried slightly forwards in order to preserve the equilibrium.

(Fig. 21)

Head lean arch standing

is as before, but the patient's head rests against a wall distant one foot's length from his heels.

(Figs 147-150)

Fig. 22.

2. Side bend standing

The trunk is flexed laterally well over to one side, care being taken to protrude neither shoulder nor hip.

(Fig. 22.)

Fig. 23.

3. Turn standing:

The legs and trunk are rotated to one side on their own long axes.

(fig. 23.)

Loin lean turn standing.

The trunk is rotated on its long axis, but the pelvis and legs must be left immovable. The feet are usually placed in the stride position in order to better keep these parts immovable; thus we have loin lean stride turn standing.

(fig. 131)

4. Fall standing:

The trunk and lower limbs by means of flexion at the ankles pass forwards as a whole. Support must be given to the front of the body somewhere to allow of this being done slowly and for the maintenance of the position.

Fig. 25.

A convenient way is for the arms to be in reach grasp position (fig. 25.) by flexing the elbows and causing them to pass horizontally outwards and forwards the patient comes to be in the reach grasp (or swim grasp) fall standing position. (fig. 25.)

B. Positions derived from the sitting position:

(a) Low sitting, where the individual sits on a low chair;

(b) High sitting, where the individual sits on a high chair;

both of which are merely for the convenience of the assistant.

I. By moving the arms.

1. Hips firm sitting.
2. Swim sitting (fig. 98.)
3. Heave " (figs. ,45,46&c)
4. Stretch "
5. Reach " (fig. 124.)
6. Yard "
7. Neck firm "

all of which can be understood from the foregoing description of the corresponding standing positions.

II. By moving the legs.

Ride sitting. The patient sits astride on a chair or bench, his feet resting on the ground or some other support. The feet and knees, or only the former, may have to be fixed to ensure stability.

Fig. 26.

III. By moving the trunk.

1. Sit Lying: The head, trunk and thighs are as in the fundamental lying position, but the knees are flexed to a right angle and hang over the edge of the bench on which the position was assumed.

Fig. 27.

2. Fall sitting: The trunk and head are kept midway between the last position (sit lying) and the vertical one (sitting), thus forming an angle of 135° with the thighs anteriorly. The lower legs must be fixed (Fig. 28.)

Fig 28.

C. Positions derived from the lying position.

I. By moving the arms.

1. Hips firm lying.
2. Heave lying.
3. Stretch lying.
4. Neck firm lying.

the meaning of which can be gathered from the corresponding different standing positions.

II. By moving the legs.

Hook Lying: The patient's trunk and head are as in the lying position; the heels rest on the bench, the knee joints and the hip joints are flexed, the former so as to form as angle of 90°, the latter 135°; (Fig. 29.).

Fig. 29.

III. By moving the trunk.

1. Half lying: By means of a hinge in its middle, one half of the bench is raised so as to be at an angle of about 150°, with the horizontal part. The patient rests with his trunk and head on the former and with his legs on the latter (Fig. 30.)

Fig. 30.

From this we may get hips firm, stretch, heave, etc., half lying according to what position we put the arms in.

2. Hook half lying: Is a combination of hook lying and half lying (figs. 29 & 30). In some cases, instead of merely having flexion of the hipjoints, we may have them in addition externally rotated and abducted (i.e. the knees are separated (Fig. 31.)

Fig. 31

Fig 32

3. Forwards Lying: The patient lies so that his elbows, forearms, abdomen and the anterior surface of his legs down to the ankle joints rest on a bench. His upper arms are horizontal and the spine is arched to allow of this. (fig. 32, 165 - 171, 8c).

4. Arch forwards lying: The patient's feet are fixed, his spine arched as much as possible; the arms are usually in hips firm position. (fig. 155.)

5. Side lying: The patient is in the lying position, but rests on his side on a bench, the arm that is underneath having the shoulder joint flexed to about a right angle, the elbow very much flexed and the hand supports the head. (fig. 33.).

Fig. 33.

6. Stretch side lying: Is like the last but the arm that is uppermost is in stretch position, i.e. in right side lying the left arm is moved; in left side lying, the right arm (Fig. 34.)

Fig. 34.

D. Positions derived from the kneeling position:

I. By moving the arms: We have neck firm kneeling, etc. (fig. 35).

Fig. 35.

II. By moving the legs. There is only one in ordinary use, viz., stride kneeling, which from the greater security of balance it affords, practically always replaces the ordinary kneeling position. In it the knees are separated by a foot's length ; the heels are kept together as before. (Fig. 35.)

III. By moving the trunk: Turn kneeling, etc.

From the foregoing an innumerable number of other secondary positions may be constructed by combining different ones, thus stretch arch forwards lying, neck firm loin lean stride turn standing, etc.

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CHAPTER IV.

GENERAL PHYSIOLOGICAL EFFECT OF ACTIVE AND PASSIVE MOVEMENTS.

A. Physiological effect of active movements: Purely active movements are not often given in Kellgren's treatment, as we can in most cases obtain a greater effect by substituting a corresponding duplicate one, and the physiological effect of the former can be readily understood from that of the latter. If however, no corresponding duplicate movement exists, or is given very seldom, I shall indicate the effects of the purely active one in its proper place immediately after the description of the movement itself.

B. Physiological effect of duplicate movements: I shall enter into this in considerable detail, and then point out the advantages that these have over the ordinary purely active ones.

In carrying out a duplicate movement according to Kellgren's method, we always when possible first stretch the part which is to be moved by traction at its distal free end in a direction away from the fixed end, and we keep up this traction during the whole performance of the movement.

This traction causes a beneficial stimulatory effect in the whole of the part to be exercised for the following reasons:

(1) The muscles are stimulated and are capable of doing more work, because the more one stretches a muscle within its physiological length, the greater does its absolute force become.

(2) Nerves are stimulated very much, owing to their relative inelasticity. Of course both motor and sensory nerves are affected, and stimulation of them reacts favourably on the muscles.

(3) There is increased absorption by the lymphatics, due to the fact that the aponeuroses and tendons of the part are stretched. (See Prof. Schäfer, "Textbook of Physiology", Vol.II. 1900 p.300.)

(4) Joints: Their opposing surfaces are separated from one another and thus any pain from inflammation, friction, etc., if present, is reduced to a minimum. The separation is effected by withdrawing of the elastic tension of the muscles and to elongation of the ligaments. The latter tend to be stimulated by this lengthening.

This application of tension is practically found only in the Kellgren school; Dr Arvid Kellgren was the first, and I think I may state,

the only one to describe it. (See "Technic of Manual Treatment," 1890, pp. 79-80). One searches in vain in the literature on Ling's system for any mention of such traction; the proceeding appears to be quite unknown to those who practise it.

That, however, it is a very important factor can be easily judged by anyone who wishes to do so. Let him, for example, do the exercise of hips firm kneeling alternate twisting (rotation) as it is given in Dr Wide's "Handbook of Medical Gymnastics" 1898, p.121, and then neck firm alternate rotation according to my description on page 125 . The difference will manifest itself at once in a most striking manner.

Having now considered the effects of the traction we apply, I shall now go on to the discussion of the effects of the movement itself.

I. Blood vessels and blood.

(1) In a concentric movement.

(a) On the contracting side: The longitudinal vessels will be shortened. The effect of this as regards the veins will be that their volume is diminished and thus their contents will pass onwards towards the heart (the valves preventing any flow in the opposite direction); the pressure of the contracting muscles will assist this. The effect on the arteries will be momentarily to retard their

flow, for the shortening of them slightly diminishes their volume, and the pressure of the muscular contraction will have the same effect. Owing, however, to their thicker wall, anatomical position, and the vis a tergo, the momentary retardation is of no great importance. As regards the smaller vessels; during the muscular contraction the contents of the inter and intramuscular veins will be squeezed out into the larger veins; the effect on the corresponding arteries will be momentary retardation.

Immediately after the completion of the contraction there will be an increased flow of arterial blood to the muscles concerned, in consequence of vaso-dilatation.

(b) On the antagonistic (opposite) side: The longitudinal vessels will be elongated. As regards the veins we have an increase in their capacity;-this will set up a suction power in them. In consequence of the valves, no blood can be drawn from the proximal parts of the veins, but instead it will come from the inter, intramuscular veins and the capillaries, and the peripheral resistance in the latter is reduced in consequence. The venous flow as a whole will be accelerated. As regards the arteries, the blood will flow at a greater velocity through them because of their elongation, and this will be assisted by the diminution in the capillary resistance as already mentioned. The

The effect on the vessels in consequence of the pressure on them from the extension of the muscles is very small; as regards the veins their flow will tend to be slightly accelerated; as regards the arteries, the effect will be practically nil.

(2) In an eccentric movement:

(a) On the contracting side:

We have elongation of the longitudinal vessels with gradually increasing partial removal of the pressure of the contracting muscles. The effects of the elongation have been described in (b) above. During the muscular contraction (not after its completion, as in concentric movements) there will be an increased flow of arterial blood to the muscles in consequence of vaso-dilatation.

(b) On the antagonistic (opposite) side:

We have shortening of the longitudinal vessels, with resultant increased onward flow in the veins; there is a very slight momentary retardation in the arteries. The effects of the gradual removal of slight pressure from the shortening of the muscles may practically be disregarded.

Thus we see that in a duplicate movement performed rhythmically several times we have in the exercised part furthering of the circulation and a greater amount of blood in it. This implies better

better nutritive changes and increased metabolism; the latter is evinced by a rise of temperature which can be tested for almost at once after the conclusion of the movement.

Thus by alternately exercising various parts we can draw more blood to them and this must be compensated for by less blood in the unexercised parts. Such movements that draw blood away are called "depleting"; thus if we exercise both arms or both legs we have depletion of the trunk.

We can bring about this effect over smaller areas; if we cause the psoas and iliacus to work, we draw blood to them from the neighbouring pelvic organs. "The maintenance of a mean arterial pressure of constant height is the object of the circulatory mechanism. ..... The whole system must therefore be so craftily built and so delicately balanced, that every variation in one part is compensated by a simultaneous and contrary variation in another part." (Prof. Schäfer, "Textbook of Physiology", Vol.II, 1900, pp.81 & 82.)

II. Heart: The heart's action is at first accelerated, due to extra strain thrown upon it. After several duplicate movements, systematically arranged, given in various parts of the body, the heart's action becomes slower and stronger,

due to its being relieved of part of its work from the furthering of the circulation (Hartelius, "Lärobok i Sjukgymnastik" , 189%, p-200) with diminution in the peripheral resistance and other factors, (See heart diseases pp. 328 &c.)

III. Lymph: There is an increase in the flow of lymph from the part, due to the pressure applied. The anatomical arrangement of the lymphatics aids this in many parts of the body. (Prof. Schäfer, "Textbook of Physiology", Vol.I. 1898, pp.300,301.)

IV. Cerebro-spinal System: We have the establishment of a "sensory motor circuit". The motor portion of it is of course composed of the upper and lower neurons, with the nerve fibres passing between them and from the lower neuron to the muscle. The sensory portion is composed of the sensory nerves, and by their stimulation we have stimulation of ordinary sensation, the muscular sense, and sense of localization. The improved circulation in the exercised parts will aid this by bringing more nutrient matter to the nerves.

Thus we have stimulation of the motor path from the brain to the exercised part, and the sensory path from it back to the brain - the whole of the nervous paths centripetally and certrifugally are involved; we have in fact an educative effect on

the nervous mechanism. "The passage (of nerve energy) through the neuron proceeds quicker after practice. Practised movements are performed quicker; the connection between the sensory stimulation and the reactionary movement takes less time to be made, as a result of practice, as is shown by the investigations in reaction time ..... There is no doubt about it: practised neurons conduct quicker." (Professor Goldscheider, "Die Bedentung der Reize für Pathologie und Therapie im Lichte der Neuronlehre" 1898, p.9, translated).

Duplicate movements thus train the individual to place his body under the influence of his own will. By them he learns to specially concentrate his energy on the muscles that are called into action, and to inhibit all others from working. Thus we have education of the powers of inhibition and sense of coordination as well.

There is also an effect on the moral faculties; this has been discussed, together with the effects on the mental ones, by Prof. Hartelius in "Tidskrift i Gymnastik", 1879, part 12, pp. 688-690 and elsewhere.

V. Muscles: The force applied by the assistant is always graduated up to such a strength that the patient on his side has to use all his energy to

resist or overcome it. Of course anything like over strain is avoided and the force applied is modified to suit each individual patient, his daily variation, and the nature and stage of the movement that is being executed. Thus we have stimulation of the muscles to their maximum extent, because we know that the greater the force, within physiological limit, that is opposed to a contracting muscle, the more will that muscle try to overcome it. Thus we get the maximum amount of increased growth. The same muscles are exercised if a movement is first done concentrically and then the reverse one eccentrically, but their antagonists if the reverse one is done concentrically.

In a duplicate concentric movement the active muscles shorten; the antagonists are passively elongated. In a duplicate eccentric movement the former are elongated, the latter passively shortened.

There is an increased supply of blood to contracting muscles; this takes place at once in eccentric, but not till after its completion in a concentric movement. This has previously been referred to (pages 49-50).

An increase in muscle energy implies the using up of more sugar in the blood, and glycogen in the liver, i.e. increase of the glycogenic function of the liver takes place.

VI. Joints and ligaments: Joints are exercised and rendered more supple and any stiffness or adhesions will be broken down; the joints are also rendered stronger because the ligaments are strengthened: this is still more the case when such muscles are strengthened which send to or derive a good part of their fibres from the ligaments and especially so when the muscles themselves act as ligaments (such as the tendon of the biceps at the shoulder joint.)

VII. Respiration: This first tends to be limited, but afterwards becomes freer and quicker. If several properly arranged duplicate movements, however, are given, it tends to become deeper and slower.

VIII. Secretion and excretion: These tend to be increased as a general rule. There is often more bile secreted, and there is a greater amount of perspiration; the latter tends, however, to diminish the secretion of urine. There is greater elimination of carbonic acid and waste matter.

IX. The metabolism of the body as a whole tends to be increased with a beneficial effect.

Some of the above effects are immediate, coming either during the performance of the movement or

just after it. Others, on the contrary, for example the educative effect on the brain, do not begin to manifest themselves until a number of days or even weeks have elapsed.

Duplicate movements have many distinct advantages over purely active ones, which may be seen from the following:

(1) Muscles can be stimulated to perform the maximum amount of work possible.

(2) Groups of muscles or even individual muscles can be isolated, and the patient can better concentrate his energy on that group or individual muscle.

(3) Muscle contraction can be brought about very early in apparently totally paralysed muscles, and some patients can perform duplicate eccentric movements before they can perform the corresponding purely active ones. (See page 373).

(4) The amount of work done by that patient can be graduated.

(5) As the traction of the parts separates the articular surfaces from one another and eliminates to a great extent any pain from friction which may

be present, we find that we can get patients to perform fairly strong duplicate movements, concentric as well as eccentric, given with traction, whereas they could not and would not do the corresponding purely active one, because of the great pain.

(6) Time is gained by the concentration of the greatest amount of muscular energy into the short space of a few seconds or a minute or two at the very most.

Apart from their therapeutic value in the treatment of diseases, duplicate movements are of great interest from a purely anatomical point of view, inasmuch as they, by the fact that we get the maximum amount of work from the muscles and can so readily eliminate and isolate them at will, afford us the best method of studying their actions.

I wish to refer more in detail to No.2 above. In all active exercises there must be a fixed point for the movement to start from, i.e. the patient must fix his trunk in arm movements, his lower leg in foot movements, and so on, using of course his own muscles to bring about this fixation. We can, however, throw these out of action by fixing these parts for him. For example; if we ask a patient to abduct his arm to a right angle and then to alternately flex or extend his fingers while we

resist over the palmar or dorsal aspect of the phalanges respectively, we find that we can bring about very little force in the execution of the latter, as any greater effort would prevent his keeping his wrist, elbow and shoulder joints immovable. If we, however, fix the upper arm, we find he has more power in his fingers, as only the wrist and elbow joints have to be fixed by him. If we now fix the forearm, he has still greater power and he only has the wrist joint to fix. If we then fix his metacarpus as well, we can obtain from him the maximum amount of work in the flexors and extensors of the fingers that it is possible to get, because the patient has not to use part of his powers in fixing any joint; he can then concentrate the whole of his available energy on just those muscles.

In all duplicate movements we have to deal with a lever; the fulcrum is the joint at which the movement takes place, and the forces acting are, firstly, the patient's muscles, and secondly, the force or resistance of the assistant. Thus to lessen his own exertions and thereby to have a better command over the part, the assistant should have the point of application of his own force, not close to that of the patient's, but far removed from it.

The contrary, however, must be said in cases of paralysis. Suppose that we have a condition where there is almost complete paralysis of the abductors of the shoulder joint. If we abduct the arm passively to a right angle and ask the patient to resist while we adduct it by applying our force at the hand, no perceptible resistance is felt. If, however, we apply our force over the insertion of the deltoid, we may feel just a little resistance from the patient. This is of great importance, as in cases of apparently total paralysis the one thing we aim at is to try to obtain voluntary muscular contraction as soon as possible; half the battle is won when we have got this.

C. Physiological effect of passive movements:

I. Passive movements at joints:

In all these, we always where possible, keep up traction of the part by drawing its distal free end away from its proximal fixed end, just as we do in duplicate movements. The effects of this traction have been considered already. In addition to these, we have the effects of the movement itself. These vary very much according to how it is given, as follows:--

1. When the movements are given energetically and through a wide radius, we have:

(1) Stimulation of the muscles from alternate elongation and shortening.

(2) Furthering of the lymphatic flow from the same reason, and because of the alternate application and removal of pressure (Prof. Schäfer, "Textbook of Physiology," Vol.I., 1898, pp.300 & 301)

(3) Furthering of the circulation of the blood from the alternate elongation and shortening of the vessels and lymphatics, and from the alternate application and removal of pressure by the muscles. This brings with it diminution in the peripheral resistance in the capillaries.

(4) There will be an increase in the amount of blood in the part in consequence of the general stimulation.

(5) The suppleness of joints is increased, and adhesions, stiffness, etc., if present, will tend to be broken down.

(6) Nervous system: There is stimulation of the nerves from alternate elongation and shortening, and from the improved circulation. Both motor and sensory nerves are affected, and thus we have, just as in duplicate movements, only to a much less

extent, stimulation of ordinary sensation, the muscular sense, and sense of localisation.

Further detail concerning this will be found in the section on nervous diseases.

2. When the movements are given slowly through a large radius.

The effects are on the same lines as before, except that the slowness of the movement causes less stimulation of the nerves and muscles and there is not such a marked increase in the amount of blood flowing to the latter.

3. When the movements are given gently through a small radius.

The effect on the muscles and nerves is very small, and there is no increase in the amount of blood in the part. What we have is better circulation of the blood, furthering of the lymphatic flow; joints are rendered more supple and if present, stiffness will tend to be removed and adhesions broken down.

Any stimulatory effects here are entirely due to the traction which we apply.

Between the first and last of the above there are of course an infinite number of grades and the effects vary accordingly.

II. The physiological effect of such manipulations as vibrations, nerve friction, &c., will be

discussed when I take up the individual manipulations themselves.

CHAPTER V.

G Y M N A S T I C M O V E M E N T S.

Under this heading I propose to describe the more important movements as they are found in Kellgren's system. I shall not consider the active and the passive separately, because some movements may be given actively in one case, passively in another, and passive manipulations may be given to a subject while he is performing an active exercise. I shall therefore take the movements as they fall under the various headings which have been adopted by the followers of Ling's system in their various works on the subject.

Gymnastic movements are classified under the following heads:

A. Flexion and Extension.

B. Abduction and Adduction.

C. Pronation and Supination.

D. Inversion and Eversion.

E. Circumduction.

F. Traction.

G. Falling.

H. Carrying.

I. Turning and Twisting (rotation)

J. Ringing.

K. Drawing.

L. Expansion.

M. Raising.

N. Lifting.

O. Vibrations and shaking.

P. Friction.

Q. Hacking, clapping, beating.

R. Stroking.

S. Kneading.

T. Pressing.

Terminology:

The above terms, used to describe the movements, are in themselves occasionally ambiguous, but they have been in use so long that to change them would only cause confusion.

The word "double" placed before an arm or leg movement means that it is given to both limbs simultaneously. In the case of our wishing to exercise only one arm or leg, the word "right" or "left" precisely specifies which. In the case of neither "double", "right", nor "left", being inserted, we mean that the movement is first done with one leg, one arm, or one side of the trunk, as the case may be, and then with the other.

PA means "Patient active", (i.e. a purely active movement is to be done). If duplicate, we put AR, (assisting resisting) or PR (patient resisting) to denote whether the movement be concentric or eccentric. PP. means "patient passive". If two such abbreviations are given, say AR, PR. it means that the first half of the movement is with AR, the second half with PR.

In wording the formula for an active movement the following order is maintained:

1. The name of the initial position.
2. Names of the part or parts of the body to be moved, with the prefix "double", "right" or "left", if necessary, inserted before that part, or each part if there are more than one.
3. The name or description of the actual movement to be executed.
4. Whether the movement be PA, AR, PR, or PP, or a combination of these, such as the first half of it with AR, the second with PR, etc.

For a passive exercise the order is the same, ~~excepting as regards~~ the last term, however is always PP.

General Directions: All movements are to be done slowly and evenly with the mind of both patient and assistant concentrated upon them. In all active

movements whether purely active or duplicate, the patient should stretch himself well, bring his chest out and respiration should be as free as possible. (See expansion, page 137). After each exercise a deep respiration should be taken. Active movements are usually repeated three times. If they are done properly, this number will be quite sufficient to produce the maximum effect within the physiological limit.

All movements at joints, unless contraindicated are to be done through the greatest range possible. The assistant often with advantage assists a duplicate concentric movement in the last stage, for although the patient himself could not concentrically do the movement so far as that, yet he can excentrically perform it (i.e. can offer resistance at once) when the reverse movement is gone through. The resistance in all cases should be suitable to the stage and nature of the movement.

In the descriptions of the various active movements which follow, I have in all cases where a corresponding duplicate one exists, described that and not the purely active one, as the modus operandi of the latter can be gathered from the former.

A. FLEXION & EXTENSION.

I. Of the Upper extremity:

1. Of the Shoulder Joint:

Standing double arm flexion forwards and upwards PA.

This movement is done by raising the arms which are kept parallel, from the initial hanging down to reach position. There the movement may stop or it may be continued upwards to stretch position. This exercise is not given by itself, but is a preliminary to others done from reach or stretch positions; it also forms the first part of double arm circle carrying (page 123). Figs. 127 &128 show the movement done from walk standing position.

The flexors of the shoulder joint perform the movement. During flexion of the arm the scapula moves in a similar manner as it does in abduction; at each stage of the former it is as it would be in the corresponding stage of the latter, i.e. it is the same in flexion through 45° as it would be in that amount of abduction, and so on for every angle possible. The same holds true for every corresponding stage of extension and adduction. The chest is lifted up.

2. Of the Elbow Joint:

We have two divisions:--

i. Given simultaneously with other movements at the shoulder joint.

ii. Confined to the elbow joint.

I will at once proceed to the discussion of the muscular phenomena of flexion and extension of the elbow joint and point out some facts which although known to the Kellgren school for years have not yet found their way into the majority of anatomy text-books.

As regards the muscles of the upper arm that aid in these movements, the biceps and brachialis anticus act in flexion, the triceps and anconeus in extension. This holds good for whatever is the position of the radio-ulnar joints, but differences in the latter produce great differences concerning the muscles of the forearm that act in flexing or extending the elbow, as follows:

1. The forearm is completely pronated: Flexion is done by the extensors on the back of the forearm, the strain being felt most in the extensor carpi radialis longior and supinator longus.

Extension is done by the flexors on the front of the forearm, the strain being felt more in those on the ulnar side.

2. The forearm is in the mid position: Flexion is done by the extensors, flexors on the radial side of the forearm, the strain being felt most in the supinator longus.

Extension is done by the extensors and flexors on the ulnar side of the forearm.

3. If the forearm is completely supinated, the flexors on the front of the forearm produces flexion, and the extensors extension, as ordinarily described in text-books on the subject. The strain is felt most, however, in the muscles of the upper arm and not in those of the forearm as is the case when we have pronation or the mid position.

Photographs to show this are usually unsatisfactory except in the case of elbow flexion with pronation, so I only give some to show the latter. In figs 36 and 38 the pronated forearm is passive. In fig. 37 the patient was requested to flex his elbow joint while I resisted; the contracting muscles are well shown. The same is depicted in another individual in figs. 38 and 39 .

The rest of the movements can readily be tested and the muscular phenomena demonstrated by giving the various movements of flexion and extension at the elbow joint, with the different positions of the radio-ulnar joints.

In the case of elbow flexion with the forearm

Fig. 36.

Fig. 37.

Fig. 38.

Fig. 39.

pronated AR, we can almost throw the biceps out of action by applying our resistence over the ulna or fifth metacarpal.

The effect of the various positions of the radio-ulnar joints is not merely confined to the muscles of the elbow joint, but also to the pectoral and posterior scapular muscles. These will be considered after the various exercises that have to deal with it.

i. Movements of the elbow joints given simultaneously with other movements at the shoulder joint.

We have:

(Stretch) half lying double elbow flexion & extension, AR.

Fig. 40.

The patient assumes the initial position with the palms of the hands looking either directly away from one another or directly forwards, or more rarely directed towards one another, the assistant grasping the patient's hands, (as in figure 40.)in his own, resists

Fig. 41.

while the latter, keeping his upper arms and forearms in the coronal plane, adducts the former and flexes the latter, until the maximum of these movements is obtained, passing through heave position of the arms half way (fig. 41.). Then the reverse movement is gone through with AR. The relative position of the palms of the hands to one another is to remain unchanged throughout, and the forearms are to lie parallel the whole time.

In this exercise we first have adduction of the shoulder joint and flexion of the elbow joint, and then the reverse movements. If the palms of the hands look directly away from one another, the posterior scapular muscles work harder than the pectoral; if they look directly towards one another, the reverse; if directly forwards, the strain is felt in them equally. The mechanism of the actual movements

of abduction and adduction will be considered on pages 98 &c.

Fig. 42.

We may give double elbow flexion and extension AR from more exerting initial positions, such as stretch arch forwards lying where the muscles of the spine are strongly taxed. (see fig. 42.)

Reach Grasp standing double elbow flexion and extension PA.

From the initial position the patient by flexing his elbows and causing them to pass horizontally outwards and forwards comes to be in the reach grasp (or swim grasp) fall standing position (figs 43 & 44) The reverse movement is then gone through.

Fig. 43

Fig. 44

In this exercise the extensors of the elbow joint are in action and some of the shoulder joint muscles.

The actual movement at the latter will be considered under arm carrying outwards and inwards (p.121). The ankle joints are first flexed and then extended.

ii. Movements confined to the elbow joint.

For the execution of these the upper arms must be fixed either by the patient or by the assistant.

(1) The Upper arm is fixed by the patient:

Heave sitting double forearm extension and flexion, AR.

From the initial position with the back supported, the patient extends his forearm at the elbow joint until yard position is reached, and then does the reverse movement. The resistance is applied over the distal end of the metacarpals; if the forearms are pronated, it will be first over their palmar and then over their dorsal aspect (fig. 45); if supinated, the reverse (fig. 46); if in the mid position, first over the fifth and then over the second metacarpal. (fig. 47.) The upper arms are to be kept immovable throughout. The upper arm is fixed at the shoulder joint by the pectorals, abductors, and posterior scapular muscles. The first of these work harder than the last if the forearms are supinated, but the reverse takes place if they are pronated; in the mid position no difference can be

Fig. 45.

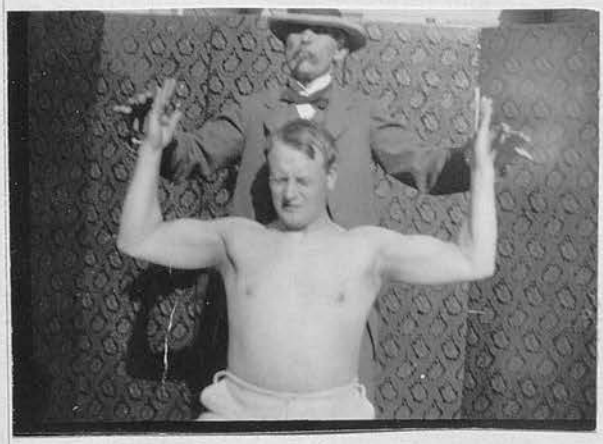

Fig 46.

Fig. 47.

detected. The abductors work equally in all these, Thus the chest is brought out most when the forearms are pronated; less so if they are in the mid position; and least so when there is supination.

(2) The upper arm is fixed by the assistant.

Fig. 48.

Fig. 49.

The patient is in the sitting position and the upper arm fixed, usually by support below its distal end and over the shoulder joint. The movements of flexion and extension are gone through with the forearms pronated (fig. 48), supinated (fig. 49), or in mid position. The muscles that act are the flexors and extensors of the elbow joint, as described on pages 68-70.

3. Of the Carpal Joints:

Sitting hand flexion and extension AR.

Fig. 50.

The forearm is fixed and the assistant's grasp is over the proximal ends of the fingers. While keeping up traction away from the forearms the patient flexes his wrist joint, with AR, as far as he can, and then extends it to its fullest extent, also with AR. (Fig. 50).

The flexors and extensors of the wrist are exercised by the above. Owing however to the great predominance of extensor over flexor paralysis, we in most cases give the movements as flexion PR, extension AR, in which case only the extensors are exercised, the flexors remaining inactive. The movement may also be given passively (with traction) i.e. flexion and extension PP.

4. Of the metacarpo-phalangeal and interphalangeal joints.

The metacarpus or the joint immediately above the one we wish to influence must be fixed, and the movements of flexion and extension then gone through with resistance, and traction applied by the assistant as before. (Fig. 51).

Fig. 51.

II. Flexion and Extension of the Lower Extremities:

1. Of the hip joint.

Lying Leg Flexion PR, Extension AR.

Fig. 52.

The patient is in the initial position with neck firm*. The assistant places one hand under the heel of that limb which is to be exercised and the other over the iliac crest of that side; while keeping up traction away from the pelvis, he lifts up the foot so as to cause flexion at the hip joint, the patient resisting and keeping his knee fully extended. When further flexion is impossible without some flexion of the knee joint occurring, the reverse movement is then gone through with AR. (fig. 52.)

In this movement the extensors of the thighs are exercised; the great sciatic nerve is first stretched and then relaxed again.

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* In all leg or foot exercises done from lying or half lying position, the patient's arms are to be placed in neck firm position, unless otherwise stated.

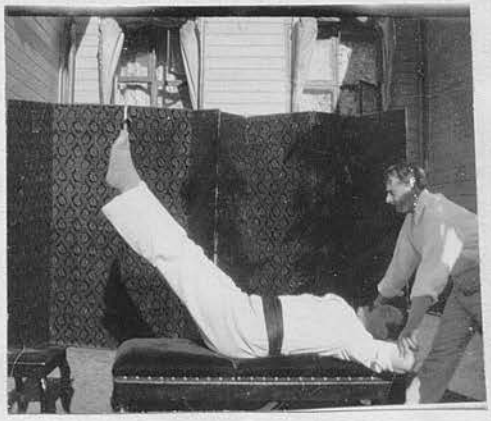
Lying leg flexion AR, extension PR.

Fig. 53

The patient is is neck firm lying position* and the assistant's grasp is over the dorsum of the foot. While the latter resists and performs traction away from the pelvis, the former flexes his hip joint, keeping his knees and ankles fully extended. The reverse movement is then gone through, with PR. (Fig. 53).

Lying double leg flexion AR, extension PR.

Fig. 54.



The patient is in the same position as in the last exercise, and performs the same movements with both limbs

* See footnote on last page.

simultaneously. A strong subject must have his elbows fixed by a second assistant. The movement may be given without resistance, as a purely active one (fig. 54).

In the last two exercises the flexors of the hip joint and extensors of the knees are in action, and to a less extent the flexors of the ankle joint. The effect of the action of the psoas and iliacus on the pelvic organs has been referred to already (p.51.) The anterior abdominal muscles, amongst others, work hard to fix the pelvis. Thus there is a tendency to inhibit abdominal respiration and congestion of the lungs and head may take place if this is not corrected (See Dr. Arvid Kellgren "Technic of Manual Treatment.", 1890, pp.96 & 97.)

2. Of the Knee Joint:

Here, as in the case of the elbow joint, we have two divisions:

i. Given simultaneously with other movements at the hip joint.

ii. Confined to the knee joint.

i. Given simultaneously with other movements at the hip joint.

Half lying leg flexion PP, extension AR.

which may also be given with both legs at once. The

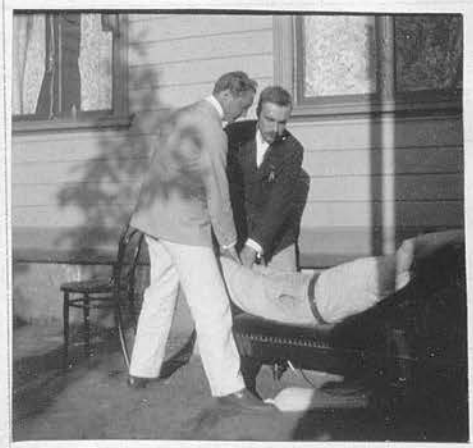


Fig. 55.

Fig 56.

Fig.57.

Fig. 58.

Fig. 59.

patient is in the initial position and the assistant grasping the patient's foot under the heel with his one hand, lays the other to the outer side of and below the knee joint. Then, keeping up external rotation of the thigh (the initial position entails this as the feet are at right angles), he flexes and abducts that joint, and flexes the knee joint as far as they will permit, keeping the patient's heel along the middle line. The patient then does the reverse movement with AR applied under the heel, the assistant's other hand being kept at the knee joint, to steady it. (Figs. 55-59.)

In this exercise we have the adductors and extensors of the thigh and extensors of the knee first passively extended and then concentrically contracted.

The above may be given with flexion PA, instead of PP, in which case the flexors and abductors of

the thigh are active; there is practically no exertion required to flex the knee joint, as this latter movement is an invariable normal accompaniment of the former.

If we first rotate the thigh internally so that the toes point upwards instead of upwards and outwards, we can by keeping both knee joint and heel along the middle line, convert the movement at the hip joint into one of pure flexion and extention by eliminating the rotation and abduction and adduction.

Half lying leg flexion PA. Extension PR.

may also be given with both legs at once. The patient first draws his leg up into the same position as the assistant placed it in the first half of the last exercise. He then resists while the

Fig. 60.

Fig. 61.

Fig. 62.

assistant by pressing on the lower part of the front of the thigh just above the knee brings the leg back in to its initial position. (Figs. 60-62). The elbows have to be fixed in the case of the movement being done with both legs at once.

At first the flexors and abductors of the thigh are concentrically and the extensors of the knee eccentrically contracted; in the duplicate part they act in the reverse manner. The anterior abdominal muscles amongst others, are powerfully contracted in order to fix the pelvis.

As in the last exercise, we may in a similar manner eliminate rotation and abduction of the hip joint .

Reach Grasp Standing Knee Flexion and Extension PA.

This is a short way of saying reach grasp step standing double elbow flexion and extension, knee and thigh flexion PA. Let us suppose that the left leg is placed in step position. While doing double elbow flexion, the patient's body "falls forwards" (see p. 36-37) and he simultaneously flexes his left knee, and keeping up external rotation of the left thigh flexes and abducts that joint as well. The reverse movement is then gone through, but instead of stopping at step position, the effect of the exercise is heightened by continuing it until the left knee is fully extended; to allow of this some flexion of the right thigh takes place, the right knee, however, must be fully extended all the time. (figs. 34 &c.)

The effect of the above will be, in addition to that of falling forwards and the arm movement, that the flexors of the left knee, flexors and abductors of the left thigh are at first in action and then their antagonists. The flexors of the right hip are in action towards the end of the movement and the exten-

sors of the right knee are specially exerted in order to keep that joint fully extended. The left great sciatic nerve is alternately shortened and stretched.

Standing Double Knee Bending PA.

From the initial position the patient flexes his knees, abducts and flexes his thighs until knee bend position is reached. The reverse movement is then gone through.

The extensors of the ankles, knees, thighs and adductors of the latter joint are exercised.

The effect of the above movement is however greatly increased by giving the following, which as a matter of fact nearly always replaces it.

Toe Standing Double Knee Bending PA.

Fig. 63.

in which the patient first rises on his toes until toe standing position is reached, then proceeding as before he comes into knee bend toe standing position. These movements are then gone through in the reverse way in the reverse order.

Fig. 64.

Varying positions of the arms may be used, thus reach lean (fig. 63.) stretch lean (fig. 64.) reach grasp, etc.

ii. Confined to the Knee Joint.

Sit Lying Knee Extension and Flexion PP.

The initial position is taken up with neck firm and the assistant grasps the patient's foot across the instep (figs. 65 & 66) keeping up traction away from the thigh he several times alternately performs extension of the lower leg at the knee joint up to the horizontal and then flexion down to the vertical (fig. 65.)

The effects will be similar to those of energetically given passive movements (page 60), the area affected being the flexor and extensor group of muscles of the knee joint.

Sit Lying Knee Extension AR, Flexion PR.

In the same position as in the foregoing exercise the assistant, keeping up traction, resists while the patient extends his lower leg at the knee joint up to the horizontal, then the reverse movement is done with PR. (fig. 65.)

Fig. 65.

The extensors of the knee and flexors of

Fig. 66.

of the ankle are exercised. If the assistant's grasp were over the proximal side of the ankle joint (lower part of the lower leg) the latter group of muscles would be eliminated.

Forwards Lying Knee Flexion AR, Extension PR.

Fig. 67.

The patient flexes his knee from the horizontal to the vertical, or as far as it will go, while the assistant fixes the

thigh with one hand, resists over the back of the os calcis with the other; the reverse movement is then gone through with PR. (fig. 67.)

The flexors of the knee joint are exercised by this proceeding.

3. Of the Ankle Joint.

Half Lying foot Flexion & Extension AR.

Fig. 68.

Fig. 69.

The lower leg is fixed, and with resistance applied over the distal end of the metatarsals on their dorsum, the patient flexes his ankle joint as far as it will go. He then extends it to its maximum limit, the resistance being over the corresponding plantar aspect (fig. 68& 69.)

The movement may be given in various other ways (see p. 228-9).

The flexors of the ankle and extensors of the toes and then the extensors of the ankle and the flexors of the toes are in action. The intertarsal joints participate in the movement, and thus in extension AR various plantar muscles (beside the ones mentioned), which serve to maintain the longitudinal arch of the foot, are also exercised.

Standing double toe raising PA.

This has been practically described already under toe standing double knee bending. It is however sometimes given by itself; the patient rises slowly on his toes to toe standing position, and then does the reverse movement.

The extensors of the ankles, flexors of the toes, and plantar muscles generally, are exercised.

The effect of the movement may be doubled by keeping one foot passive, using only the other to do the raising.

We may give reach lean position of the arms here for the sake of balance; and in the double toe raising also if needed.

4. Of the toes and other joints of the foot.

Flexion and extension may be given here with fixation of the joints immediately above the ones we wish to influence.

III. Flexion and Extension of the Head.

Reach Grasp Standing head flexion PR,

Extension AR.

also called neck bending and stretching.

Fig. 70.

Fig. 71.

The assistant places both hands on the patient's head, so that his thumbs lie under the occipital bone; his fingers, slightly spread out, lie over the lateral parts of the skull. Then, lifting the head upwards all the time, he flexes it forwards, the patient resisting and at the same time drawing in his chin. The effect of the last mentioned will be that the cervical vertebrae are kept rigid and the movement is in consequence confined

to the occipito-atlantal joint. The reverse movement is then gone through with AR. (figs.70&71)

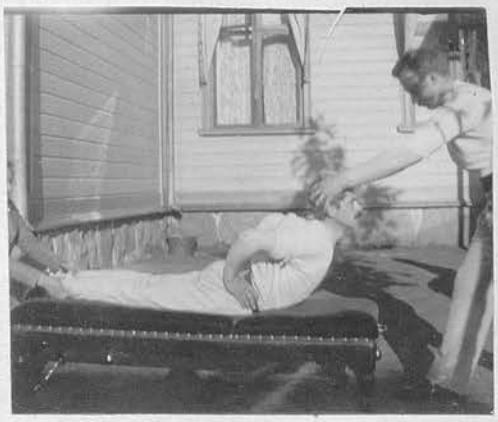
The circulation through the brain is hastened, due to the alternate elongation and shortening of the vertebral vessels, the carotid arteries and the internal jugular veins. The muscles that are active are the extensors of the cervical vertebrae (which fix them) and the extensors of the occipito-atlantal joint; in consequence of their activity they become better supplied with blood and thus act depletingly on the brain.

If the chin is not drawn in as described, all the cervical vertebrae participate in the movement, very little stretching is felt in the extensors and the exercise loses a great deal of its effect.

If the movement be done in the opposite way, i.e. first extension backwards with AR, and then the reverse with PR, we have compression of the internal jugular vein by the omo-hyoids and sterno-mastoids which lie over it, and thus congestion of the head tends to be produced.

Flexion PR and Extension AR of the head may also be given from other positions, such as hips firm, arch forward lying. The assistant's grasp is different from the one described in the movement done from reach grasp standing position; the dif-

Fig. 71.A



ference practically amounts to the fact that the thumb and fingers change places (fig. 71A.) In this case in addition to the cervical extensors, all the erectors muscles of the spine are strongly in action.

Flexion to one side or obliquely may be given if we wish to exercise smaller groups of muscles, i.e. if the patient flexes head backward and to the left, AR, the left upper third of the trapezius can be felt to be strongly contracted. And in other ways we can exclude and include other groups of muscles at will.

IV. Flexion and Extension of the Trunk.

Stretch stride standing bending forward PA.

Fig. 72.

Fig. 73.

Fig. 74.

From the initial position the patient keeping his arms as extended as possible and stretching himself to his utmost, flexes his hipjoints so that his trunk passes forward and his pelvis backward. The movement proceeds, the vertebral column flexing on itself to some extent as it goes, until the patient cannot bend forward any more while keeping his knees completely extended. The reverse movement is then gone through. (figs. 72 - 74.)

All the posterior muscles of the body are in action, especially the spinal and scapular

muscles, the vertebral column becomes stretched on itself and thus any abnormal rotations or curvatures will tend to be corrected.

I may here mention that all movements in which the patient has to actively stretch his spinal column tend to correct such deformities in it if they exist, and can be prescribed for such conditions.

Stretch stride standing bending sideways PA.

Fig. 75.

The patient stretching himself and his arms to the utmost, specially that arm which is on the side opposite that to which he is going to bend, flexes his trunk sideways to side bend position, keeping the lower limbs and pelvis quite still. The reverse movement is then done. No rotation of the vertebrae should take place, i.e. there should be no protru-

Fig. 76.

sion of either shoulder or hip. The lateral flexors are strongly in action, i.e. quadratus lumborum, erector spinae, intercostals, small muscles of the back, the lateral abdominal muscles, etc. (Fig. 75-76.)

In the last two exercises, almost all the other muscles of the body are active in order to maintain the immobility of the joints that are unmoved and to preserve the equilibrium.

Hip lean standing, lateral flexion PP.

Extension AR.

Fig. 77.

The patient assumes the initial position with neck firm. The assistant grasps the patient round the elbows and while keeping up traction away from the pelvis, flexes his trunk

Fig. 78.

laterally over the bar into side bend position. The reverse movement is then gone through with AR applied at the elbow of the extended side, the assistant's other hand being used merely to steady the patient. (figs. 77-78.)

As in the last exercise, the lateral flexors of the trunk are in action.

Ride sitting trunk flexion PR,
Extension AR.

The patient assumes the initial position with hips firm; the assistant then places one hand under his occiput, as in figure 79. The patient straightens his back as much as possible and then the assistant causes flexion at the hip joint to take place by pressing his head forwards and downwards, the patient resisting, but keeping his spine quite

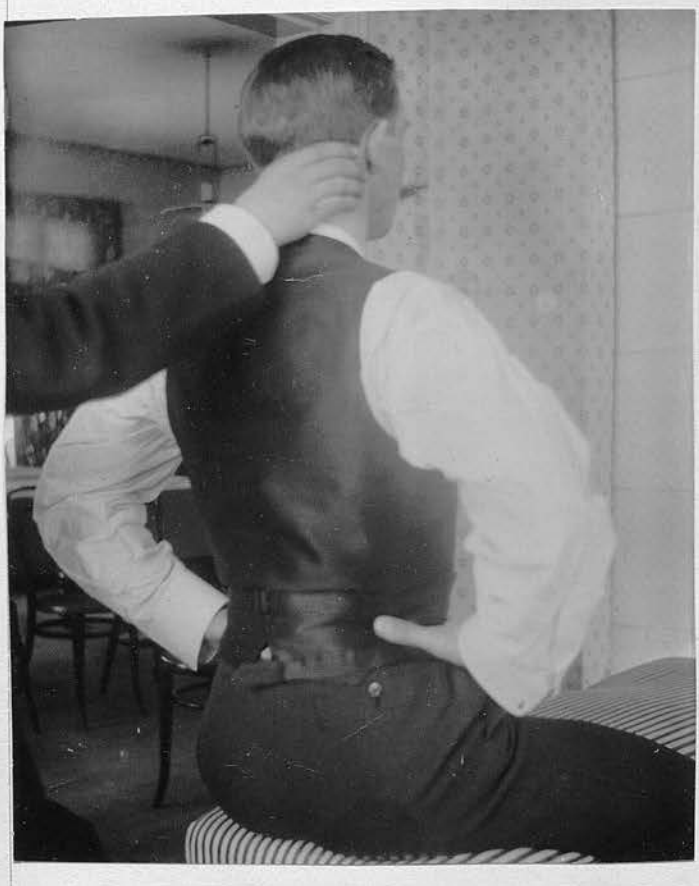


Fig. 79.

Fig. 81.

Fig. 80.

straight all the time. The flexion is continued through about at angle of 60° and then the reverse movement is gone through with AR. (fig. 80.)

In this exercise the extensors of the thighs are first eccentrically and then concentrically contracted; the spinal muscles are also in action and are more and more taxed as the flexion proceeds; during extension the strain on them is gradually removed, but they are still powerfully active.

Sitting trunk extension and flexion PA.

From the initial position with hip firm (usually) and the lower legs fixed, the patient keeping his back and head as straight as possible, slowly "falls backwards" (i.e. allowing extension of the hip joint to take place) until sit lying position is reached. The reverse movement is then gone through. (Fig. 81). In this movement the flexors of the thighs are active, and the anterior abdominal muscles and spinal extensors are strongly taxed, in order to keep the trunk straight and the head erect.

Leg lean stride standing trunk flexion PR,
Extension AR.

The patient assumes the initial position with hips firm. The assistant places one hand under the patient's occiput as in ride sitting trunk flexion

Fig. 82.

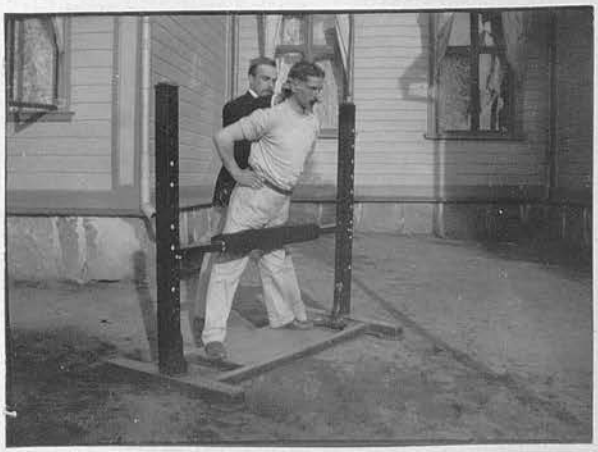


Fig. 83.

PR. extension AR and the same movement as in that exercise is gone through, only somewhat further, through an angle of about 90°, instead of 60°. The reverse movement is then gone through with AR. (figs 82 & 83.) The extensors of the thighs and spinal column are exercised.

B. ABDUCTION AND ADDUCTION.

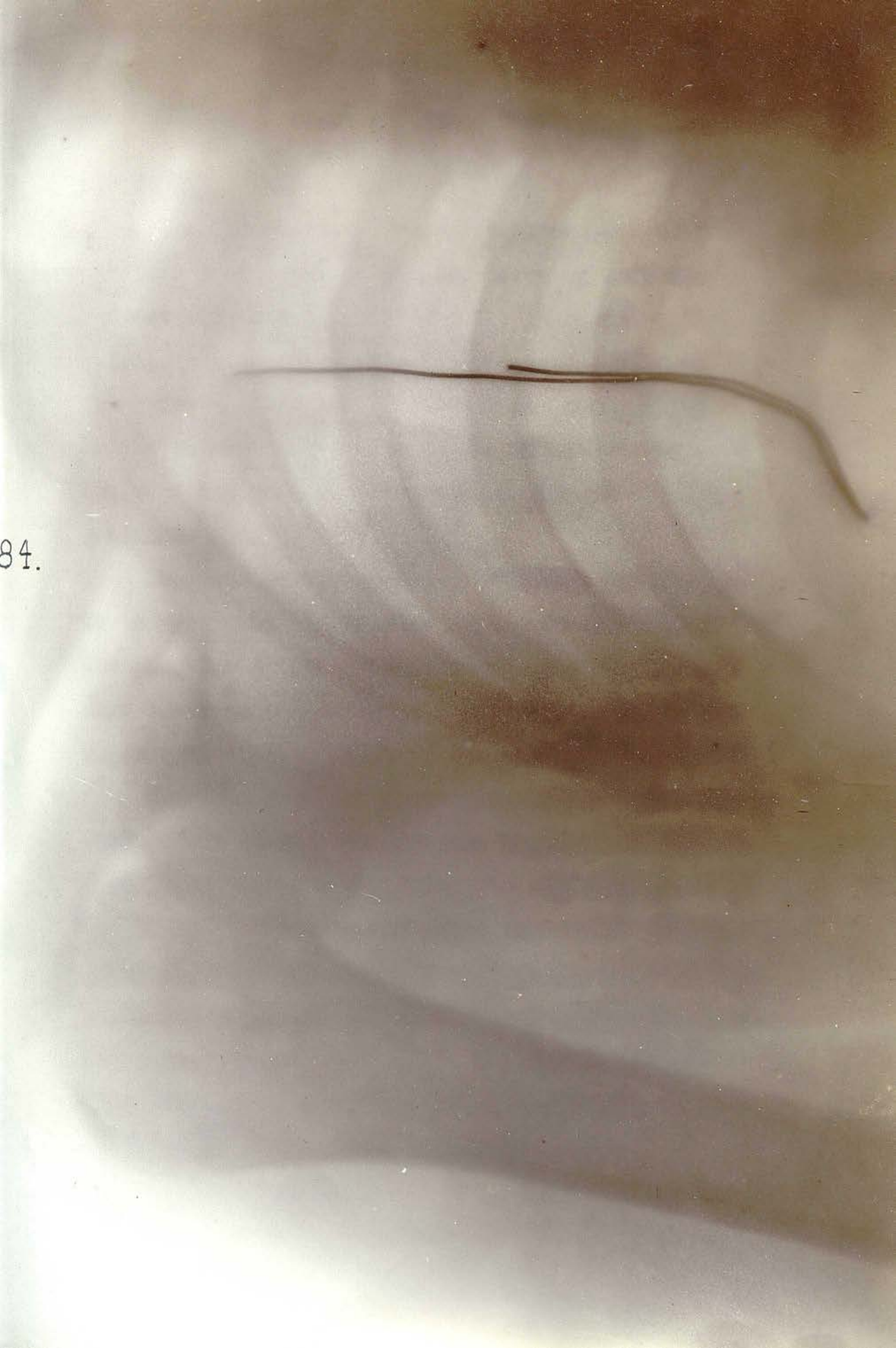
1. Of the Shoulder Joint:

I will forthwith commence a discussion of the physiology of these movements, entering into the subject with considerable detail, inasmuch as the average anatomical textbook gives but a brief description - often incorrect - of the consecutive events which take place when the arm is raised from the vertical hanging down through yard to stretch position.

From the statements usually given, one is lead to suppose that the maximum range of movement at the shoulder joint is through an angle of 90°, and that rotation of the scapula only begins after the humerus has been brought to the horizontal.

This, however, is quite erroneous. What really does happen is that the scapula begins to rotate at once and has nearly completed its rotation when the arm lies horizontally and after that moves very little. I give herewith three X-ray photographs very kindly taken for me by Dr Dawson Turner of Edinburgh, showing this. (figs. 84.85.86.) I also give in figs 87.88.89. a scheme of the X-ray ones to show the various angles, etc.

In the figures 84 to 86 the vertebral border of the scapula is marked out by a piece of wire



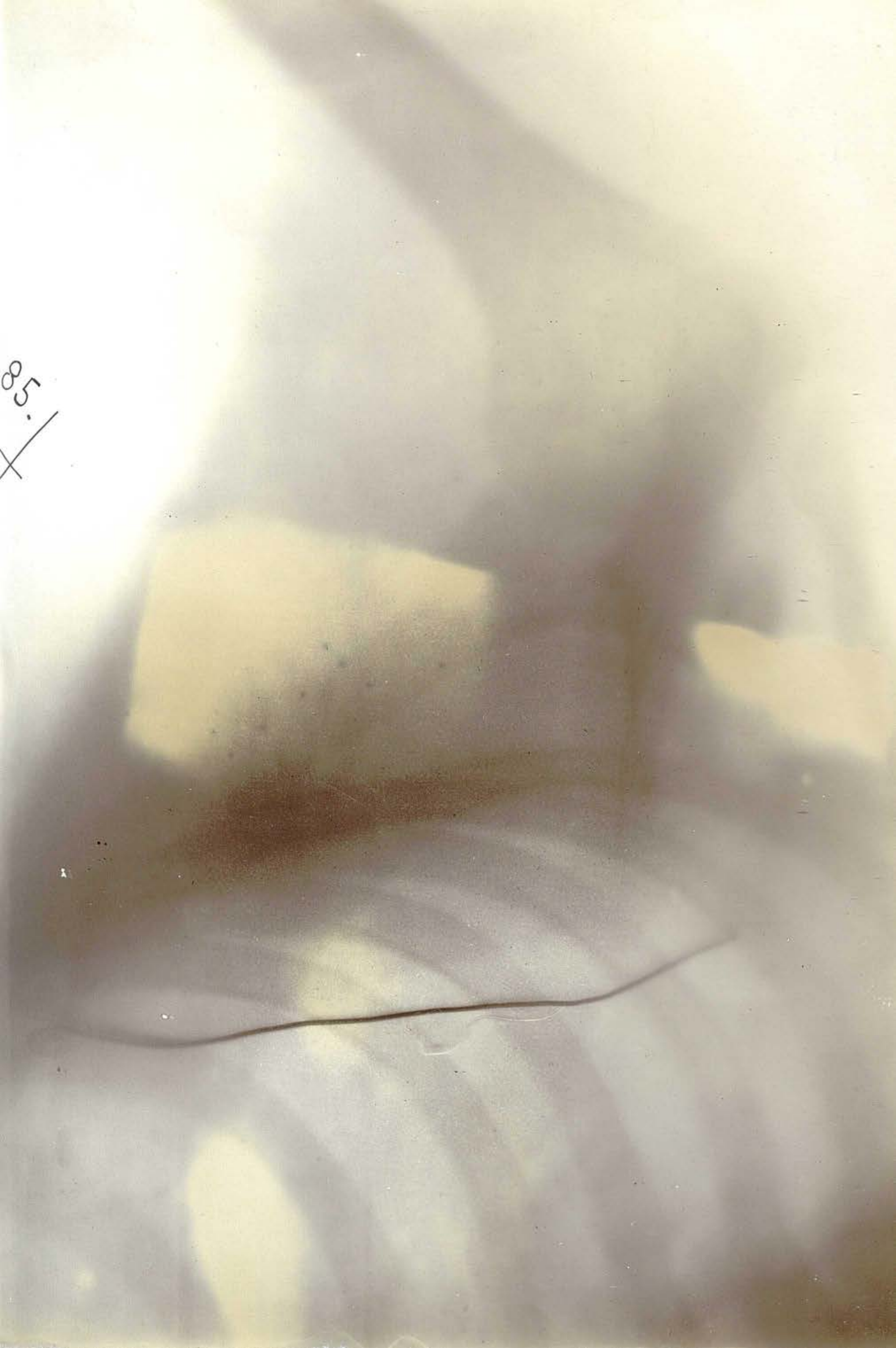

85.

Fig. 86.

Fig. 87.

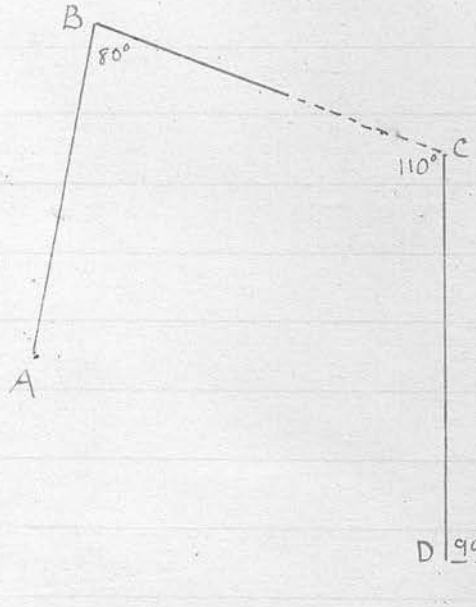


Fig. 88

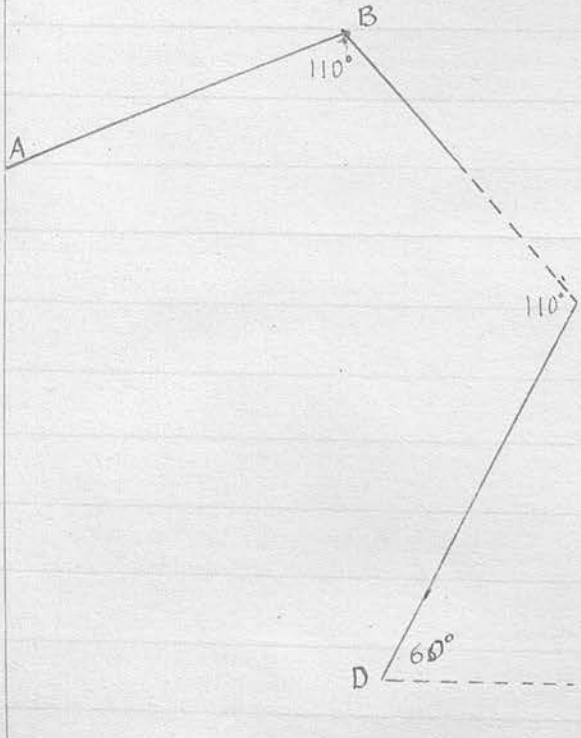


Fig. 89.

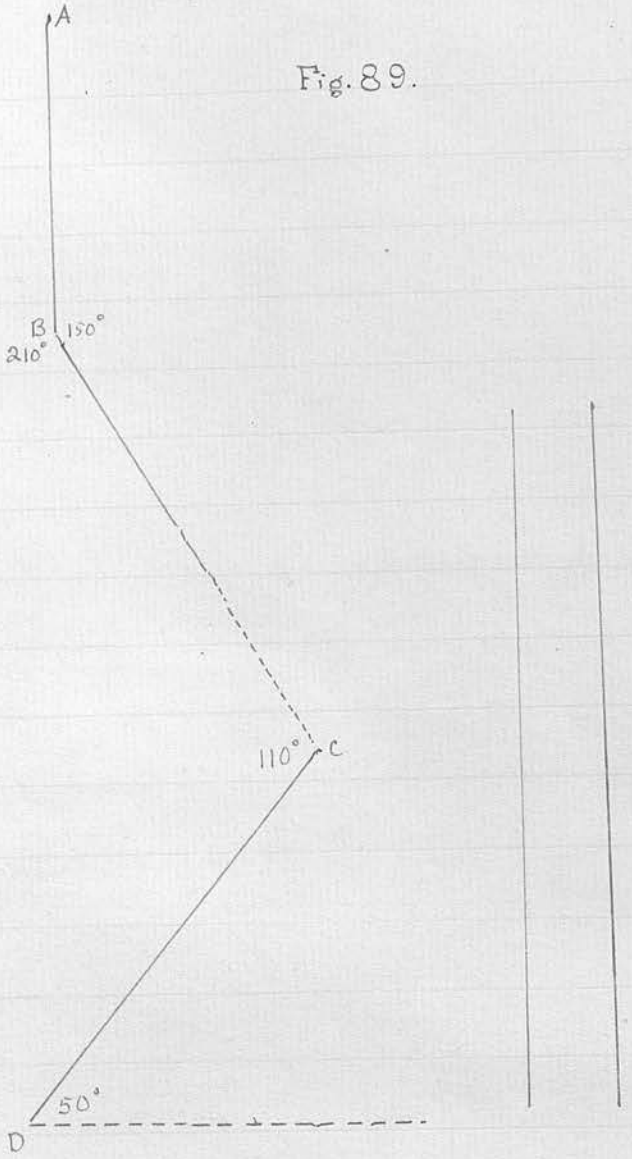


Fig 90

Fig 91

Fig 92

Fig 93.

98C.

fixed onto the patient while the photographs were being taken.

Let AB be the long axis of the humerus, BC the acromium process and a line projected from it which meets CD the line of the vertebral border, at C. Let EF represent the vertebrae.

In fig. 84, the humerus is hanging down by its own weight, and forms an angle of 10°with the vertical. The angle between the long axes of the humerus and acromion is 80°. The vertebral border of the scapula lies vertical.

In fig. 85, the humerus has been abducted through an angle of about 60°; the scapula can be seen to have rotated, for the acromion lies at an angle of 110° with the humerus and the vertebral border at an angle of about 60° with the vertical, instead of 140° and 0° respectively, which would be the case if the bone had remained immoveable.

In fig. 86, the humerus has been still further abducted, so as to have passed through an additional angle of 100°, altogether therefore 160°, the angle with the acromion is 210°, the scapula has rotated only through about 10°, but has moved en masse round the side of the chest.

The range of movement at the shoulder joint is through about 130°. Figs 90 to 93 show the movement in the living subject taken with ordinary

photographs. In fig. 90 the arm is hanging vertically downwards, in fig. 91 it is in yard position, and the scapula has rotated through about an angle of about 30° in fig. 92 the arm is in stretch position; the scapula had rotated very little more In fig. 93 the spine of the scapula is marked out by a black line.

The above facts can be verified anyday in the living body in normal subjects.

Ride sitting double arm abduction AR, adduction PR.

The patient assumes the initial position, and the assistant grasping his wrists, performs traction away from the shoulder and resists while the patient abducts his arms through yard position (with the palms of the hands looking directly forwards) up to stretch position (where the palms should look directly towards each other). The reverse movement is gone through with PR. (Figs 94 - 97.)

We may give this exercise with adduction AR instead of PR.

The movements are of course abduction and adduction of the shoulder joint, with a certain amount of supination and pronation respectively. The scapulae have to be kept well back, and this

Fig. 94.

Fig. 95.

Fig. 96.

Fig. 97.

combined with the fact that the whole shoulder girdle is lifted up, causes the chest to be brought out.

Swim sitting double elbow pressing downwards PR, upwards AR.

Fig. 98.

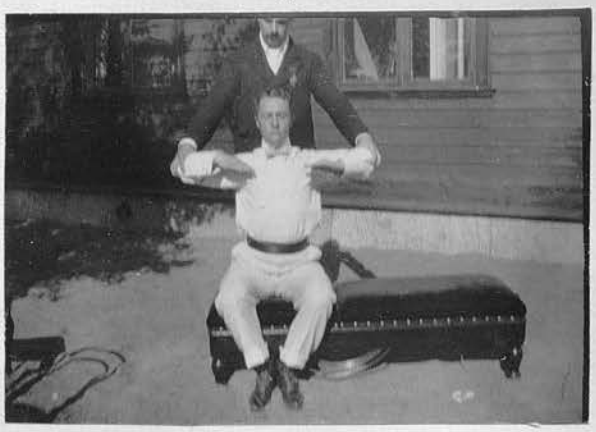


Fig. 99.

The patient assumes the initial position and the assistant by pressing over the upper aspect of his elbow joints causes adduction of the upper arms down to the vertical, the patient resisting meanwhile. The reverse movement is then gone through with AR.

(figs. 98-99.)

The movements are adduction and abduction of the shoulder joint. The upper thirds of the trapezii can be felt to be strongly contracted.

2. Of the thumb.

Abduction and adduction (opposition) of the thumb with or without resistance can be given in the case of weakness of the muscles that control these movements.

3. Of the Hip Joint.

Lying double leg abduction AR. Adduction PR. From the initial position the patient separates his legs, while the assistant resists over the outer side of the feet and performs traction away from the pelvis. Adduction is then gone through with PR. The abductors of the hip joint are exercised.

Side Lying leg abduction AR. adduction PR. The assistant applies one hand over the outer surface of the ankle of that leg which is uppermost; with the other hand he steadies the hip. He performs traction away from the pelvis and resists while the patient abducts his leg as much as possible. The reverse movement is then gone through

Fig. 100.

with PR. The pelvis must be kept immovable, otherwise some flexion of the hip joint will readily occur if the crest of the ileum passes backwards. (fig. 100.) In this exercise the muscles that fix the pelvis and the abductors of the hip joint are exercised.

Lying double leg flexion PA, abduction AR. Adduction PR.

Fig. 101.

The patient first flexes his hip joints as already described (page 78) to an angle of 30°, and keeping them in that flexed position, goes

Fig.102.

through the movements of double leg abduction AR, adduction PR. (figs 101 & 102) The flexors and abductors of the hip joint are exercised.

4. Of the Knees:

Hook half lying double knee abduction AR.

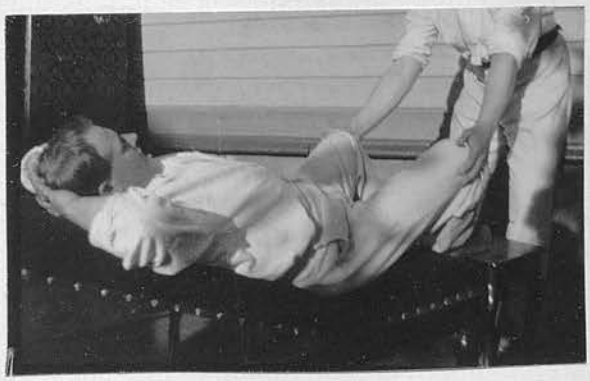
Adduction PR.

The terms abduction and adduction here are in reality misnomers, as such movements do not exist at the knee joint; the terms however have been in use so long that it is needless to change them. Dr Kellgren uses them in "Technic of Manual Treatment", 1890, (p. 107.)

Fig.103.

The patient from the initial position separates his knees as far as possible with AR over the outer

Fig.104.



surface of the knee. The reverse movement is then gone through with PR. The amount of flexion of the hip joints and knee joints should remain constant and the heels are to be kept together all the time. (Figs. 103 & 104.).

The movements are external rotation and abduction of the hip joint at first and then the reverse, the muscles performing that work are its external rotators, abductors. The effect of the contraction of the psoas and iliacus on the pelvic organs has been considered (page 51).

If the movement is given as abduction PR, adduction AR, the internal rotators and adductors are in action.

C. PRONATION & SUPINATION.

The upper arm is fixed and the forearm flexed to about a right angle at the elbow joint (this is to eliminate rotation at the shoulder joint). The assistant grasps the patient's hand as if he were going to shake hands and then the movements of pronation and supination, passive or duplicate, are gone through. (fig. 105).

Fig. 105.

In ordinary life, pronation and supination are first done by grasping some object with the hand and then trying to turn it one way or another. This means that the flexors fingers and fixators of the wrist joint are called into action. In the case of supination, a fact not usually mentioned in textbooks is that the triceps has to work hard to counteract the biceps, which if unopposed would cause flexion of the elbow joint.

The effects of pronation and supination on the shoulder joint have been discussed already (P. 71.8c).

D. INVERSION & EVERSION.

These movements are only found in the ankle joints. To give them the lower leg is fixed above the ankle and the assistant's grasp is over the inner surface of the foot in inversion AR, eversion PR, and over the outer side in inversion PR, eversion AR.

The muscles that are active are the inversors (tibalis posticus and anticus and flexors of the toes) and eversors (the peronei and extensors of the toes) respectively. The movement takes place chiefly at the mediotarsal joint.

E. CIRCUMDUCTION, also called ROLLING.

These have the widest range of all movements.

1. Of the shoulder joint.

Half lying double arm rolling PP.

The patient is in the stretch half lying position with the palms of the hands looking directly away from one another, or less commonly, directly forwards, The assistant grasping the patient's hands.

Fig. 106.

(1) Extends the shoulder joint and flexes the elbow until the upper arm lies against the side of the thorax and the forearm is in extreme flexion.

(2) By drawing his hands outwards and upwards he gets the patient's arms into heave position.

(3) Finally, by drawing them upwards and inwards they come into the original position again. (fig. 106.)

The position of the radio-ulnar joints is to remain constant throughout.

The movement is recommenced and this is done from 6 to 10 times; this constitutes the first half of the exercise "from within outwards". It is then repeated a like number of times in the reverse order, from without inwards. The division into three parts is merely for the sake of description; in practise the rolling should be done as evenly and continually as possible, the various component parts merging into one another without a break.

In this exercise we have circumduction at the shoulder joint, and flexion and extension of the elbow.joint; the forearms are usually pronated throughout, though in some cases the mid position may be used instead.

The movement may be done quickly and energetically and the effects I have already indicated on page 60 when discussing the physiological effects of passive movements at joints given in that manner, are:

The muscles of the whole limb are stimulated and contain more blood; the circulation in the arteries, veins and lymphatics is furthered; the nerves are stimulated; the joints rendered more supple and stiffness, if present, will tend to be removed, etc. The chest is increased in capacity by its being alternately lifted up and down again.

The movement may be done slowly as in some cases of heart disease, where we wish to produce the reaction slowly, or if we wish to convert it into a pure respiratory movement. In the latter case the patient inspires deeply as the arms are brought into stretch position, and expires deeply when the reverse is done. If given like this the stimulatory effects on the arms are not so great as when the movement is done rapidly.

If we have exceeding stiffness or great pain being caused by movement, or in freshly reduced dislocations, we may give an arm rolling with one arm at a time, the patient being in the sitting position. The assistant fixes the shoulder and places his other hand at the elbow; while keeping up traction away from the trunk, he moves the elbow in a gradually increasing circle first in one direction and then in the other, thus bringing about circumduction at the shoulder joint.

Further details as to rollings and their effect on the heart are given under heart disease.

2. Of the Wrist Joint.

Sitting hand rolling PP.

Fig. 107.

The forearm is fixed and the assistant grasps the fingers of that hand. Keeping up traction away from the wrist he performs circumduction at the carpal joints, first in one direction and then in the other. Figs. 107 & 108 show two different methods of performing this.

We have circulatory, muscular, nervous, etc., effects, as already indicated, in the hand and forearm.

Fig. 108.

3. Of the Thumb and Fingers.

The thumb may be rolled with its metacarpal bone, the wrist being fixed, traction away from the latter being kept up all the time.

Fig. 109.

The fingers may be rolled in a similar manner with their corresponding metacarpal bone fixed.

The circulatory and other effects are on the same lines as before. (Fig. 109.)

4. Of the Hip Joint.

Half lying leg rolling PP.

which can also be given with both legs at once.

The patient is in the initial position with neck firm. The assistant, whose grasp is practically the same as in half lying

Fig. 110.

Fig. 111.

Fig. 112.

knee flexion

PP, extension

AR (fig.55&)

proceeds as

follows:--

(1) Flexes the knee and thigh (not to the maximum possible, but stopping short of the natural limit)

(2) Rotates the thigh outwards and abducts it, i.e. he presses the knee outwards. (fig. 110.)

(3) He then draws the foot directly away from the trunk back to its original position, thus bringing about internal rotation, adduction and extension of the thigh and extension of the knee, i.e. the reverse of what he did in (1) & (2) (fig.111&2)

He then recommences and does this 6 to 10 times; this is the first half of the movement from within outwards. He then does the rolling in the reverse direction (from without inwards) a like number of times.

The division given above is merely for the sake of description, just as in arm rolling there should be no pause, the movement being given evenly and continuously.

In the case of moderate stiffness or inflammation at the hip joint the movement is given slowly and with traction away from the pelvis; this is done by placing one hand in the bend of the knee, and drawing it away from the trunk all the time, the other hand being as before.

In cases of very great pain or stiffness, rolling at the hip joint can be given even with greater traction than in the last method. With the patient's knee fully extended, the assistant grasps the foot and draws it away from the pelvis by moving it in a circle causes a smaller circumductory movement to take place at the hip joint. The circle at first small in range, can be gradually increased, and should be done first in one direction and then in the reverse one, as before.

The effects of this exercise as regards the muscles, nerves, lymphatics, blood circulation, etc., are as before, varying of course with the rapidity

of the movement. In Prof. Schäfer's Textbook on Physiology, Vol.II, 1900, p.121, I find stated: "It was determined by Braune that if the thigh be rolled outwards and backwards, the pressure in the femoral vein under Poupart's ligament falls 5 to 10 mm. H_2O below zero, and becomes positive again when the leg is placed in the opposite position. The bones, the muscles,and the fascia, together with the vein, make a suction and forcepump, and thus by this mechanism, walking can aid the flow in the femoral vein. Elongation of the veins in their long diameter has been found to increase their capacity, and thus aspiration may be produced therein by alternate extension and flexion of the body or limbs."

Now leg rolling given as described, induces from its nature, the same changes as the above, although not quite to the same extent. We thus see what a powerful movement it becomes in the treatment of congested venous states of the greater circulation, such as are found in heart disease, etc.

5. Of the Foot.

Half lying double foot rolling PP.

The lower legs are supported and the assistant's grasp is such that his fingers and thumb are placed over the dorsal and plantar aspects of the metatarsals

Fig. 113.

Fig. 114.

respectively at their distal end. He then performs circumduction of the foot 6 to 10 times in one direction and then a like number of times in the reverse one. The movement should be confined to the foot, i.e. as little rotation as possible of the hip joint should be introduced. (Figs. 113 & 114.)

The ankle joints are not alone influenced, for various tarsal joints participate. The muscular, circulatory, nervous, etc., effects are as already described, the areas affected being the foot and lower leg.

We may give the rolling with one foot at a time, in which case the lower leg is fixed by the assist-

ant's one hand, the other grasping the foot; but not in the same manner as in the double movement: he places the palm of his hand instead of his thumb on the plantar aspect of the distal end of the metatarsus (as fig. 69). The advantage of doing the rolling with one foot at a time is that in consequence of the fixation of the lower leg, all loss by transmission of some of the movement to the hip joint, is eliminated; the range of rolling is greater, and the grasp gives a better command over the foot.

6. Of the toes:

May be given with the corresponding metatarsal bone fixed and with traction away from it kept up the whole time. The effects are as before.

7. Of the head:

The assistant with one hand on the occiput and the other over the forehead slowly rolls the head first in one direction and then in the other, keeping up traction away from the trunk all the time. Unlike

Fig. 115.

other rollings, this one is never given energetically to its fullest extent. (Fig. 115.)

The movement is a combined one of flexion and extension of the occipito-atlantal joint and rotation of the atlanto-axial joint , with bending forwards, sideways, and backwards in the cervical vertebrae. The effects are as before.

F. TRACTION.

In all duplicate movements wherever possible, the assistant keeps up traction of the part by drawing its distal free end away from its proximal fixed end. This has already been described and repeatedly insisted upon. The physiological effect of traction has been considered (page 47).

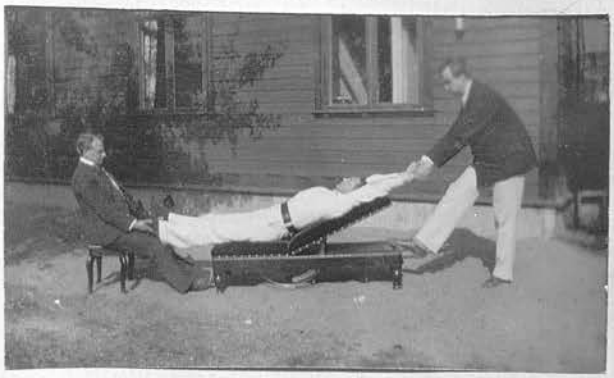
I shall now describe some passive exercises given specially to stretch parts.

Stretch half lying double hand and foot traction, PP.

Fig. 116.

Two assistants, one grasping the hands and the other the feet stretch the patient by

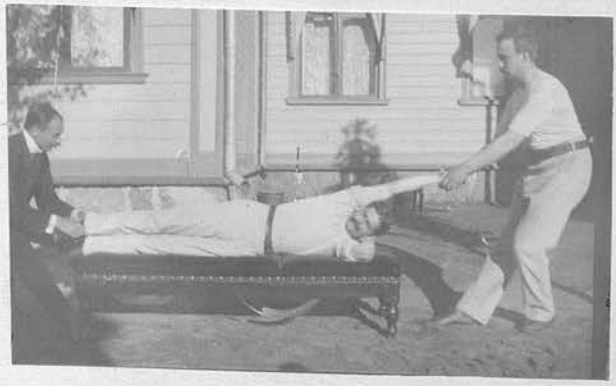
Fig. 117.



pulling in opposite directions for a few seconds simultaneously. (fig. 116 & 117.)

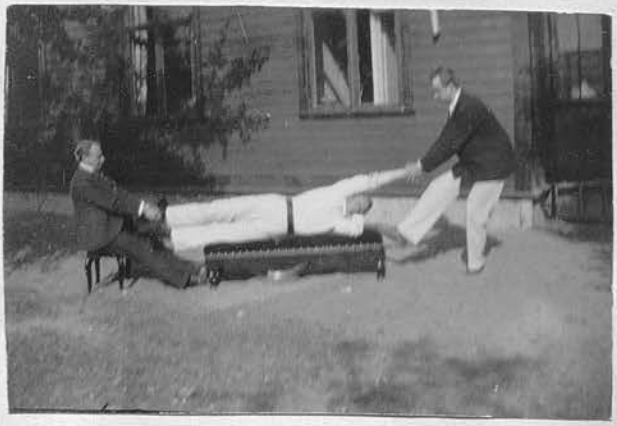
Stretch side lying hand and foot traction PP.

Fig. 118.



Two assistants one grasping the hand and the other the foot that is uppermost, proceed as before (figs 118 - 119.)

Fig. 119.



Arm Traction sideways, PP.

Fig. 120.

The assistant, grasping the patient's hand, brings the arm of that side into yard position. He fixes the shoulder, and then by drawing the hand away from it, performs traction of the arm. (fig. 120.)

Side Lying leg traction PP.

The pelvis being fixed, the foot of that leg is drawn away from it. This movement also enters into the first two traction exercises given above.

Traction of individual joints. See vibration (pages 197-198).

All the foregoing tractions may be given with simultaneous vibration of the part.

Standing vertebral column stretching, AR at patient's head, may conveniently be described here. The patient is in the standing fundamental position with his back against a wall. The assistant places one hand lightly over the patient's abdomen to steady him, and the other over his lambda. The patient then stretches upwards, (i.e. he makes himself as tall as possible without rising on his toes) and backwards, the assistant resisting by drawing in the opposite direction. No actual movement should however take place, the assistant taking care not to overcome the patient's efforts , or let his own be too weak. (fig. 121).

Fig. 121.

This exercise is a very powerful one for the extensor muscles in the back; the strain should be felt most in the lumbar region.

G. FALLING.

This is a term used for certain trunk movements. Falling forwards, in which the lower limbs and trunk

move as a whole, has been described already (p. 36.)

Falling backward occurs as part of other movements, but the term by itself is restricted to :

Ride sitting falling backwards, breathing PA.

The patient from the initial position with hips firm usually, lets his trunk pass backwards by means

Fig. 122.

of extension at the hipjoints, until ride fall sitting position is reached. He remains there long enough for him to respire deeply three times, and then comes up to the original position again. (fig. 122.)

The flexors of the hip joints perform the movement. The spinal and abdominal muscles are strongly taxed, and this exercise is specially given for the latter. It is also a respiratory movement.

H. CARRYING.

This is a term to denote certain arm movements. I shall give three examples:

High sitting double arm carrying outwards AR, Inwards PR.

Fig. 123.

Fig. 124.

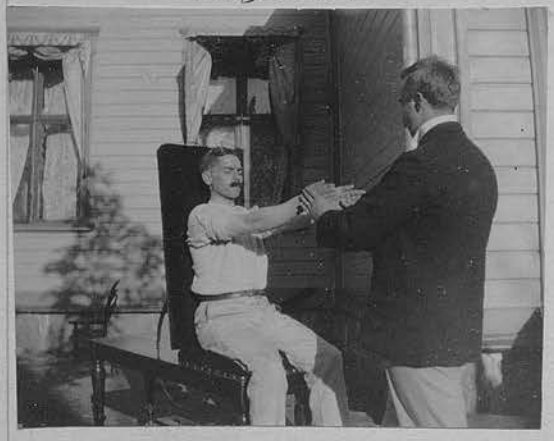
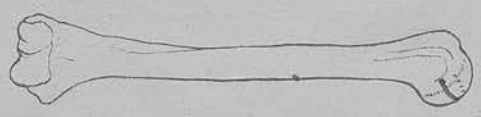


Fig. 125.

when the patient from the initial sitting position with his back supported, first brings his arm into reach position. Then with AR over the dorsal aspect of the metacarpals, he carries his arms horizontally outwards and backwards as far as he can, keeping his shoulders drawn well down and back. The reverse movement is then gone through with PR. (figs 123-125).

In this exercise the upper dorsal, posterior scapular and posterior muscles of the whole upper limb are exercised. The movement at the shoulder joint is none of the ordinary simple ones of flexion, abduction, rotation, etc., nor is it circumduction. It is a kind of new 8th movement of the shoulder joint and consists in the gliding of the head of the horizontally held humerus on the glenoid fossa, the line travelled on the former being as in the fig. 126.

Fig. 126.



Sitting elbow pressing backwards AR, forwards PR.

This is given with one arm at a time. The patient places his upper arm in a position about midway between yard and reach positions, flexes the elbow joint to an acute angle and has the palm looking directly downwards. The assistant places one hand on his shoulder to steady it, and the other over the lower end of the humerus posteriorly. Then the patient, keeping the various parts of the upper arm

horizontal all the time, causes his elbow to pass backwards as far as he can with AR. The reverse movement is then gone through with PR.

The effects are exercising of the same muscles at the shoulder joint as in the last movement.

Walk standing double arm circle carrying, breathing, PA.

Fig. 127.

is done by the patient bringing his arm from the initial position through reach to stretch and then through yard to the original position once more. He inspires deeply during the first part of the movement up to stretch position, then keeping his breath in, brings his arm to yard position; from there the final stage of the movement is done quickly and a quick deep expiration is made. (figs 127 - 129.)

Fig. 128

The movement is a respiratory one. In cases of defects in the respiratory or circulatory apparatus, or often without the existence of these, as a kind of general tonic, we give

Fig. 129.

this arm carrying after each exercise. In this case it is only done once each time, but if given separately as an exercise by itself, it is done three times in succession, first with one foot forwards, and then with the other.

The actual movement of the arms is circumduction of the shoulder joint.

I. TURNING and TWISTING (ROTATION)

By this we mean rotation on that axis which is vertical in the fundamental standing position. We may, as in "ride sitting screw" (page 127.) combine a rotation with other movements.

1. Of the Head:

The assistant's grasp is as in head rolling (page 115). Keeping up traction upwards all the time, the head is first turned to one side and then to the other, passively or with resistance as the case demands. The movement is almost exclusively confined to the joint between the atlas and the axis. The muscles that act in active turning are those that rotate the joint mentioned, and those that fix the cervical vertebrae.

2. Of the Trunk.

Loin lean stride standing alternate rotation AR.

The patient is in the initial position with neck firm. The assistant grasps him round the elbows and keeping up traction of the trunk away from the pelvis (this is done by lifting upwards and outwards) brings it passively into turn position. The reverse movement is then gone through with AR. in front of the posterior elbow and behind the anterior (usually more specially the

Fig. 130.

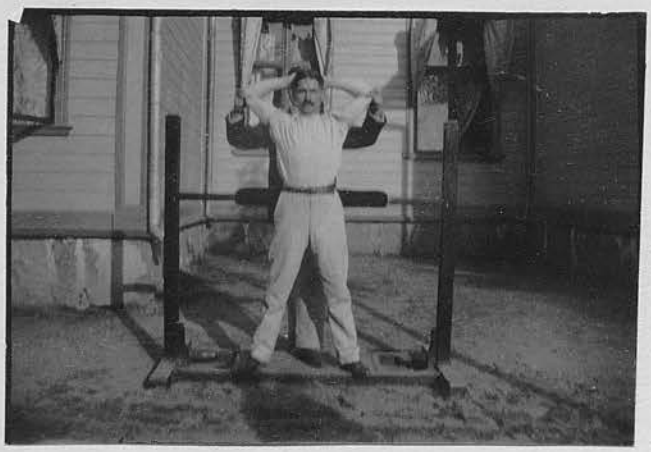


Fig. 131.

Fig. 132.

latter) with traction as before. This is then done on the other side. (figs 130, 131.) The movement may be done from ride sitting or loin lean stride kneeling position. (fig. 132.) In this exercise we have rotation of the trunk on the vertebral column, chiefly in the dorsal region. Suppose that the patient is in left turn position,

then the muscles which act in bringing him back to the original position are in three groups:

(1) External oblique and external intercostal of the left side.

(2) Internal oblique and internal intercostal of the right side.

(3) Rotator muscles of the trunk, i.e. the rotatores spinae, multifidus spinae and semi spinales, etc.

Besides the above, the posterior scapular, upper dorsal and cervical extensors are powerfully contracted in order to maintain the position of the arms and head.

The abdominal viscera are stimulated in this exercise from the alternate application and removal of pressure, and for this reason as well as for the fact that most of the abdominal blood vessels are alternately elongated and shortened, we have furthering of the circulation. Increased absorption from the lymphatics also takes place.

I shall now describe a complex movement known as

Ride sitting screw PP.

The patient assumes the ride sitting position with neck firm with his lower legs fixed. The assistant's grasp is at first as in the last exercise and he commenced by rotating the patient's trunk to one side, say the right, so that he comes to be in the right turn position (fig. 133).

He now lets go the elbows; his right forearm and hand he places as in fig. 134 and he then swings the patient's trunk round so that his head describes a circle, the centre of which is the position his head would occupy if it were placed in the ride sitting fall position. (figs. 134 - 136). During the execution of this, the trunk is rotated on itself, so that at the completion of the circle it is in the left turn position. The final step is then taken by rotating the patient back to the original position.

The grasp of the assistant varies slightly in the different stages of the movement; the positions can be fairly well gathered from the photographs.

Having brought the patient back to the original position, the screw is repeated twice in a similar manner, and then three times in the reverse direction.

The whole movement is to be done with evenness and continuity, the above division into parts being merely for the sake of description. Between each screw a deep respiration is to be taken.

The movement is a complex one and consists of:

(1) Flexion of the trunk at the hip joints, through a range of 90°,

(2) Complete rotation of the trunk from right turn to left turn, or vice versa,

(3) Some lateral flexion of the trunk,

(4) A slight amount of rotation of the pelvis on the hip joints,

(5) A slight amount of compensatory flexion and extension of the knee joints,

Fig 133

Fig 134.

Fig 135

Fig 136

Figs 133- 136. Four positions as described in Ride sitting screw PP.

All of which combine to give us a rotation of the trunk. The abdominal contents are powerfully stimulated as a result of this in a manner similar to the last exercise, only to a much greater extent. We have in fact a combination of the effects of ringing, alternate rotation, besides other factors which increase them.

3. Of the Extremities.

(a) Of the arms:

Rotations at the shoulder joint can be given with upper arm supported and the forearm flexed to about a right angle (so as to eliminate pronation and supination). The assistant's grasp is over the wrist joint and the passive or duplicate movements of internal and external rotation of the humerus can be gone through. The muscles performing these movements are exercised.

(b) Of the legs:

These are conveniently given in half lying position; the toes are moved through the arc of a circle whose centre is the heel; as the knee joints are fully extended we cannot have any rotation there; the whole movement is transmitted to the hip joint.

As a duplicate movement, resistance is applied over the outer side of the metatarsals in external

rotation AR, and over the inner side in internal rotation AR. The muscles performing the movements are the external and internal rotators of the hip joint respectively.

J. RINGING.

This is a passive form of movement; by it we mean a rapid alternating flexion and extension. The use of the word however, is very restricted; sit lying knee extension and flexion PP may be called ringing, otherwise we have the term only in the following exercise:

Loin lean stride standing ringing PP.

Fig. 137.

The patient assumes the initial position with neck firm the assistant applies his grasp under his elbows. Keeping traction upwards and outwards, he passively flexes the patient's trunk to one side, say the left, into left side bend position and then right over through the original to

right side bend position, then back again and so on 6 to 8 times fairly quickly (Fig. 137). The movement may be done from other positions, such as ride sitting, loin lean stride kneeling (fig. 138) etc.

Fig. 138.

The effect is chiefly on the abdominal contents, from their alternate shortening and elongation, and application and removal of pressure, we have stimulatory and circulatory furthering effects. The latter is partly brought about by the fact that the aorta and inferior vena cava lie on opposite sides of the mesial plane, and also by the fact that the azygos veins are similarly affected by the alternate lengthening and shortening.

K. DRAWING.

The explanation of this term can best be found by reading the description of the various movements it comprises. These are three in number:

1. Drawing forwards:

2. Drawing backwards:

3. Drawing sideways, which however may also be called drawing forwards, for although the patient is drawn sideways the assistant draws him forwards towards himself.

1. Drawing forwards:

Stretch Grasp Standing Drawing Forwards
PP.

The patient having assumed the initial position, the assistant stands in front of him and passing his hands round his sides under the arms, places his hands over the upper part of the scapulae, so that his palms lie in contact with them and look directly forwards. Then, keeping them so, he pressed the scapulae inwards and at the same time draws the patient's body away from the ladder (towards himself). He then, keeping up this pressure inwards and towards himself, causes his hands to glide down the patient's back, keeping close to the spine in so doing, until the lumbar region is reached.

Fig. 138A.

The assistant then brings his hands around the sides of the abdomen and the patient either passively glides back through them to the original position by his own weight and the elastic tension of his body, or he may draw himself back, the assistant resisting slightly. The patient's feet must touch the ground the whole time. (Fig. 138A)

If instead of beginning high up over the scapulae, the hands began in the lumbar region, the exercise would lose a great deal of its effect. It may be given from heave grasp standing position. (fig. 139).

Fig. 139.

The effects are: stretching of the anterior muscles of the arms, trunk and thigh, with subsequent shortening or moderate concentric contraction of the same. The greatest effect is on the abdomen, and thus this movement is conveniently given as a preliminary stimulation to the giving of any manipulation on the abdominal organs.

2. Drawing Backwards:

Loin lean stride standing drawing backwards PR., forwards AR.

The patient assumes the initial position and the assistant grasping his elbows and keeping up traction just as in ringing done from this position (page 131) causes extension of the trunk on itself by drawing it backwards over the bar, the patient resisting somewhat. The reverse movement is then gone through with AR.

The movement may be done from loin lean stride kneeling position (fig. 140-141).

The abdominal contents are affected from the alternate stretching and relaxation, application and removal of pressure, and the anterior abdominal muscles are first in excentric and then in strong concentric contraction.

3. Drawing sideways (forwards)

Side span standing drawing forwards, PP.

The assistant standing as in the drawing forwards already described, places his hands as in fig. 142 over the infra-axillary region which is nearest the apparatus and draws him towards himself (i.e. away from the ladder). He then glides his hands over the patient's body, the palms looking directly towards himself, till they reach the crest of the ilium, when he lets

Fig. 140.

Fig. 141.

Fig. 142.

Fig. 143.

Fig. 144.

his hands slip round the patient's body, the latter passing back to the original position either passively or by his own efforts, as in drawing forwards from stretch grasp standing position.

If properly done the stretching is not merely felt in the lateral aspect of the abdomen, but in that side of the thorax as well. The position of the assistant's hands is well seen in the figures (Figs 142, 143, & 144) which show the commencing, intermediate and final positions during the drawing forwards. At fig. 144, the patient commences to pass back again to the original position.

There is stretching of all the muscles, ligaments, vessels, etc, of the one lateral half of the body, especially the abdomen,

with subsequent shortening (passive or active according to circumstances). The movement is conveniently given as a preliminary stimulation in cases of subsequent manipulations on the abdominal organs, just like stretch grasp standing drawing forwards..

L. EXPANSION.

This term is used only as regards certain chest movements which are specially given to expand the chest and increase the respiratory function.

Every active movement, whether duplicate or not is in itself a kind of chest expansion, as the cardinal rule must always be followed: "Keep the head up, the chin in, and the shoulders down and back as much as possible in the execution of each movement." Mr Allan Broman in "School gymnastics" 1895, writing on the subject of Ling's pedagogical gymnastics, says (p.27): "Every gymnastic exercise should be done under conditions of full and free breathing. An exercise which does not permit this is bad educationally and should be eradicated. In fact, every gymnastic exercise rightly executed is a respiratory movement." This principle, a sine qua non in Ling's pedagogical is also one which must be rigidly followed in the practice of medical gymnastics.

I will here briefly refer to the effect of respiration on the circulation of both blood and

lymph. Inspiration aids the return of the venous blood in the cavae as they lie in the thorax by establishing a negative pressure in them and it likewise assists in the passage onwards of the blood in the pulmonary veins. In the abdomen the effect is also marked, the inspiratory descent of the diaphragm and the expiratory contraction of the abdominal muscles assists in the diastolic filling of the heart. Inspiration also acts on the lymph flow by inducing a negative pressure in the thoracic duct.

Increase in the respiratory function will cause a corresponding increase in all the phenomena above mentioned. Now, movements that increase the respiratory power will in the course of time produce development in the respiratory organ (excepting in emphysema where better respiration means retraction and diminution in the size of the chest and lungs). This brings a greater amount of oxygenated blood into the body, with better nutritive changes and improvement in the system as a whole.

See heart diseases (p. 330 &c) for further details as to the importance of proper respiration.

Low sitting chest expansion (lifting) PP.

The assistant, standing behind the patient, supports his back with his knee, and grasps his upper arms over the shoulder joint. He lifts them upwards and backwards, downwards and backwards, downwards and forwards, and finally forwards and upwards; thus causing the head of the humerus to describe a circle; this should be done with all possible continuity and evenness, and repeated without a pause some five or six times. During the lifting of the shoulders the patient should inspire deeply, during the descent, he expires. (Fig. 145.)

Fig. 145.

The chest is actively enlarged by the patient's deep respiration and still further passively by the assistant's efforts.

Heave lean standing chest expansion PA.

The patient assumes the initial position, leaning slightly forwards, and then keeping the forearms fixed, rises on his toes. He then sinks down on his heels, letting his forearms move with his trunk. This is repeated three times with deep inspirations when rising on the toes, and deep expirations when sinking down again. Thus the forearms and upper arms come lower and lower down (at each repeated movement) and the patient further and further forwards, which expands his chest more every time. Pressure on the vertebral borders of the scapulae from behind, so as to approximate them, increases the effect of the exercise. As a final manoeuvre the arms are slid up the poles until stretch lean is reached, a deep inspiration being taken coincidentally and then the arms are adducted with a deep expiration (Fig. 146.)

Fig. 146.

The movement, as the name implies, is a chest expansion.

Head lean arch standing toe raising, PA.

The patient stands in the initial position with hips firm. He then rises on his toes, but keeps his head at the same level as before; in sinking down on his heels however, his whole body moves en masse. Having done this, the spinal column is more arched than before. This is repeated three times and each time his head comes lower and his chest comes further out. After the third time the patient straightens himself up to hips firm standing position. The respiration should be: deep inspiration when rising on the toes -- deep expiration in sinking down again. The extensors of the spinal column and hips are in strong contraction. The chest is expanded. (Figs.147 - 150.)

Stretch grasp toe standing going backwards and breathing PA.

Fig. 151.

The patient assumes the heave grasp standing position first and then rising high on his toes he stretches up his arms and grasps two vertical poles as high up as possible. He thus comes to be in

Fig. 147.

Fig. 148.

Fig. 149.

Fig. 150.

Fig. 152.

stretch grasp toe standing position. He then walks backwards as far as he can and remaining there, supported by his hands and toes, takes three deep respirations, after which he goes through the stages of the movement in the reverse order back to the original position. (Figs. 151 - 152.)

We have here a stretching of the whole of the body, especially the abdomen; the chest is very much lifted up, and the movement is specially a respiratory one.

M. RAISING.

This is a term applied to certain trunk and leg movements.

Stride kneeling sitting down PA, Raising AR.

From the initial position with the back somewhat arched and the arms in neck firm, the patient, with the assistant's grasp as in drawing backwards (fig. 140). flexes his thighs and knees and straightens his back so that he comes to sit on his own lower legs with his trunk erect. The reverse movement is then gone through with resistance over the front of the elbows. (Figs. 153 to 154.)

The extensors of the knees and thighs and extensors of the spine are exercised.

Fig. 153.

Fig. 154.

Forwards lying back arching PA, breathing PA.

From the forwards lying position with the feet fixed, the patient, first placing his hands in hip firm, brings himself into arch forwards lying position and staying there, breathes deeply three times (Fig. 155.)

Fig. 155.

The extensors of the spine and thighs are exercised. It is chiefly a respiratory movement.

Forwards lying leg flexion PP. raising AR.

The patient lies in the initial position and the assistant grasping the ankle brings the leg with the knee quite extended down over the side of the bench and flexes it until an angle of 60° or so with the floor is reached. Then the patient goes through the reverse movement with AR over the back of the

Fig. 156.

ankle. The assistant should keep up traction away from the hip in both the active and the passive parts. (Fig. 156).

The effect of the exercise is increased if the patient when raising his leg instead of stopping when the limb lies horizontally on the bench, continues extending it as much as possible above it, and then resisting while the assistant presses it down to the original position.

The extensors of the hipjoint are exercised, specially the gluteus maximus. A certain amount of abduction and adduction enters into the movement in order to enable the limb to be brought over the side of the bench, and then on it again.

N. LIFTING.

Some of the raising movements are occasionally called lifting, otherwise we have the term only in the following

Sitting head lifting PP.

The patient is in the sitting position and the assistant places one hand on the frontal bone and the other under the occipital.

Fig. 157.

He first lifts up the head (performs traction upwards) and then does a little flexion forward, and back again, doing this several times. The head should be flexed on the cervical vertebrae, not the latter on one another (Figs. 157 & 157A.)

Fig. 157A.

From the stretching and alternate elongation and shortening of the vessels the circulation through the brain is hastened, as in head flexion p. 91. The movement is practically confined to the occipito-atlantal joints.

O. VIBRATION AND SHAKING.

P. FRICTION.

I shall consider these together as some structures allow of frictions and vibrations being given on them, but not shaking, and others allow of shakings and vibrations, but not frictions, etc.
I shall divide these manipulations from a practical point of view into three great groups:

I. Vibrations and Frictions of nerves & ganglia
II. Vibrations and shakings of other structures
III. Frictions of other structures.

History and Development:

P. H. Ling does not describe any direct nerve treatment in his writings. Later on under Branting, a manipulation was tried which consisted in pressing on a nerve for a few seconds, with or without a coincidental trembling movement. Sometimes blunt pointed sticks were used instead of the operator's fingers. The method can be found described in Dr A. C. Neumann, "Die Heil-gymnastik", 1852, p.212 et seq., "Lehrbuch der Leibsübungen", 1856, p.267., Dr N. Roth's "Handbook of the Movement Cure", 1860, p.175, etc., and elsewhere. The method with sticks was after a time abandoned as being of no use, and

even the manual nerve pressing was but little gived, as the benefits obtained were not marked.

Professor Hartelius at the time that electricity was so much vaunted, combined it with medical gymnastics; the experience he got, however, led him to the conclusion that the latter did more good alone than when given together with the former; he even in some cases found that electricity had the effect of destroying the little improvement that medical gymnastics had brought about. So electricity was not used any longer; nerve pressing likewise fell into disrepute. In the whole of Professor Hartelius' "Lärobok i Sjukgymnastik" 1892, consisting of 350 pages, we find that the only descriptions given are those of arm and leg nerve pressing, and these occupy scarcely 20 lines; as regards the other nerves, only casual reference is made to a few of them -- vagus, phrenic, intercostal, great sciatic, etc. It was left to Henrik Kellgren to invent the method of nerve frictions and vibrations as a direct means of stimulating and soothing nerves, and we find that in the late sixties he was using these new methods with great success. In the course of years many medical men came to hear of them, although but slowly, owing to the fact that Kellgren himself published nothing concerning them, and those of the profes-

sion who were interested lacked the practical knowledge and technic which was necessary in order to write on the subject. After the lapse of many years, however, the name of "Kellgren's nerve frictions and vibrations" came to be generally known. Professor J. N. Nussbraun of Munchen in "Neue Heilmittel fur Nerven", page 16, says (translated): "At the present moment very great attention is being awakened at a 'Kuranstalt', where Dr Kellgren in various diseases selects the affected nerves and gives passive movements called nerve vibrations and obtains results which are so striking that the scientific world must take notice of them. These nerve vibrations are beyond doubt a new and great cure for nervous diseases." In 1887, Dr Levin, now head of the medical department for female students at the Central Gymnastic Institute, personally visited Mr Kellgren, spoke of his manual treatment in "Tidskrift i Gymnastik" 1892, No.2, p.687, and on his return to Stockholm he introduced some of the nerve vibrations into his clinique with success.

Dr Arvid Kellgren is the only writer so far, who has given anything like a systematic description of the modus operandi and technic of his brother's nerve treatment. Since the appearance of his various works, attempts have been made to imitate

these new methods, chiefly by those who had never seen them done as they should be done, and many have tried to place the credit of the invention on themselves.

It is a curious fact that since the publication of Dr A. Kellgren's description of the nerve treatment, that machine known as a vibrator, whose object was to replace the manual vibrations, has greatly come to the fore. The usual way that gymnasts, not of the Kellgren school, perform vibrations is to put the muscles of the whole arm and shoulder into strong contraction; vibrations of the part result, but the movement is very exhausting and after a few seconds it becomes uneven, then spasmodic, and finally the gymnast has to stop to rest. Machine vibrations are preferred by some because they are more even and can be given more continuously, etc., over a longer space of time. The question of superiority is one which has caused endless strife and is not yet settled. From a practical point of view, however, both machine and "whole arm" vibrations succeed in doing very little, if anything, in diseases of the central nervous system, and are a failure as compared with the properly applied manual vibrations of the Kellgren school.

It would appear that some of the imitators have been unable to discriminate between nerve fric-

tion and vibration and nerve pressing. As regards the latter, there seems to be no limit to enthusiasm with some gymnasts: Dr Wide, in "Handbook of Medical Gymnastics" 1898, p.59, says that "Local nerve pressing is when the special nerve to be treated is found and pressing exercised upon it," and on page 64, he goes on to say that "a nerve pressing can be given quickly passing or continual for minutes or hours." To give a nerve pressing for hours will result either in paralysis or a neuritis being set up, in either case an undesirable result. On reading such statements, one ceases to wonder at the very poor results obtained by such gymnasts in diseases of the central nervous system.

Definitions and Modus Operandi of Vibration, Friction and Shaking.

I cannot do better than quote from a paper read by Dr Arvid Kellgren before the Eleventh International Medical Congress at Rome on April 3rd, 1894, which has been reproduced amongst other journals in "Tidskrift i Gymnastik", 1894, pp.20-24.

"It is pretty generally known, that since the beginning of this century, there has existed in Sweden a system of movements called after the name of its founder, "Ling's System". In course of time, some of the old movements have been modified and new

ones have been added. This is more especially the case with those which come under the headings of shaking, vibration and nerve vibration. The changes and additions in these movements have mainly been made by my brother, Mr Henrik Kellgren. By their means we can, provided they be correctly executed, not only reduce many inflammatory conditions, but also give great relief to patients suffering from diseases in the central nervous system. .....

"I. Shaking: The part of the operator's hand which comes in contact with the patient's body in the new shaking movements is the inner surface of the distal phalanx of one or more fingers. The movement should start from the elbow joint of the operator. The bones of his forearm, wrist and hand, with their intermediate joints act, between the elbow and the last phalanges of the fingers, like a chain through which a wave-like motion is sent forward and transmitted to the patient. In order to produce this wave-like motion, it is essential that the operator's joints should be only so far extended that the elasticity of the movement is not lost. Stiffness is on no account permissible, for if the joints be kept stiff, the movement becomes hard and pushing, pain and discomfort are caused to the patient, and the disease is not attacked at all, or is even

intensified. On the other hand the movement - if it be correctly applied - promotes circulation, diminishes pain by reducing congestion and inflammation and increases secretion from the glands .....

"II. Vibrations: In order to produce vibrations, the operator places the whole or part, as the case may require, of the palmar surface of the hand and fingers lightly over the affected part of the patient's body and then makes quick contractions, principally with the flexors and extensors of the forearm and the radial and ulnar flexors of the wrist. By the rapid succession of these contractions the vibrations are produced.

"The operator's hands or fingers must not be allowed to slide over the point of contact with the patient's body, as it is evident that then no vibrations can be transmitted to the latter.

"In executing these movements the operator must work with loose and free joints and with the smallest possible contraction in the muscles he is using.

"There are two mistakes which I have often seen made by those who have tried to produce these vibrations, viz.:

(a) Instead of making the movement at the wrist, from side to side, they use ordinary flexion and extension.

(b) They produce the vibration by continued strong contraction of the muscles of the shoulder, arm and hand.

"In the first of these cases no vibrations are produced; in the second the movement is hard, the delicate sense the operator ought to have of the pressure he applies, is lost, and it becomes impossible to continue the treatment for any length of time, even for a few minutes.

"III. Nerve Vibrations: There are two ways of producing nerve vibrations:-

(1) By friction, that is to say, the fingers are drawn transversely across the nerve, somewhat in the manner in which a harp player passes his fingers across the strings of his instrument.

(2) By vibrations made over and on the nerve.

"When the latter course is adopted, the operator either follows the course of the nerve with the fingers in a centripetal direction, or he keeps his fingers fixed and vibrates on the more painful parts of the nerve.

"Which method of procedure (frictions or vibrations) should be adopted, depends on the position and surroundings of the nerve and upon the presence or absence of pain. When we have to do with a muscular or a mixed nerve, and when our intention is only to stimulate it in an ordinary way, we apply frictions and pass up and down its course; but when pain is present or the nerve is purely sensory, vibrations either alone or followed by constant pressure, are to be preferred.

" In giving these frictions or vibrations to a nerve, it is necessary that the operator should either feel it, or when it lies deeply, be well down on it, and that the tissues between the fingers of the operator and the nerve should move with the former, as otherwise the frictions do not reach the nerve.....

"It is needless for me to say that these movements can only be properly applied by those who have had a careful and extended training. The idea seems to have got about that a strong arm and a powerful hand are the only requisites for applying the manual treatment. There could be no greater mistake. What is wanted is a light touch and an elastic hand, the strength of the operator comes in due time as the result of working. But what is wanted, quite as much as the skilled hand, is a thorough knowledge of the human body and long and good training. No amount of theoretical learning, however great, will of itself enable anyone to know what can and what cannot be done by this treatment."

In "Technic of Manual Treatment," 1890, p.56, Dr. A. Kellgren draws a very close analogy between the effects of nerve friction and electricity, and he takes the electrical effects as his guiding idea for the application of manual stimulation. This leads

me to the consideration of a variety of manipulation not given by Dr Kellgren in the description I have just quoted, i.e. that of giving frictions on a nerve trunk at two different places remote from one another at the same time, thus on the internal plantar and great sciatic nerves of one side. It has been shown that electrical excitation produces a greater effect when given at both ends of a nerve path simultaneously than when applied at either end separately, and thus the manual application of the same is also used when we wish to produce a specially powerful effect.

The speed of these manual vibrations is about 11 per second in the case of my own hand; I have not yet been able to ascertain precisely whether all of my colleagues have the same rate, but I do not think the difference will be great. The number corresponds to that of ordinary muscle contraction. I give herewith a timed tracing taken on a revolving cylinder in the physiological laboratory of Edinburgh University, by kind permission of Professor Schäfer.

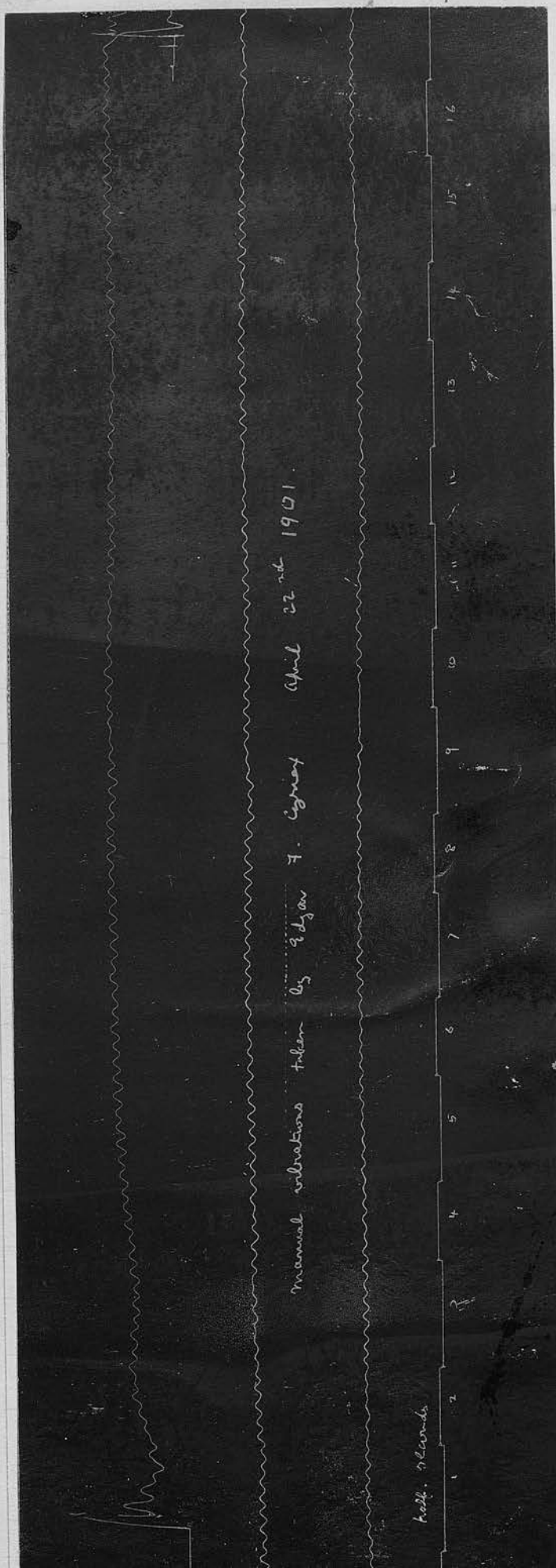


Fig. 158.

Middle line shows 9·2 vibrations in 8 secs. This is 11½ vibrations per second.

I. VIBRATIONS AND FRICTIONS OF NERVES & GANGLIA.

The effects of nerve frictions and vibrations have been described by Dr Arvid Kellgren in "Medical Press and Circular" for July 25th, 1888, "Technic of Manual Treatment", 1890, in his paper before the Medical Congress (as just quoted), etc.

The effects are briefly:

1. Raising of the nervous energy.
2. Diminution of pain.
3. Contraction of smaller blood vessels.
4. Stimulation of muscles to contraction.
5. Increased secretion of glands.
6. Diminished excretion from the skin.
7. Decrease of temperature.

As regards No.6, I must state that my own experience has not tended to show this as a general rule, excepting in cases of phthisis; as I have usually found, especially in fever, that nerve treatment has had the result of bringing on profuse perspiration.

To the above effects I have to add the following:

1. There is not merely a local influence, but the effect is transmitted over the whole path of the nerve from centrum to periphery, or vice versa.

2. Effects on sympathetic nerves by direct manipulations on the ganglia or nerves, or on the nerves leading to them. We have

(a) Contraction of the blood vessels supplied by the nerve, with compensatory dilatation in other parts.

(b) Stimulation of the various functions which are located in those nerves and ganglia.

As an illustration I may quote that a friction over the ganglion impar. often causes flushing of the head and scalp, and stimulation of part of the abdominal sympathetic (as is evinced by a desire for defaecation which often ensues immediately.) (see p.168 .)

3. Various reflex phenomena can be induced. Dr Arvid Kellgren gives one example of these in "Technic of Manual Treatment," 1890, p.54, i.e. reflex contraction of muscles, but does not enter into the matter in great detail. The subject, however, is a very large one and by no means fully worked out. I shall content myself merely with a few examples.

(a) Stimulation of sensory nerves may cause reflex contraction of muscles through the motor branch of the common trunk, i.e. frictions over the radial nerve in extensor paralysis of the forearm from hemiplegia will in some cases cause reflex extension of the wrist and finger to a greater extent than can be done voluntarily.

(b) Stimulation of motor nerves may cause re-

flex contraction of the muscles through the same path. Frictions over the internal plantar nerve in cases of spastic paralysis usually cause extension of the toes if given with moderate energy; if however given harder or for a few seconds continuously, flexion of the knee and thigh occur.

(c) Stimulation of sensory nerves causes increased nutrition in the underlying muscles.

J. Munk in "Die Physiologie des Menschen und der Saugethiere" 1892 (page 426) says (translated): "Through irritation of the skin" (such as is done in cutaneous nerve frictions) "the metabolism of the muscles even when no visible contractions appear in consequence of this, is most markedly increased. And in this case, in consequence of the centripetal sensory stimulations, the muscles are stimulated to increased metabolism from the spinal cord; there is increased production of carbonic acid and warmth."

(See also sympathetic ganglia in the thorax and abdomen, pages 165 - 168.)

(d) Various reflex phenomena of sensation can be induced, and will be referred to under the individual nerves themselves.

I shall now take up the individual nerves and ganglia, but shall refer at length only to those not found in Dr Arvid Kellgren's "Technic of Manual

Treatment" 1890. As regards those described by him in that treatise, I shall content myself by merely alluding to them and beg to refer the reader to the aforementioned work for further details.

The sites mentioned in the following description have special reference to the application of the frictions and vibrations.

A. Of the Head:

1. Great occipital nerve.

2. Small " "

3. Posterior auricular nerve, to which one gains access just behind the mastoid process.

4. Supraorbital nerve which is found at the notch or foramen of that name and vertically above it in the scalp.

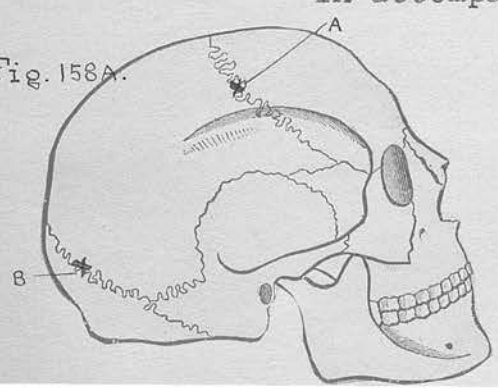
5. Supratrochlear nerve, at the inner side of of the orbit.

6. Nasal nerve, as it passes over the lower edge of the nasal bone.

7. Ganglia and nerves for the eyeball and eyelids.

(a) At the outer part of the upper eyelid
(b) At " inner " " "
(c) At the inner part of the lower eyelid there are well defined small areas which are more sensitive than the surrounding structures.
(d) Frictions given at the spot marked A in accompanying figure cause a peculiar sensation in the eyeball; unless the spot is found exactly, usually no such feeling results. It is situated on the coronal suture over the site of the motor area for movements of the head and eyes.

Fig. 158A.



(e) There is another spot in the scalp where a similar sensation can be obtained. It is situated at about the spot indicated by B. in fig. 158A. at about the occipito-parietal suture. The head must be supported and the frictions given upwards and inwards.

8. Lachrymal Nerve; a twig probably from this passes round the outer edge of the orbit, just opposite the outer canthus and can be conveniently got at there.

9. Facial nerve; this we find as it comes over the ascending ramus of the jaw, as it spreads over the face. Filaments from it can also be felt over the zygoma.

10. Fifth nerve behind the jaw is found by passing one's finger deeply behind the ascending ramus of the jaw near the ear.

11. Infraorbital nerve may be got at as it passes out of the foramen of that name.

12. Mental nerve is found as it emerges from the mental foramen vertically below the infra-orbital notch.

13. Lingual nerve: To this we gain access below and internal to the horizontal ramus of the jaw.

The submaxillary ganglion can also be reached below the lower jaw by a friction from behind forwards (towards the mentum).

14. Hypoglossal, and

15. Glosso-pharyngeal nerves are found like the lingual below and internal to the horizontal ramus of the jaw and all these three can conveniently be stimulated at the same time.

16. Superior laryngeal nerve is found at the posterior end of the upper border of the thyroid cartilage.

17. Inferior (recurrent) laryngeal nerve: This is stimulated at the side of the trachea.

18. Vagus: This we get at low down, as it lies under the sterno-mastoid by passing the finger behind the inner border of that muscle, just above its insertion. Eructations, or even vomiting, can be induced in many subjects by giving frictions here.

19. Phrenic nerve: Shaking in the subcostal triangle is more efficient in relieving diaphragmatic spasm than direct manipulation of this nerve (See Dr A.Kellgren's "Technic of Manual Treatment" 1890, p.56) Shaking over the bladder will also do this.

20. Cervical nerves: are found as they emerge under cover of the trapezius muscle. Cold shivers down the body generally and spine, result on giving friction here, the effects may even be felt in the toes. (Op.cit. 1890, pp.66 & 67.) The two upper cervical nerves appear to be vasomotor for the head; frictions over their posterior branches under the occipital bone will frequently relieve headache from hyperaemic or congestive states, as in fevers, etc.

21. First cervical sympathetic ganglion. The assistant with one hand flexes the patient's head forwards, so that his sterno mastoids are relaxed. The ganglion is found lying internal to that muscle high up. It should be stimulated in the case of eye and middle ear affections.

22. Second cervical sympathetic ganglion: With the patient's head as before, the assistant passes his finger behind the middle of the sterno-mastoid and then makes the friction. It should be stimulated in affections of the eye, throat, and tongue.

23. Third cervical sympathetic ganglion: Lies behind the clavicular insertion of the sterno-mastoid (which must be relaxed as before) and the frictions are given over it there. In some cases respiration becomes deeper and fuller when such frictions are given here.

24. Spinal accessory nerve, is found as it passes downwards and backwards just behind the sterno-mastoid at the junction of its upper and middle third. It is, however, often more convenient to get at this nerve through the subtrapezius plexus. Slowing of the cardiac action and respiration has resulted from stimulation of this group of nerves.

Not only that, but I have found, in cases of diseases of the pelvic organs in the female, where chronic shoulder-ache was an additional distressing symptom, that this could be referred to the subtrapezial plexus, and that in many cases frictions given on it could relieve the pain.

25. Cervical plexus: The lower cords are found by passing the finger deep into the posterior triangle in a backward and downward direction in front of the trapezius.

B. Of the Trunk:

1. Intercostal nerves in thorax. The ribs must be elevated in order to expose these nerves better. Thus we put the patient into stretch grasp position, or stretch half lying position and give the frictions from before backwards, near the lower margin of the upper rib of the space.

The lateral cutaneous branches are found a little in front of the midaxillary line. The anterior cutaneous branches are found near the sternum.

2. The descending cervical are found as they pass over the clavicle down to the mammary gland.

3. Dorsal spinal nerves: The posterior sensory branches are stimulated as they emerge near the middle line. The anterior motor branches have been referred to under intercostal nerves in the thorax (see above)

4. Lumbar spinal nerves. The posterior branches are found further away from the spine than the corresponding dorsal ones.

5. Sacral spinal nerves: The posterior branches are best stimulated as they emerge from the foramina in the sacrum.

Sympathetic ganglia in the thorax and abdomen:

Each of these is in anatomical and physiological communication with the corresponding dorsal nerves. "It must be remembered that every pair of sensory nerves, springing as they do from the posterior primary divisions of the spinal nerves, may be regarded as being in connection with its own segment of the spinal cord, while we must also bear in mind the intimate relations between the spinal nerves and the sympathetic ganglia." (Dr Arvid Kellgren, "Technic of Manual Treatment," 1890, p. 69.)

The Kellgren school has found that diseased conditions of various internal parts are in most cases accompanied by tenderness in the spinal nerves just about over the spots where the communicating cords with the sympathetic ganglia are situated; not only that, but they have found that frictions over these

sensory areas have caused amelioration in the morbid conditions of these organs. These facts have been known for many years to the Kellgren school, although they were not pointed out until Dr Arvid Kellgren inserted them in his work.

Thus we find in morbid conditions of:

1. Lungs and bronchi: There is tenderness between the scapulae; this is no doubt due to the fact that the posterior pulmonary plexus is to a great extent formed from the 2nd to 4th sympathetic ganglia (thoracic). There is in phthisis often a very tender spot just at the supero-internal angle of the scapula. In pneumonia the nerves over the diseased lobe or lobes are specially tender.

2. Heart: There is tenderness when we give frictions over the 4th, and 5th dorsal nerves on the left side.

3. Liver & gallbladder: There is tenderness when we give frictions below and internal to the inferior angle of the scapula on the right side; the area corresponds to the 6th and 7th dorsal nerves.

4. Stomach: The 6th, 7th & 8th dorsal nerves on the left side are affected. In conditions of the pylorus, the same nerves on the right side are often involved.

5. Intestines: 6th - 11th dorsal nerves; this is no doubt through the greater and lesser splanchnic nerves.

6. Diaphragm: Frictions over the second (also sometimes first) lumbar nerves will often with the patient in a position of rest, as in forwards lying, cause him to "catch his breath", although no pain is produced.

7. Spleen: 9th and 10th dorsal nerves on the left side.

8. Kidneys: 10th, 11th & 12th dorsal nerves; the channel is most likely through the least (also sometimes the lesser) splanchnic).

9. Genital organs: We have three places which seem to be specially affected:

(a) 12th dorsal nerve
(b) 5th lumbar nerve.
(c) 2nd - 4th sacral nerves.

The 3rd sacral nerve is often specially painful in conditions of the uterus.

10. Rectum. 4th sacral nerve, and ganglion impar.

From the above it can be gathered that these nerves do not in every case correspond to the tender skin areas of referred pain as determined by Head (Prof. Schäfer, Textbook of Physiology, Vol.II, 1900, p.849, etc) and in many cases can only be elicited on deep pressure, not merely on touching the skin.

The Kellgren school has regarded these nerves as affording an excellent means of therapeutic stimulation, arguing from the analogy in the case of sensory nerves, stimulation of which causes increased growth and activity in the muscles that lie under them. The whole subject, however, is one worthy of future investigation, nor merely from a therapeutic but also from a diagnostic and prognostic point of view.

6. Intercostal nerves in the abdomen:

The anterior abdominal muscles must be on the stretch, otherwise we cannot get at these nerves properly, and so we conveniently put the patient in stretch grasp or stretch half lying position. The nerves are then stimulated by frictions given from without inwards at the point where they become cutaneous near the linea semilunaris. (Fig. 159.)

There is a close connection between the intercostal nerves in the abdomen and the viscera of that cavity. "The nerves supplying the abdominal muscles and skin derived from the lower intercostal nerves are initmatelyconnected with the sympathetic supplying the abdominal viscera through the lower thoracic ganglia from which the splanchnic nerves are derived" (Gray's Anatomy, 1897, p.793)

7. Ilio-inguinal nerves. Ilio-hypogastric nerve:

These are found running forwards between the crest of the ilium and the last rib. The former can also be found in the inguinal canal, where frictions made transversely across it will greatly relieve the agonising sickening pains arising from contusions of the testicle.

8. Ganglion impar.

Is found by passing the finger in front of the coccyx and making the friction from above downwards.

Fig. 159.

The patient in many cases experiences a kind of lightning pain through his abdomen, with a desire to defaecate, and a sensation of fulness in his head and scalp, which can be seen to flush. This shows that the sympathetic nerves in the abdomen have been stimulated with intestino-motor and vaso-constrictor effect, compensatory dilatation of the vessels in the more distant parts ensuing in consequence.

I have noted that in some cases of habitual constipation this ganglia has given no sensation at all on stimulation, and the re-establishment of feeling here only came on gradually as the constipation improved.

9. Coccygeal nerves:

It is particularly the last nerve at the very tip of the coccyx which we desire to stimulate. The effects are somewhat similar to those already given at the ganglion impar.

10. In the interior of the rectum there is often great susceptibility at a point about 1½ inches from the anus on its anterior wall, frictions here may cause a rectal evacuation when other nerve frictions have failed for the time being.

11. Renal plexus:

This can be got at reflexly by stimulating the corresponding dorsal nerves (10th and 11th, and 12th) or by putting the patient in half lying position and proceeding as follows: the assistant places his finger tips deep into the abdomen inwards and downwards at a point about three inches above and three inches external to the umbilicus (in normal individuals). The finger must not be thrust in suddenly, for that would cause reflex contraction of the abdominal muscles which would at once prevent their entrance. The patient must be told to breathe freely, and with each expiration the fingers are passed in until they lie deep enough. The frictions are then given from without inwards, and both renal plexus and kidney are stimulated simultaneously.

Instead of the fingers, the thumbs may be used, and in cases of unusual tendency towards reflex contraction of the abdominal muscles the patient may be placed in hook half lying position which relaxes them more than if the knees are extended.

The above method of getting gradually deep down into the abdomen applies to other structures, such as,

12. Solar plexus:

The fingers must be passed in deeply about 1-2 inches above the umbilicus, and the frictions made

from without inwards; stimulation of the abdominal sympathetic as a whole seems to result from this in many cases. Similar effects, however, can be caused by

(1) Making frictions on the umbilicus itself, in which case pain is felt passing up to the sternum, downwards into the point of the penis and generally speaking radiating in all directions from the part and in the abdomen.

(2) Shaking of the pit of the stomach (p. 196.)

13. Sympathetic nerves of the Bladder:

If we make vibrations from below upwards just over the symphysis about 1 inch from the middle line, we usually have an immediate desire on the part of the patient for micturition and a rush of blood to the head.

As regards this bladder vibration (or shaking) I must state that it has the extraordinary effect of relieving cough and rendering respiration freer; I have observed this in phthisis pulmonum, acute and chronic bronchitis, some cases of laryngitis, smphysema, etc. There must exist some very intimate relation between the sympathetic nerves of the bladder and those of respiration, though the precise anatomical channel is still a mystery to me.

A case of a different kind to show this may be quoted here:

Miss S,..... J....., aged 16, came to me on September 14th 1900, with the complaint that she stammered. This was the result of a fright she got one night eight years ago, and the condition had come on gradually after that. Before saying any word and between them, came the syllable "tut", repeated from 5-15 times. The chief signs I found were rapid spasmodic action of the diaphragm when she tried to speak and the bladder was very tender when I gave shaking over it; not only that, but the abdominal muscles just over the symphysis pubis were hard and contracted. I treated these parts more particularly and at the end of five weeks when the patient left, the muscular contractions mentioned were gone, the bladder was not so tender, the diaphragm worked better. When the patient was not excited, her speech was that of a perfectly normal person. I also made the observation that her speech varied with the condition of her bladder; the better the latter, the better the former, and vice versa.

Therefore shaking over the bladder should always be given in cases of respiratory disorders due to inflammation or muscle spasm, or in fact from whatever cause.

I have already mentioned that stimulation of

Fig. 160.

the abdominal sympathetic frequently causes vaso-dilatation in the head. This can be prevented in most cases by applying firm pressure over the coronal suture while giving the former; this in some way or other exercises a vaso-constrictor effect on the vessels of the head. (See fig. 160.)

C. Of the Upper Extremity:

1. Brachial Plexus as a whole. The Plexus can be felt in the axilla as the cords lie round the axillary artery.

2. Circumflex Nerve: It is found posteriorly as it comes out of the quadrilateral space.

3. Musculo-spiral nerve: This is best found as it lies between the internal and external heads of the triceps.

4. Median Nerve is found

   (a) In the upper arm as it lies internal to the biceps muscle.
   (b) At the elbow as it lies about the middle of the forearm (which must be flexed).

(c) In the hand as it lies along the inner edge of the first metacarpal bone.

5. Posterior Interosseous Nerve: This is best found as it winds round the head of the radius internal to the supinator longus. The forearm should be first flexed and somewhat pronated.

6. Radial Nerve: Is found in the forearm high up as it lies to the inner border of the supinator longus; the forearm must be flexed somewhat in order to relax the latter muscle. One branch may also be found lower down as it lies external to the 2nd metacarpal, the frictions being given from the dorsum with one thumb or forefinger transversely across it.

7. Ulnar Nerve: Can be stimulated as it lies in the groove at the inner condyle of the humerus or along its course in the forearm.

D. Of the Lower Extremity:

1. Superior gluteal nerve: Is found as it runs along about two inches below the crest of the ilium and describing the same kind of curve. Involuntary contraction of the gluteus maximum may follow on our giving frictions here; this is in all probability a reflex through the lumbo-sacral cord to the inferior gluteal.

2. Inferior gluteal nerve: Is found at the inner side of the buttock. Frictions here have the same effect as those given on the superior gluteal, the contraction in this case being direct, not reflex.

3. Cutaneous nerves of the Buttock: Frictions given over the gluteus maximus will stimulate these, i.e. lateral branch of the last dorsal, iliac branch of the ilio-hypogastirc, external branches of the posterior primary divisions of the first and second lumbar nerves, and branches from external cutaneous, small sciatic sacral nerves, etc.

4. Great Sciatic Nerve: Can be stimulated either as it passes between the great trochanter and tuber ischii, or as it passes down in the middle of the back of the thigh.

5. Internal Popliteal Nerve: It can easily be stimulated as it runs down the middle of the popliteal space.

6. External Popliteal Nerve: "It is easily felt beneath the skin, behind the head of the fibula at the inner side of the tendon of the biceps." (Gray's Anatomy, 1893. p.808)
   To find the popliteal nerves the knee joint must be flexed somewhat.

7. Anterior Tibial Nerve: This nerve is found along the outer edge of the tibialis anticus; lower down between the extensor longus Hallucis and the extensor longus digitorum.

8. Posterior tibial nerve: It is found in the middle line at the back of the calf, and lower down behind the internal malleolus.

9. Internal Plantar Nerve: This is found at the outer edge of the abductor hallucis, or in the space between the first and second metatarsal.

10. Anterior Crural Nerve: Can be stimulated as it lies between the psoas and iliacus at Poupart's ligament and further down in its course.

11. Long Saphenous Nerve: Is cutaneous in the greater part of its extent and is thus easily found along the inner side of the leg. There seems to be in some cases a physiological connection between this nerve and the nerves of the ovary of that side.

12. External Cutaneous Nerve: Is stimulated as it becomes cutaneous below the anterior superior spine in the upper third of the thigh.

13. Obturator Nerve: This is found in front of the adductor magnus high up.

14. Short Saphenous Nerve: Is cutaneous in the greater part of its length and therefore easily found on the outer side of the leg.

15. Sensory nerves of the Foot:

(a) Long Saphenous;
(b) Short Saphenous;
(c) Musculocutaneous;
(d) Anterior tibial;
(e) Internal plantar;
(f) External plantar;
(g) Plantar cutaneous from the posterior tibial.

which can be conveniently stimulated in groups by giving frictions with the backs of the nails over the skin of the foot.

EXERCISES COMPRISING THE TREATMENT OF NERVES IN REGIONS.

1. Upper Extremity:

Yard sitting arm nerve frictions, PP.

The assistant grasping the hand of that arm which is to be stimulated, first abducts the latter to a right angle or rather less, and supporting it in that position with his one hand, uses the fingers of his other one to give the vibrations or frictions.

The cutaneous nerves alone can be stimulated by running the backs of the nails of the fingers over the arm from the hand up towards the shoulder.

In the case of our wishing to stimulate the deeper lying trunks of the nerves, we proceed as follows: The assistant begins over the brachial plexus, then giving a continuous set of frictions or vibrations all along, proceeds down along the inner edge of the biceps, thus getting at the median and ulnar nerves, behind the internal condyle on to the ulnar and then down the latter on the front of the forearm and on to the third finger where the median and radial are found as well. Then he passes up along the back of the forearm over the posterior interosseous onto the musculo-spiral above the elbow joint, along that nerve in the upper arm straight to the circumflex,

from there to the top of the scapula on to the supra scapular nerve, across the suprascapular fossa and then downwards between the shoulder blade and the spinal column over the upper dorsal nerves. The cutaneous nerves in the path of the manipulation are stimulated as well.

2. Lower Extremity:

Half lying double leg nerve friction PP:

The assistant uses one hand for each leg; he begins over the great sciatic and follows it down to the termination of the internal plantar, via the internal popliteal and posterior tibial. From there he passes on to the dorsum of the foot and travels up to the pelvis along the anterior tibial and external cutaneous nerves. The second time he gives the frictions, he may return via the internal plantar, posterior tibial behind the malleolus, long saphenous and internal cutaneous and obturator (fig.160A).

Side Lying leg nerve frictions PP.

The assistant only treats one leg at a time (the uppermost one). One hand proceeds along the great sciatic down to the end of the internal plantar (as before) and the other along the external cutaneous, anterior tibial, both hands travel-

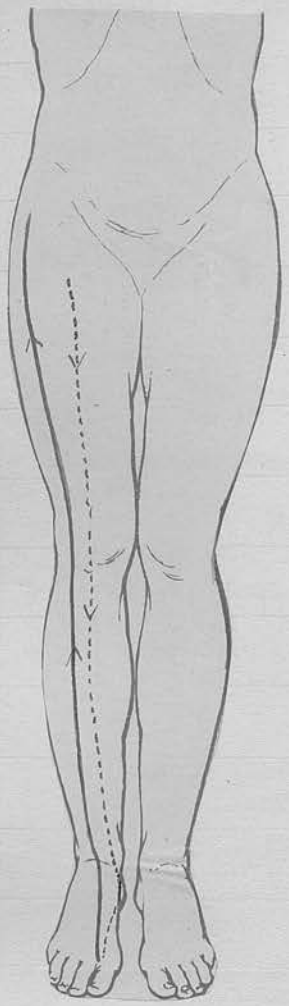
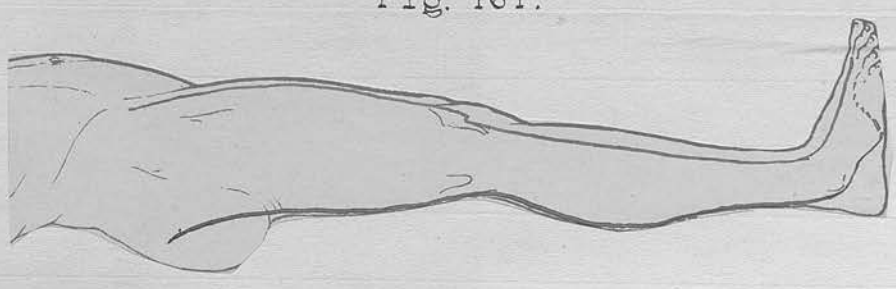


Fig. 160A.

Fig. 161.



ling at the same rate and finishing up in the space between the first and second metatarsals. Then the frictions may be recommenced from above, or one hand may first travel back, via the anterior tibial external cutaneous (fig. 161).

The cutaneous nerves in the path of the frictions on the deep lying nerves are also stimulated in both the above.

The nerves of the foot have been enumerated on page 176 ; they may call for separate treatment, otherwise most of them are included in the giving of leg nerve frictions as above.

3. Head and Face:

The patient is in the sitting position and the assistant may give nerve frictions or vibrations.

Fig. 162.

(1) In the lines of the superior longitudinal sinus and great lateral sinuses. Cold shivers down the spine result from giving frictions here, the sensation being similar to that obtained when giving cervical nerve frictions. (Fig. 162.)

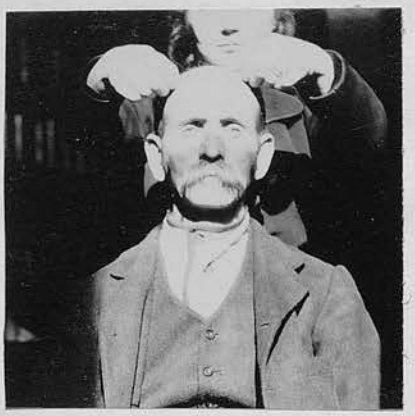


Fig. 163.

(2) Around the side of the skull from the tuberosities of the frontal bone to the great occipital nerve, and then travelling down that. (Fig. 163.)

(3) On the facial nerve in cases of paralysis, etc.

(4) On the 5th nerve in cases of tic douloureux, etc.

(5) Over other individual nerves if they call for special attention.

Other manipulations are usually given in addition to these; see head exercise, p. 213 &c.

4. The cerebro spinal system as a whole.

Sets of frictions may be given from one end of the body to the other in a continuous stream, their path being directed to the most important nerves as they pass down.

Forwards lying head to foot running nerve frictions, PP.

The assistant gives the same frictions simultaneously on both sides, so I will only describe the method on the one. The fingers begin over the tuber of the frontal bone, pass round the side of the skull, thus getting at the nerves of the scalp (as in frictions of the head No.(2).) on to the cervical nerves, then down the arm along the outer edge of the biceps, and back again over the musculo-spiral nerves, then over the circumflex and suprascapular; from there into the interscapular region; his fingers then pass down the back near the spine, giving frictions upwards and outwards over each spinal nerve as they go, in turn getting at the dorsal, lumbar and sacral. Having got about as far as the third sacral nerve, he passes outwards on to the great sciatic and follows that down the leg, successively performing frictions over the internal popliteal, posterior tibial, internal plantar and finishing up in the interval between the first and second toes (see figs. 164-171.)

These sets of frictions are conveniently given three times. The strength of the exercise may be greatly increased if necessary, by having

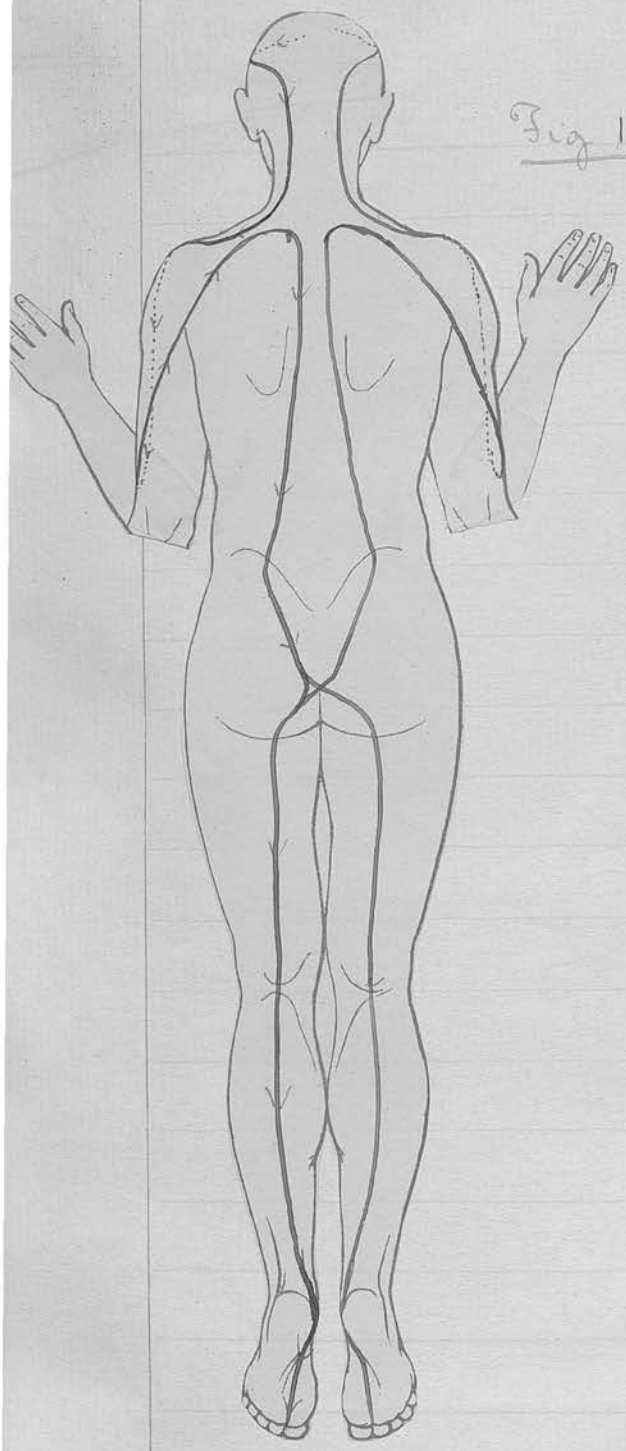


Fig 164.

Diagram to show the path followed by the assistant's fingers in giving "Forwards lying running nerve frictions PP"

(The position of the arms given is only diagrammatic; how they should be placed can be gathered from Figs 165 – 171.)

Fig. 165

Fig 169

Fig. 166.

Fig 170

Fig. 167

Fig 171.

Fig 168

Figs 165 - 171. Towds lying running nerve frictions PP.

the frictions given by three assistants simultaneously, as follows: the first commences as described, and when he is about half way, the second commences in the same manner; the third waits until the second is about half way (by which time the first is just finishing at the internal plantar nerve) and then he begins. As soon as he has got half way, the first recommences, and so on, each giving the frictions three times.

Stretch side lying running hand to foot nerve frictions, PP.

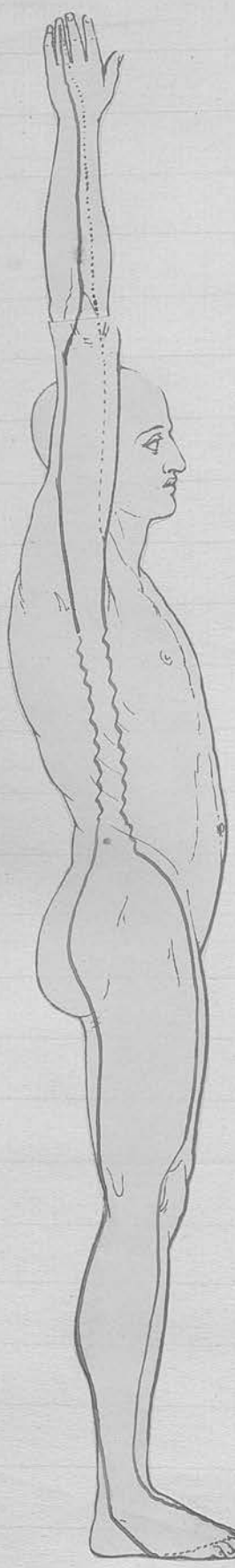
These frictions are usually given first on one side of the body and then the patient turning over receives them on the other. In some cases of unilateral conditions, such as hemianaesthesia, etc., only the affected side is thus treated, although even in such conditions it is often of advantage to include the healthy side as well; this is because the patient having experienced how the frictions feel on the healthy side, is rendered more capable of learning to feel them on the affected one. Not only that but the brain and spinal cord and nerves are stimulated on both sides, and thus the whole nervous tone is raised.

The assistant performs the frictions with both hands simultaneously and keeps them at the same level all the way down; the paths, however, travelled by his hands are different, and I shall therefore describe them separately.

Onehand begins anteriorly over the third finger of the patient's hand, travels along the ulnar nerve, the outer border of the biceps, and gets down on the ribs; a friction is given over each intercostal nerve in the anterior axillary line, and then the hand passes along the side of the abdomen in the same line, thus getting at the last dorsal, iliohypogastric, ilioinguinal nerves, etc.; from there it travels down the antero external aspect of the leg, getting at external cutaneous and anterior tibial nerves and finishing up by passing along the dorsum of the foot in the path of the nerve last mentioned until the interval between the first and second metatarsals is reached.

The other hand begins posteriorly over the third finger and travels along the posterior interosseous musculo-spiral and circumflex nerves on to the ribs. A friction is given over each intercostal nerve in the post axillary line, and then the hand passes along the side of the abdomen in the same line; from there frictions are given on the nerves of the gluteal region, then the great sciatic, internal

Fig 172.



popliteal, posterior tibial and internal plantar, finishing up at the same place as the other hand, but on the corresponding plantar surface. (Fig. 172.)

Stretch half lying hand to foot running nerve frictions, PP.

The manipulations are given simultaneously on both sides of the body, and so I shall only describe the path traversed by one hand. Beginning over the third finger, a series of running frictions are given consecutively over the median nerve in the forearm, then along the inner edge of the biceps (median and ulnar) intercostal nerves, side of abdomen (see above) external cutaneous in the thigh, anterior tibial, and then on to the sole of the foot on the internal plantar. (Figs. 173 - 178).

All the foregoing sets of frictions are given three times running, and without a break, as evenly and continuously as possible.

We can, if we think it necessary, include the intercostal nerves in their entire length, (not merely giving friction along one inch or two of them). This is done more easily in the last two exercises than in the first mentioned, because the arms in them are stretched up, the ribs elevated, and the nerves rendered more accessible.

An additional effect can be got in the last two

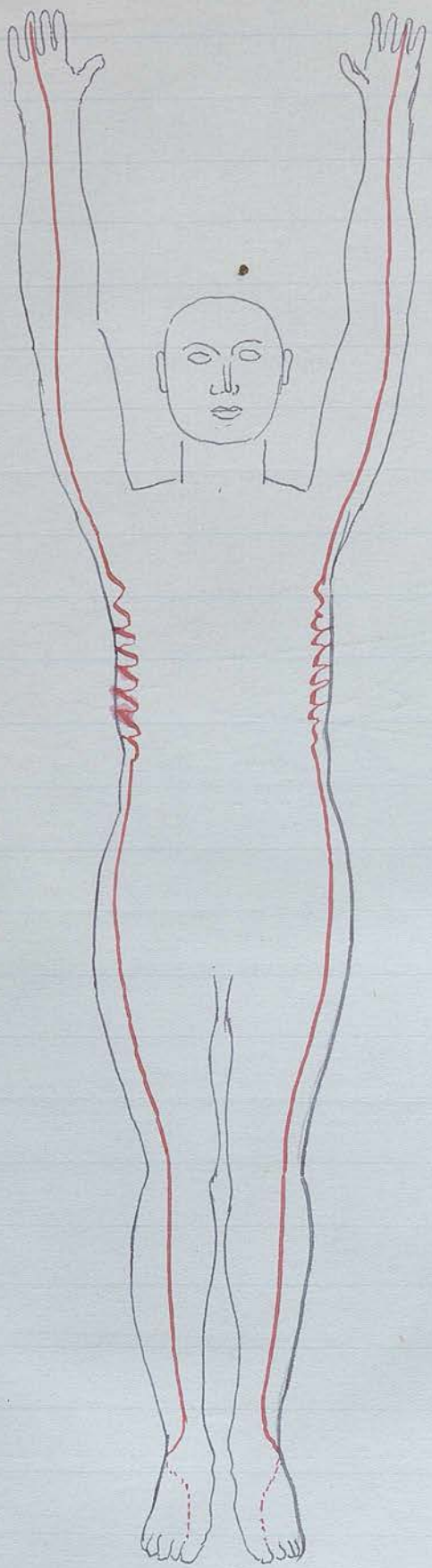


Figure 173.

Fig 174

Fig. 177

Fig. 175

Fig 178

Fig 176

Figs 174 – 178.
Sketch half lying
running nerve
frictions PP.

exercises by applying traction at the hands and feet during the time that the frictions are given, i.e. we may give stretch half lying double hand and foot traction, head to foot nerve frictions, PP. in which case two assistants perform the traction, while a third does the nerve frictions.

For convenience sake I shall omit the words "hand to foot", "head to foot", and shall call the manipulations simply "running nerve frictions", i.e. forwards lying running nerve frictions, PPs. etc.

Stretch half lying double hand & foot nerve friction, PP.

In this exercise two assistants are required; and they simultaneously give from 6 to 10 frictions, the one on both median nerves as they lie internal to the first metacarpal bones, and the other both internal plantar nerves as they lie internal to the middle of the sole of the foot. In many patients these frictions cause sensations to be felt throughout the body. (Fig. 178).

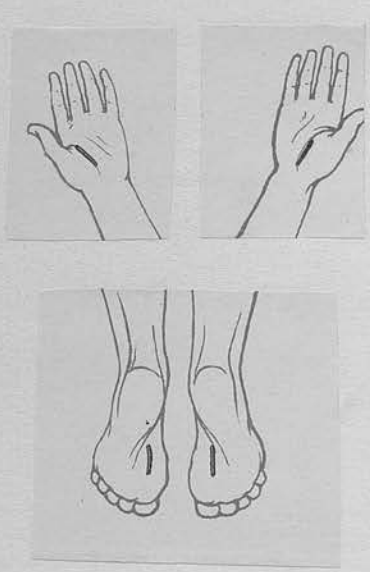


Fig. 178.

In the case of patients with very dulled nervous activity, we may give frictions over various nerves of the body simultaneously, such as cervical, median, and plantar as above, great sciatic, etc. This, however, is not often done.

Effect of all the above sets of running nerve frictions.

We have stimulation of the cerebrospinal system as a whole, and of the sympathetic system as well, owing to the intimate connection there is between the two, as already mentioned. In addition to all the individual nerves mentioned above, all the cutaneous nerves in the path of the frictions are stimulated.

The effect of giving frictions simultaneously in different parts of the body has been given on page.

I have now considered the question of nerve frictions and vibrations at considerable length. I have only to add that this method of treatment has succeeded in eliciting a great many new physiological nerve continuities for which no anatomical explanations at present exist. What is the nerve channel in the case of what I have called "ganglia for the eyeballs"? of the radiating pain when frictions are given on the umbilicus? of the connection between the fourth, and fifth left dorsal nerves near the spine and the heart?

These questions open up an entirely new field for investigation; no doubt science will soon be able to trace these physiological continuities and place them on a firm basis.

II. VIBRATIONS & SHAKINGS OF OTHER STRUCTURES.

1. Of the Head:

Manual vibration of the head is only given by the Kellgren School. No description of any such proceedings are found in the literature on Ling's medical gymnastics. Shakings of the head were used once; but the technic was primitive and they dropped out of use (See Dr Neumann, "Die Heilgymnastik", 1852, p.291.)

Any part of the head may be vibrated, the parietal, occipital, temporal, or frontal regions. The medulla may also be vibrated with the tips of the fingers placed in the nape of the neck under the occipital bone. The usual way of vibrating a head is to put one hand over the occiput and the other over the frontal or parietal region. The latter hand vibrates, while the former by moving sharply downwards and lightly upwards (the scalp moving with the fingers) sets up a kind of "suction" movement which, from the nature of the manipulation, hastens onwards the venous flow from the scalp. (Fig. 180) As there is an intimate connection between the latter and the venous circulation in the brain, we can thus affect the one by influencing the other. Instead of the

Fig. 180.

Fig. 181.

"suction" movement, we may give cervical nerve frictions with that hand. (Fig. 181).

In fevers we can by vibrating the head in most cases cause a hot head to become cool and not only this, but we can sometimes reduce the temperature, as can be seen by testing with a thermometer immediately before and immediately afterwards, either in axilla or rectum.

In cases of hyperaemia or congested states of the brain, not accompanied with fever, we can ameliorate or cure by these methods. In localised lesions, we apply our vibrations over those areas which we know from the symptoms are specially affected. Usually, however, in whatever case, in addition to vibrations, we give nerve frictions on the scalp and other manipulations. See head exercise, p. 213.

2. Of the Eyes:

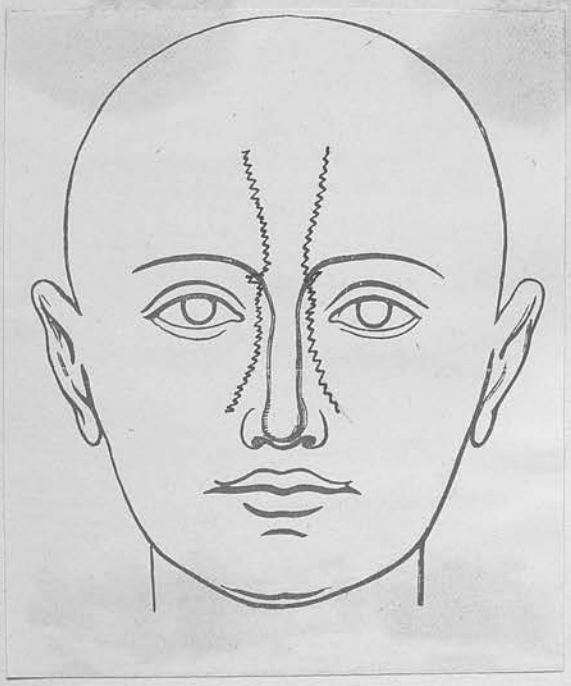
These are of two kinds, (a) The patient closes the eyes and the operator, standing behind him, lays two fingers on each eye and commences the vibrations. He has to take care that the eyelids do not move up and down, but are kept steady on the eyeball, so that the vibrations pass through them. (b) We may place the distal phalanx of the thumb on the outer side of one eye, and the

same phalanx of the fore and long finger on the outer side of the other eye, and make the vibrations." (From Dr Kellgren's "Technic of Manual Treatment," 1890, p.46, q.v.)

3. Of the Root of the Nose.

May be given by grasping that part between the forefinger, and thumb, and then vibrating or shaking. It is often useful in cases of coryza, etc., to give a kind of running vibration, as follows:

Fig. 182.



beginning on the inner part of the frontal eminences or even above them, the fingers travel vertically downwards across the sides of the glabella, upper inner angle of the orbits, along the sides of the nasal bones and down the nose. As the vibrating fingers pass downwards and lie in turn over the supratrochlear, infratrochlear, and nasal nerves they pause for a few seconds and give frictions on each of them. This is repeated several times. The path of the manipulation is shown in fig. 182.

4. Of the superior maxilla:

Vibrations may be given over it for antral disease.

5. Of the external auditory meatus and pinna:

The tip of the finger may be placed either directly into the external auditory meatus, or else at a point just below and behind it, and then the vibrations or shakings given.

6. Of the pharynx, larynx and trachea:

"Shaking of the pharynx. There are three different manipulations for the pharynx and these have already been described by me (Medical Press & Circular, 25th July, 1888)

(a) The fingers of one hand are placed, with the palmar surface upwards, as far back as possible, two on each side of the root of the tongue. Then a quick shaking movement is made in an upward and slightly forward direction. If while giving this shaking, we move our fingers forwards it is evident that the tongue, submaxillary, and sublingual glands will be more especially affected.

(b)The root of the tongue grasped between the thumb and the fingers and shaken in a lateral direction.

(c) The tips of the fingers are placed behind the ascending ramus of the lower jaw." (Dr Arvid Kellgren, Technic of Manual Treatment, 1890, pp.33,etc.)

"Shaking of the larynx and upper part of the trachea. The tips of the fingers are placed on one side of the thyroid cartilage and the thumb on the other. . . The shaking is made sideways..... If, retaining the same position of the hand and passing it downwards, we make a similar side movement, we act more directly on the trachea itself; and the nearer we approach the sternum, the more deeply into the chest is this movement propogated. Instead of grasping the trachea, we may place one or more fingers on it, in the hollow of the sternum; in this manipulation it is of the highest importance that the hand lies close to the throat in order that the angle formed between the fingers and the trachea may be as small as possible. When the angle is increased the movement loses its softness, it becomes disagreeable to the patient; the motion produced is, of course, less in the direction of the trachea, and thus its range of effect becomes more and more limited, until when the angle is large, the benefit is practically nil." (Dr. A. Kellgren, "Technic of Manual Treatment", 1890, pp.36, 37.)

"Vibration of the throat. When vibrations are given for ailments of the throat, the fingers are placed in the same position as for shakings, and the former are here always substituted for the latter at the beginning of acute inflammation." Op.cit. p.47.

Vibrations of the larynx are given with the same grasp as in shakings of that structure.

7. Of the Arms:

Vibrations or shakings of the whole of the arm may be given with traction (See arm traction sideways, p. 118).

8. Of the Whole Body:

Tractions of the whole body or one half of it may be given with vibration simultaneously. (See traction, p. 116 &c).

9. Of the Thorax:

We have two different manipulations:

(a) Shaking of the lower part of the thorax, commonly called side shaking. The assistant "places one hand on each side of the lower part of the thorax. With the palms he makes soft and quick compressions, alternating with relaxation. During the latter, the hands are not to be lifted from the thorax; but should remain in close contact with it. The patient must breathe deeply. The ribs being

Fig. 183.

Fig. 184.

elastic, rebound when the pressure is left off, and the respiration becomes deeper and freer. Besides this, the movement has the influence on pleuritic adhesions at the lower part of the thorax of breaking them down, and the organs in the upper part of the abdominal cavity. below the vault of the diaphragm, are also affected. " (Dr.A. Kellgren, "Technic of Manual Treatment," 1890, p.38) (See figs. 183 & 184.) Side shaking also has a quieting effect on excited cardiac action.

(b) Vibrations of the thorax. "The place of application of the hand in giving vibrations for the thorax varies with the nature of the disorder we are treating. The whole hand is here used. It lies loose and free, without pressure, on the thoracic wall. The vibrations pass through the thoracic walls to the lungs, which they stimulate and strengthen. They produce free expectoration followed by

less irritation, promote rest and a feeling of ease, and when administered in conjunction with nerve frictions between the shoulder blades, etc., also reduce congestive and inflammatory conditions. The vibrations on the thorax are given for all diseases of the lungs, and they must be continued for some minutes." (Op.cit. pp.48 and 49.)

10. Of the Heart:

(a) Shaking of the heart. One hand is placed on the front of the left half of the thorax low down, so that the thumb lies about over the xiphisternum and the fingers somewhat spread out over the fifth to seventh ribs. The shaking is then given downwards and inwards. The effects are similar to

Fig. 185.

Fig. 186.

(b) Vibrations of the heart. May be given with the hand as before, vibrations being given instead of shakings. (Figs 185 & 186.)

"The effect of the vibrations is a stronger quieter and better beat. This is well seen in a fainting fit when the heart stops or begins to flag, and also in the opposite condition, viz. palpitation. During the former, the beat soon comes back or grows stronger; while in the latter steadiness in its action returns." (Dr Arvid Kellgren, "Technic of Manual Treatment," 1890, p.50.)

11. Of the Abdomen or Part of it:

(a) Of the abdomen as a whole. The hand is placed lightly over the front of the abdomen in about the middle part, the fingers being spread out so as to obtain the greatest range possible and then the vibrations given.

(b) Of the pit of the stomach: The fingers are placed in the subcostal triangle and the shaking or vibration is given in a backward and downward direction. The solar plexus is influenced by this and spasmodic contractions of the diaphragm can be relieved.

(c) Of the liver, gallbladder, spleen, kidneys, ovaries, etc. (See manipulations of individual organs, p.233&c)

(d) Of the uterus. May be given in cases of inflammatory condition; the fingers are passed in above the pubis and then the vibrations are set up.

(e) Of the external anus. Vibrations given with the last phalanx of one or two fingers are useful in irritative and inflamed conditions here.

(f) Of the anal canal. The forefinger is passed in as in the ordinary way in making a rectal examination and then vibrations are set up. Spasm of the sphincter may be relieved by this; often at first the passage of the finger is prevented, but by gentle pressure in the direction of the canal combined with simultaneous vibration, this can often be overcome with the minimum amount of pain.

12. Over Ulcers:

A piece of lint is placed between the hand of the assistant and the ulcer, and the vibrations given. They appear to materially hasten the healing process.

13. Round abscesses:

(See Dr A. Kellgren "Technic of Manual Treatment" 1890, p.52). The vibrations should begin at the periphery and gradually approach the centrum. Pointing takes place quicker, and the abscess opens sooner; after opening has taken place, the pus, etc, is removed more painlessly.

14. Of Joints:

Vibrations of joints are of three kinds:

(a) Simple vibrations. The fingers are placed

on the joint: the vibrations they set up are transmitted through it.

(b) Vibratory traction: Two hands, one placed immediately above the joint and the other below it, perform traction of the part by drawing in opposite directions, keeping up vibration simultaneously. (Fig 187).

(c) Vibration and passive movement given simultaneously. One hand vibrates the joint, as in (a), the other keeping up traction performs passive flexions and extensions, beginning by doing these through the smallest range possible, and gradually gently increasing; then a little circumduction may be given, and its range increased, and so on, thus trying to gradually re-establish the normal amount of movement. (Fig. 188).

Fig. 187.

Fig.188.

III. FRICTIONS OF OTHER STRUCTURES.

By these I do not mean rubbing, but a manipulation resembling a friction over a nerve - the assistant draws his fingers sharply across a structure. Thus we can give frictions across muscles, etc., over the kidneys, spleen, etc. The latter will be considered under manipulations of individual organs, pages 222 &c.

Q. HACKING, CLAPPING & BEATING.

The above have been included by some under the comprehensive term "tapotement", although there are some differences between these manipulations, as given by the Kellgren school and those of other schools.

Hacking, clapping and beating may be described as the giving of a series of short, sharp, elastic strokes. It is of the greatest importance that the fingers, wrists and elbow joints be kept loose, or else the manipulation becomes one of banging, thumping and bruising. In this respect the Kellgren school differs from Professor Hoffa, who in describing these methods in "Technic der Massage," 1897, p.14, says (translated) "The fingers and wrist joints are kept as stiff as possible; on the other hand, the

shoulder joint is therefore brought into greater action."

Hacking is given thus: the forearm is in the mid position, with the fingers slightly separated from one another and somewhat flexed in all the phalangeal joints, each inner finger being more flexed than its outer neighbour. As the hand goes to meet the part to be hacked, the forearm is supinated a little, so that the dorso ulnar surface of the two or three inner fingers meet that part.

Clapping is given with the palmar aspect of the fingers(which are slightly flexed) with or without the palm in its distal part.

Beating is given with the fist which is loosely closed; the dorsal aspect of the last two phalanges of all the fingers and the proximal part of the palm meet the surface we wish to stimulate.

Hacking and clapping are usually given with both hands, each giving a stroke alternately; beating, however, is nearly always given with only one hand.

The effect of all the above is stimulatory; it sets the muscular fibres into vibration and stimulates them to contract; the activity in superficial vessels and nerves is increased and when applied to the back and thorax, the vibration is propogated on to internal parts." (Dr Arvid Kellgren, "Technic of Manual Treatment," 1890, p.29.)

I. Hacking:

(1) Shoulder hacking: May be given in reach grasp standing position; the strokes are given on, above and between the shoulders. We may give an active exercise with the manipulation, such as double elbow flexion and extension, PA, (fig. 189.)

Fig.189.

(2) Back hacking: The hacking is given on either side of the spinal column simultaneously, from the uppermost dorsal vertebrae down to the sacrum and then back again. This may be given with the patient as in shoulder hacking, or while he is doing stretch stride standing bending forwards.

(3) Hacking of the whole posterior surface of the body (often called length hacking). This may be given after forwards lying running nerve frictions. The hacking is given

Fig. 190.

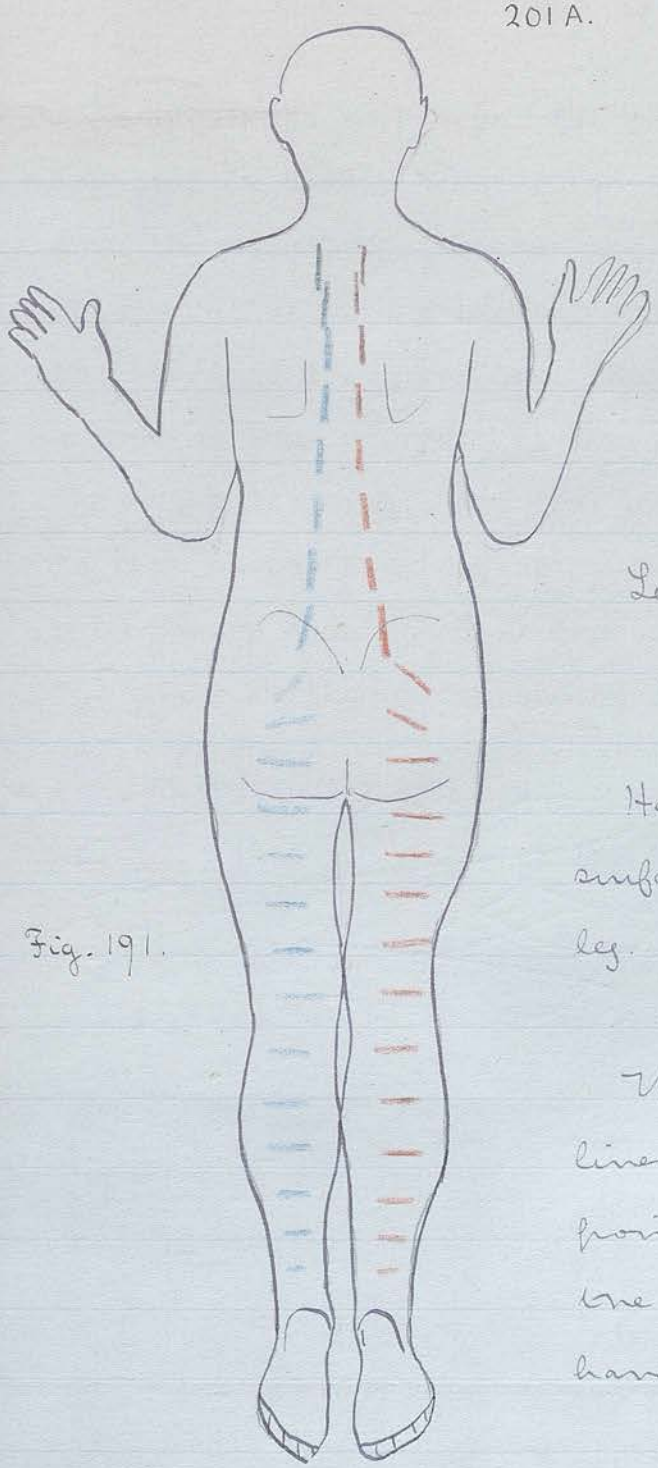


Fig. 191.

Fig 191

Length tracing

Fig 192

Tracing of the external surface of the right leg.

The blue & red lines indicate the points of contact of the left and right hands respectively

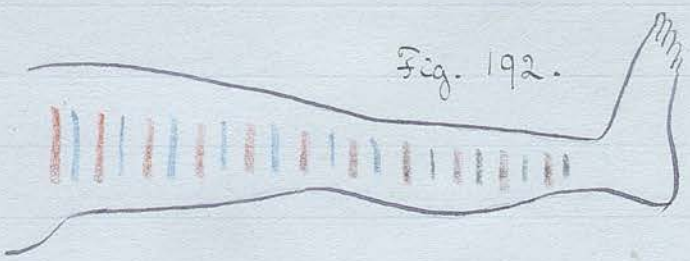


Fig. 192.

from shoulders to heels; the position of the assistant's hands, however, varies; while passing down the spinal column they are kept with their long axes parallel to one another and to the spine, and the hackings are given over the posterior spinal nerves as they emerge; at the gluteal region the hands now lie with their long axes at right angles to that of the body; keeping them like that, one hand passes down the left leg to the ankle joint and the other on the corresponding parts of the right leg. (Fig. 191).

The scapular and kidney regions may receive special attention while giving the above.

(4) Hacking over the lumbar region: This is often given during an active exercise, such as stretch stride standing bending forwards, or reach grasp standing knee flexion and extension. (Fig. 193). Or we may give it with the patient passive such as in forwards lying position, etc.

Fig. 193.

(5) Hacking of the lower extremities or the whole lateral aspect of the body: The patient is in

stretch side lying position and the hacking is given from the scapula or the crest of the ilium, as the case may be, down to the ankle. (Fig. 192).

Fig. 194.

(6) Hacking of the arms: The limb is in yard grasp position, and the hacking given on its upper and lower surfaces. (Fig. 194.)

(7) Hacking of the spleen: Is given over the 9th-11th ribs on the left side. The patient is conveniently in left side span standing position. Professor Georgii, in "Kinetic Jottings", p.97, says that he found that percussion of the spleen in itself sometimes caused diminution in size in that organ. If this is a fact, hacking over it should have a similar but stronger effect, as it is a more powerful manipulation.

(8) Hacking over the liver: Is given over the 5th-10th ribs on the right side. The patient is conveniently in right side span standing position.

(9) Hacking over the Kidneys: Is practically included in the manipulation over the lumbar region.

(10) Hacking of the head was used once by Swedish gymnasts. It is a useless manipulation, as its therapeutic value sinks into insignificance when compared with head vibration and head nerve frictions.

(11) Hacking over organised subcutaneous effusions, etc., may also be given to break them up.

II. Clapping:

This is given chiefly as chest clapping, i.e.

Heave grasp standing chest clapping, PP.

The assistant stands in front of the patient and passes his arms round his chest, so that his hands come to lie over the scapular region with their palms looking directly forwards, (i.e. towards himself) thus there is supination of the forearm. Then with loose wrist and finger joints he gives a series of short sharp strokes over the superscapular and scapular regions, continuing vertically downwards until the lowest parts of the lungs are reached. Then gradually pronating his forearms as he goes, he continues the clappings with the palms of his hands round the sides of the thorax over the lower ribs and then up the front of the chest to above the clavicle (Figs. 195 - 197.) In female patients

Fig. 195.

Fig. 196.

Fig. 197.

the clappings should be given nearer the sternum while passing up the front of the chest, in order to avoid the mammary glands.

This has the effect of causing stimulation of the lungs and heart; expectoration is facilitated.

Clapping may be given on the extremities. The manner in which it is given is the same as in hacking, but the effect is more superficial, as the manipulation does not penetrate; the cutaneous nerves are specially stimulated.

Clapping of the soles of the feet, (i.e. simply slapping them) is useful in cases of anaesthesia, etc., which so readily cause difficulty in balancing when walking, etc.

III. Beating:

Is almost exclusively given as sacral beating.

Reach grasp standing knee flexion and extension PA, sacral beating, PP.

During the performance of this movement the beatings are given thus: during flexion of the knee, over the upper part of the sacrum and inner parts of the gluteal region; during extension the strokes are given down the sac-

Fig. 199.

rum, so that the final ones are given over the coccyx just as complete extension is reached. (Fig. 199.)

The sacral nerves, gluteal regions, and organs of the pelvis are stimulated.

R. STROKING.

This manipulation, otherwise known as effleurage, is described as follows: "It is a stroking movement in the direction of the heart, the object being to act more particularly on the venous and lymphatic circulation in superficial parts, such as the skin, subcutaneous tissues, etc." (Dr Arvid Kellgren, "Technic of Manual Treatment", 1890, p.9.) He further goes on to say: "The effleurage may be very superficial or deep -- in other words the pressure may vary from the lightest touch to one of considerable force; but this force must be gradually increasing as it passes towards freer and healthier parts, and should not be applied with vigour from the outset."

Pure stroking movements are but very little used by the Kellgren school, as other manipulations can

better replace them. It is often, for example, of advantage to combine such a stroking with a vibration - this is called a running vibration.

As above mentioned, these manipulations are in almost all cases given in a centripetal direction, i.e., in the direction of the lymphatic and venous flow. But there are decided exceptions, such as lymphangitis after a wound or abrasion, erysipelas, etc., where we given then centrifugally, as we wish to prevent the entrance of toxic matter into the lymphatics and veins.

S. KNEADING.

This manipulation, otherwise known as petrissage, is described by Dr Arvid Kellgren in his "Technic of Manual Treatment", 1890, p.13, as follows: "Petrissage is a kneading movement by which the skin, subcutaneous tissues and more particularly muscles, are acted upon. The muscle or part of it, is grasped between the thumb and the other fingers, and rolled slowly between them, in very much the same manner as one rolls a pencil, the pressure sometimes increasing, sometimes diminishing, care being taken that the joints of the fingers and wrist are kept loose." Page 14: "The manipulation with two hands ..... The muscle is rolled as before described, but it is also stretched by the backward movement of the fingers of one hand, while the thumb of the other passes forwards."

The length of time which muscle kneading should be given: A minute or two is usually quite sufficient, as movement at joints, active and passive, and nerve treatment, should be given instead, by which means a much greater effect is produced.

Kneading of a whole limb may be given. "Take, for instance, the arm. The patient holds it in a horizontal position, but steadying the hand on a table or the back of a chair. Both hands of the operator are placed lightly on the arm, and are moved quickly round it as they pass up and down two or three times." (Dr Arvid Kellgren, "Technic of Manual Treatment" 1890, p.31.)

Kneading of effusions arising from various causes: Dr Arvid Kellgren, in "Technic of Manual Treatment," 1890, p.16, says: "I work with the whole of the thumb down to its thenar part. I start above the effusion. In order to obtain a larger and freer range of motion, the thumb is put down a little above the place to be subjected to the manipulation and carried back to the particular area to be treated. If this precaution is not taken, the skin becomes stretched and irritated by the onward movement of the thumb. The thumb describes a half circle with gradually increasing pressure as long as it moves in the centripetal direction, then the pressure is relaxed, the thumb is lightly moved back to the

starting place and the same action repeated. The movement should be given slowly and deliberately."

Kneadings of such effusions are usually given for a longer time than those of muscles, and must be supplemented by movements at joints, nerve treatment, and often by running vibrations as well.

From the above remarks one can gather that there is a great difference between these manipulations of stroking and kneading, and the ordinary massage methods, such as Dr Metzger uses; briefly the differences are as follows:-

(1) In giving massage the masseur uses fat, vaseline, or some similar agent in order to diminish the friction between his fingers and the part to be massaged. Thus the movement that results is one of his fingers over the skin; the latter will be greatly affected, but the deep lying structures very little. In the Kellgren school, the assistant's fingers and skin of the patient move as one over the underlying structures, which are thus much better got at than by the ordinary massage manipulations.

(2) Perspiration is prevented in the parts massaged with vaseline (or whatever the agent employed) owing to the clogging up of the orifices of the ducts of the sebaceous and sweat glands.

Not only this, but sometimes the so-called massage eruptions arise, and the treatment has to be stopped until these have passed away.

(3) Massage may cause hyperaemia of the skin, actual soreness, or even rupture of capillaries and extensive bruising, in which case the treatment has also to be stopped, as the pain the massage produces is so great. The Kellgren school avoids these mishaps by working with a loose wrist and finger. Dr Arvid Kellgren, in "Zur Technik der Schwedischen Manuellen Behandlung," 1895, says, page 6., (translated) "I do not give the treatment in that hard way that the pupils of Metzger do ..... For that reason, also I do not use the so-called 'introductory massage' which many medical men use, and by means of which so much time is lost for the patient. Also the 'wounding of the skin' has not yet happened with me. Who attains such a result stands self-accused that he has been working with a stiff hard hand and that his treatment has been a rough one."

(4) Massage is given over a much longer time than the kneading such as I have described; each seance lasting often from ½-1 hour. This is quite unnecessary, as active and passive movements and nerve frictions and vibrations produce the desired effect much quicker and much better.

(5) Kneadings by the Kellgren method unless specially contraindicated, are always given over thin linen or silk clothing, and not on the bare skin. Dr Arvid Kellgren, in "Zur Technik der Schwedischen Manuellen Behandlung," 1895, p.6, says (translated): "Dr Hoffa has in his book "Technic of Massage" designated all massage which is not given on the bare skin as charlatanism. I can only explain this by taking it that he is not acquainted with the above kind of massage, or can it really be possible that Dr Hoffa would find himself incompetent to give, for example, abdominal massage, if a linen shirt were to lie between his hand and the body of the patient? If this were the case, it would certainly be pleasant for Dr Hoffa's patients if he were to make up his mind to learn how to do this."

T. PRESSING.

Nerve pressings, such as they are found in Ling's system have been referred to already (p.151&2.)

Compressions of arteries and veins, apart from their use in stopping haemorrhages, are sometimes employed. Compression of arteries, of course, causes temporary anaemia of the part. Compression of veins acts in a contrary manner; in the case of fainting from sudden anaemiae cerebri, bilateral

compression of the internal jugular veins will revive the patient almost quicker than anything else. Another simple way of sending more blood to the brain is to stimulate the abdominal sympathetics. (See pages 169 et seq.).

The vaso-constrictor influence of pressure on the coronal suture has been already described. (page 173).

SPECIAL MANIPULATIONS OF VARIOUS ORGANS AND REGIONS.

In the case of our having to treat any large area of the body, say the arm, the head, etc., we frequently give certain sets of manipulations in a definite order on these regions in such a way as to successively act on the muscles, the nerves, the vessels, etc. Such sets of manipulations are found in the case of the head, throat, eyes, arm, abdomen, and are conveniently termed "exercise", thus "head exercise".

In the following descriptions of these exercises it is by no means to be assumed that each set must be slavishly and precisely followed out, but more than anywhere else, we must modify, add, supplement, and omit to suit each patient and his daily variation.

I. Head:

Sitting Head Exercise PP.

The patient is in the sitting position with his head erect; the assistant then

(1) performs head lifting,

(2) vibrates or works on those parts of the head that call for attention,

(3) gives nerve frictions , general,and local if required.

(4) performs head lifting again.

Fig. 200.

Fig. 201.

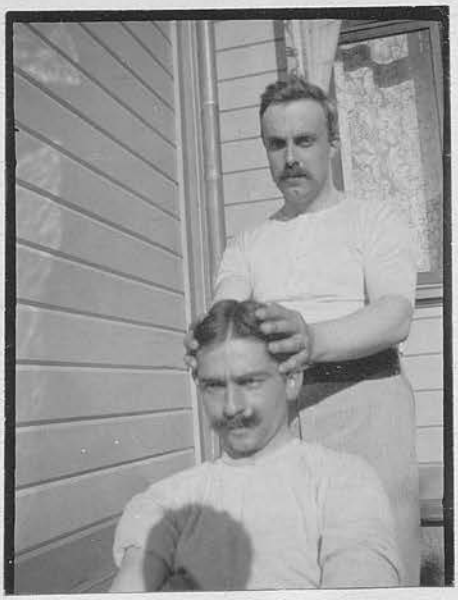


Fig 202.

The above is the routine exercise, such as it is given for congested or hyperaemic states of the head with a view to relieving these conditions by reducing the amount of blood in the cranium. In the case, however, of our having cases of melancholia, syphilitic dementia, and where we wish to stimulate the brain, the exercise is given much more vigorously and for a shorter time. (See figs. 200-202).

II. Throat:

Sitting Throat Exercise PP.

The patient is in the sitting position.

(1) The assistant performs head lifting; he then places one hand under the occiput to keep the head erect or even a little flexed forwards, and with the other hand he

(2) vibrates or shakes the submaxillary region, larynx, trachea, inflamed glands in the neighbourhood, etc., according to the nature and site of the lesion,

(3) gives frictions on the nerves of the part he is vibrating or shaking, especially the superior and recurrent laryngeal;

(4) finally, he performs head lifting again.

Just as in head exercise, this "throat exercise" can be given in a quiet soothing manner, or energetically in order to be more stimulatory.

III. Eye:

Sitting Eye Exercise, PP.

The patient is in the sitting position and the assistant,

(1) performs head lifting,

(2) vibrates the eyes, bimanually or with one hand at a time,

(3) gives frictions on the various nerves of the eyelids and orbit, i.e. infra-orbital, supraorbital, nasal, sympathetic ganglia, etc.

(4) A few vibratory strokings may then be given on the eyelids in the direction of the venous flow.

(5) Head lifting is repeated.

A head exercise should be given in addition if we have symptoms pointing to congestion or other states on which the eye symptoms partly depend. There appears to be in many cases a physiological continuity between the nerves around the orbit and the eyeball itself. I have, for example, in one case seen that frictions over the supraorbital nerve corrected a convergent strabsimus, which however returned again in a few seconds, to be again relieved by another friction, and so on. In the course of time, however, permanent improvement resulted.

IV. Upper Extremity:

Yard grasp sitting arm exercise, PP.

(or PP. and PA. if duplicate movements are included)

The following is the order in which the various manipulations are given:

(1) A rapid kneading of the muscles of the arm generally.

(2) Hand or finger rolling, which may be preceded by kneadings of any affected joint.

(3) Duplicate movements of these joints.

(4) Passive or duplicate movements of elbow and shoulder joint.

(5) Nerve frictions, running, general or local,

(6) Clapping or hacking of the arm.

(7) Arm traction sideways.

It is seldom necessary to give all the above, healthy joints need not be given any duplicate movements and in any case, of course, we only give the latter when they are specially indicated.

V. Abdomen :

Half lying stomach exercise, PP.

The patient is in neck firm half lying position, the assistant sits at his side so as to look towards his face, not so as to look transversely across him. The correct position is shewn in figs. 203 - 205.

"The whole of the palmar surface of the hand is in contact with the abdominal wall. The hand is spread out over it, the fingers lying to the left in the interval between the lower ribs and the iliac crest, but somewhat nearer the former, while the thumb has the same position on the right side, and the base of the hand is a little above the pubic arch, with the strongest part, the ball of the thumb, near the right iliac fossa.

"As this manipulation and others of the abdomen are never given on the bare body, it is of the highest importance that the part of the abdominal wall under the hand should follow it in its movements; otherwise irritation of the skin is caused. In order to decrease the possibility of this the dress nearest to the skin ought not to consist of wool, but should be made of silk or linen. It is also clear that if the hand moves over the surface of the abdomen, the intestines are not acted on, or only very slightly. It is of the utmost importance that the hand works firmly and yet softly, that there is no stiffness in any joint, and that the forearm is kept as nearly as possible parallel to the patient's body.

"The movement itself has a circular character, and is generally started from below with the base of the hand. This, with slight extension (dorsal flexion) at the wrist, passes under soft, gradually increasing pressure, to the right into the iliac fossa, and then upwards in the line of the ascending colon. It is natural that the thumb is brought higher up and comes to lie close under the ribs over the hepatic flexure. The hand now moves, always in contact with the abdominal wall, and continuing its slightly circular way to the left, the thumb and the thenar part of the hand having overtaken the work. It is not enough to move the hand over;

it is also pronated a little at the same time, and the thumb is adducted towards the finger. These again, as the hand passes to the left, come over the splenic flexure, and in their turn become the principal agents. They move downwards, bending more and more at the metacarpo-phalangeal joints, not at the phalangeal ones and with a slight flexion at the wrist. As the hand passes lower and lower down close beside the os ilium, it is somewhat supinated, and when the wrist is again near the pubic arch, the base of the hand again takes up the work.

"These manipulations, although described separately, do not exactly follow one another, but one begins a little before the other has ended, and in this manner the kneading is produced. If this were not done, there would of course only be pressure in one direction after the other ..... The movement is very difficult, and indeed, nearly impossible to describe well; but is also as difficult and as impossible to give for any one who has not been gifted by nature with a good hand for the treatment, and it is necessary both to see and still more to feel it." (Dr Arvid Kellgren, "Technic of Manual Treatment", 1890, pp. 18-20.)

"For the colon and rectum. Petrissage (kneading) is here mostly given for constipation. There are specially two places to which our attention must

Fig. 203.

Fig. 204.

Fig. 205.

be directed, viz., the sigmoid flexure of the colon and the splenic flexure of the colon. We begin the movement as far down in the pelvis as possible, and gradually pass upwards. Each individual kneading always goes from above downwards in the line of the intestine. The fingers are to be flexed only at the metacarpo-phalangeal joint, because if the fingers are bent, the manipulation becomes pointed and painful. We cannot get down deep enough and the kneading character is lost."(Op.cit., p.21.)

Some authors describe a kind of manipulation which resembles to some extent the stomach exercise just given. The differences and disadvantages of their methods are as follows:

(1) Their manipulations are given on the bare skin, which is rubbed in with fat or vaseline, egtc. Besides of course the objection to uncovering the abdomen in the case of female patients, the vaseline results in the effect on the abdominal contents being very small indeed, and massage of the parietes is the chief result. As mentioned in kneading of muscles, it is impossible to affect the deep lying structures unless the skin moves together with the assistant's finger over them. The fat of course reduces the deep effects very considerably, and also may cause eruptions, prevents perspiration, etc., in a similar manner.

(2) They use a great deal more violence; the gymnast's wrist is often extended to a right angle with the forearm, and the whole hand dug into the abdomen. That this is true is shown by the fact that one reads something like the following: "The first few massage seances are spent in overcoming the reflex irritation of the abdominal muscles." In my own practice, I have never seen such reflex contractions, excepting perhaps for the first few seconds after I laid my hand on the abdomen in very nervous patients.

(3) The gymnast is placed so as to look transversely across the patient's abdomen. The position is more awkward than the one adopted by the Kellgren school (See p.216, and figs.203-205), besides that the manipulation is harder to give, more clumsy, and the proper direction of the movement is not so easy to obtain. Dr T Möller, in his "Zur Therapie der Habituellen Obstipation" 1898, p.14, says (translated): "Wide has, in his new handbook, a picture which is supposed to show how the medical man should sit for the giving of abdominal massage, (i.e. looking transversely across the patient's abdomen) From my point of view this is an illustration of how he ought <u>not</u> to sit;" a point on which I most readily agree.

Physiological effect of Stomach Exercise: The various physiological phenomena which result are so intimately bound up with one another, that it is almost impossible to eliminate each factor and to state whether this would occur alone or is merely the result of a combination of several.

(1) There is a furthering of the circulation generally; there is an increased flow of arterial blood; the contents of the portal vein move on quicker; the venous return in the iliac veins and inferior vena cava is also hastened.

(2) This increased circulation causes increased activity, with consequent increased growth of the intestinal muscle. This reacts on the portal flow. "Peristalsis of the intestines greatly promotes the portal venous flow." (Prof. Schäfer, "Textbook of Physiology," Vol.II. 1900, p.121) The muscles of the stomach proper are also stimulated.

(3) There is an increased churning up of the contents of the intestine or stomach proper, brought about partly by increased vital activity of the latter, and partly by the mechanical alternating application and removal of pressure by the hand of the assistant.

(4) Passage onwards of the intestinal contents is brought about for the same two reasons as in (3).

(5) Increased secretion of intestinal juice.

(6) There is increased absorption in the lacteals.

(7) A diuretic effect.

(8) An effect on the abdominal sympathetic. The exact effect is difficult to determine; that there is one, however, is shown by the fact that reflex slowing of the heart takes place. (See "Tidskrift i Gymnastik," 1892, p.700.)

(9) An effect on the abdominal parietes; this is however, slight, as they move as one with the fingers of the assistant. Reflex contraction of them as in phthisis pulmonum and heart disease can be overcome.

The organs of the abdomen:

(1) The liver and gall-bladder; May be stimulated by running vibrations along the lower costal margin, the patient being in such a position that the ribs are lifted up (neck firm, half lying, stretch grasp, side span standing, etc.) Or we may work at the gall bladder and the 6th & 7th right dorsal spinal nerves simultaneously; one hand attends to the latter, and the other gives frictions downwards and inwards (in the direction of the ducts) at the 9th costal cartilage. The skin of course, must move with the fingers, which after giving each friction

relax their pressure and come lightly back to the original position and give another friction and so on.

(2) The Spleen: With the patient as before the fingers are passed in under the left costal margin and the frictions given directly inwards at the level of the 10th rib. The 10th dorsal nerve on that side can be conveniently stimulated at the same time.

(3) The Kidneys: With the patient as before, the fingers give frictions just below the 12th rib at the outer edge of the erector spinae transversely across these glands. Or we may get at the kidneys and renal plexus from the front as described on a previous page. (page 170.). Fig 206.

Fig. 206.

(4) The Bladder: The patient is in stretch grasp standing or half lying position, and supra-pubic vibration or shaking is given as already described (page 171 &c).

(5) Prostate gland: The patient is in hook half lying position with his knees somewhat separated. The assistant places his forefinger on the gland about one inch behind the symphysis pubis and frictions are given from behind forwards. That the sympathetic nerves are stimulated is shown by the fact that in many patients a rush of blood to the head takes place, just as in bladder vibration.

(6) The Ovaries: The patient is placed in half lying position. The palmar surface of the distal parts of the fingers of both hands are placed about two inches internal to and one inch below the crests of the ilia. Then with the movement almost exclusively generated from the metacarpo-phalangeal joints, those of the fingers being kept extended, the manipulation is given downwards and inwards, then lightly back again, and so on alternately, the abdominal parietes moving together with the fingers. The manipulation must be given gently.

(7) The Uterus: Frictions over the uterus through the abdominal parietes just after parturition, using both hands, one on each side, is a more powerful method than ordinary kneading and thus tends to minimise post partum haemorrhage and brings the uterus back to its normal size in a shorter space of time. They need not be given so as to cause pain excepting in inertia uteri or other serious conditions.

One hand alone may be used which grasping the fundus of the uterus, moves downwards, the fingers closing on it as it does so; the pressure is then relaxed and the hands move lightly upwards again and so on, several times. The parietès should move with the fingers.

(8) The Anus: Frictions may be given here in case of incompetent sphincter, etc.

Instead of frictions of all the above, we may give vibrations in case we wish to soothe rather than stimulate. The positions of the assistant's fingers are as before, but instead of giving frictions across the structures, vibrations are set up instead I have on a previous page described the latter in the case of the anus, (page 197) anal canal (page 197) and uterus (page 196).

CHAPTER VI.

C O N C L U D I N G R E M A R K S

T O P A R T I.

I have now briefly described the more important exercises and manipulations as they are found in Kellgren's manual treatment. I wish, however, to point out that an infinite number of modifications may be inserted, if thereby we can specially adapt our movements to any particular case so as to produce a more beneficial effect. And in complex cases we may have to modify so much that it amounts practically to inventing new manipulations. As a general rule, passive movements lend themselves far more to modification than duplicate ones. This is specially marked in such complex forms as head exercise, stomach exercise, where no precise details are given, or can be given. Experience alone can tell how to give it to each patient and to change it day by day to suit him.

Modifications may be made as regards the

(1) Initial position: The harder the initial position, the less can the patient concentrate his efforts on the actual movement. This may or may

not be of advantage. In patients confined to bed, of course, all movements are given from lying or half lying (possibly sitting) positions and in acute cases, such as fevers, the patient may be allowed to occupy whatever position is most comfortable, provided that this in no way acts injuriously to his person or impede the giving of the actual manipulation, or impair its beneficial effect. The suspension of the rule that all initial positions are to be carefully and correctly taken up and maintained during the whole performance of a movement from beginning to end is of course allowable here. It is also permitted in certain passive movements given from lying or sitting position, provided that this in no way interferes with the giving or effect of the manipulations, e.g. there can be no objection to letting a patient change the position of his foot for comfort's sake during the time he is getting a lengthy head exercise.

(2) Energy with which passive movements are given, or with which the resistance is offered in duplicate ones.

(3) Rapidity with which a movement is performed. It may be taken as practically true that the slower a duplicate movement is done, the greater will be the energy required.

(4) Frequency of repetition, or time of application (in active or passive movements respectively).

(5) Length of the pause between the repetitions.

(6) The arrangement in the daily programme of exercises, such as putting two consecutively which call the same muscles into action, which of course will be more tiring than if these are separated by movements involving other muscles.

(7) Giving two passive manipulations simultaneously.

(8) Application or withdrawal of part or whole of the resistance, or other modifications, etc, etc.

I will refer to the last mentioned specially. If we have any movement with AR, in which a certain group of muscles are active, then by giving it PR, we exercise their antagonists. Thus ride sitting arm abduction AR, adduction PR, exercises the abductors, but if given as abduction PR, adduction AR, the antagonists (adductors) would be called into action instead.

In a similar way we can obtain different effects by giving part of duplicate movements purely active, or passive. As an illustration of how great the differences may be, and how many variations there

are, I shall give the following: Half lying foot flexion and extension.

Flexion	PP,	extension	PP;	is a passive movement
"	PA,	"	PA;	is a purely active movement of the flexors and extensors.
"	PR,	"	PR;	is a duplicate eccentric movement of the flexors and extensors.
"	AR,	"	AR;	is a duplicate concentric movement of the flexors and extensors.
"	PP,	"	PR;	is a duplicate eccentric movement of the flexors.
"	PR,	"	AR;	is a duplicate concentric movement of the extensors.
"	PR,	"	PP;	is a duplicate eccentric movement of the extensors.
"	AR,	"	PP;	is a duplicate concentric movement of the flexors.
"	AR,	"	PR;	is a concentric and eccentric movement of the flexors.
"	PR,	"	AR,	is a duplicate concentric and eccentric movement of the extensors.
"	PA,	"	PR;	is a purely active and duplicate eccentric movement of the flexors.
"	PA,	"	AR;	is a purely active movement of flexors and duplicate concentric movement of extensors.

etc., etc.

There is no reason why the treatment should be discontinued during the menstrual period. Exercises of an exerting nature or that draw blood away from the pelvis (except as in menorrhagia) can be omitted, but the rest of the daily programme should be gone through as usual. It is a noteworthy fact that with this treatment patients both those who do or do not suffer from any pelvic disorder, often show greater improvement just after the period than during the rest of the previous month.

I wish to take this opportunity of pointing out the utter impossibility of learning this treatment, or even Ling's system, from merely reading textbooks, or by looking on at the performance of the various movements. One might as well expect to become an expert player on the piano or violin by learning the theory and watching professionals. What is needed is continual and steady practice, combined with the constant intention of doing one's best. "It should be added that mere theoretical teaching will never train anyone to give the exercises properly. To gain complete mastery of the movements necessitates several years of careful work..... Moreover, a special aptitude is required for the treatment, which even long experience will not create - just as one man may bring to the practice of operative surgery a neatness and dexterity of handling

which others may work for years without being able to acquire. The treatment, in short, is one that cannot be lightly taken up in connection with other forms of medical work, but should either be exclusively practised or left alone." (Dr. Arvid Kellgren, "Technic of Manual Treatment," 1890, p.6)

Before leaving the subject of the exercises themselves and passing on to notes of cases to illustrate them, I may in a few words recapitulate the most important differences between Kellgren's treatment and the ordinary Ling's system of medical gymnastics of to-day,* which are as follows:--

(1) The application of traction in all duplicate and passive movements wherever possible.

(2) Kneadings are only given for a very short space of time and vaseline and ointments are excluded. All manipulations are nearly always given over ordinary linen or silk garments.

(3) The fact that the Kellgren school lay great weight on treating the nerves that lead to and from a part, by means of nerve frictions and vibrations, methods which are practically unknown to the Ling'school of the present day.

* I say "of to-day" because there is a good deal of difference between the system as it stands at the present day and as it was 20 or 30 years ago; it is not now what it used to be.

(4) The giving of vibrations from the wrist and finger joints, which make these manipulations much more even, regular, and capable of being continued at a constant rate, rhythm and strength for as long as necessary - it may be for hours.

(5) Treating the constitution, not merely the local lesion. This will be discussed more fully on pages