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Lecture given before the Ling Association, London,
on January 8th 1906

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EDGAR F. CYRIAX, M.D. G.D.

It having been suggested to me that "Vibrations and their Effects" would be a subject worthy of your notice, and in itself of considerable interest, I have the pleasure of now laying before you a brief exposition of the same, together with a practical demonstration of the modus operandi.

By vibration is here meant that particular passive movement which is produced when the gymnast's hand (or a vibrating machine) is placed on the part to be treated and, remaining continually in contact with it, sets up a series of alternating movements so that the part manipulated is traversed by a rapid series of undulating waves of alternate compression and relaxation.

A kind of vibration was used to a moderate extent in medical gymnastics by P. H. Ling and his school; Branting contributed certain developments. After the latter's time, however, these manipulations gradually fell into disuse and under Hartelius were accorded only an unimportant position. It was reserved for Henrik Kellgren to develop and perfect the existing forms of vibrations and to invent many new ones. As Kellgren's methods of vibrating are by far the best of the existing forms of manual vibrations, I shall chiefly confine my attention to them. By their means many forms of disease can be successfully attacked, and this when other manipulations would only make matters worse.

In the performance of Kellgren's vibrations the actual movement of the gymnast's hand is generated either from the fingers or from the wrist and fingers, the muscles employed being the flexors of the forearm and fingers. In rare cases it is generated from the elbow-joint and in still rarer cases from the shoulder-joint, but so little are the two latter forms employed that I shall in this lecture disregard them altogether.

The rule in executing these vibrations is that the minimum possible amount of muscular contraction should be used. This ensures evenness, enables the gymnast to execute them for hours if necessary, and avoids dulling of the fine sense of touch and appreciation of the effect. Too great vigour in executing and too little delicacy, either from the use of wrong muscles or from too much effort, are largely responsible for the failures reported by certain operators.

As regards the site of application, vibrations may be applied continuously over one point, or may be caused to progress along a certain line, i. e., the line of a nerve or the direktion of the venous or lymphatic flow. The former are called stationary, the latter running vibrations. Running vibrations may be either slow or fast, and may proceed either towards the heart or away from it.

A less commonly used variety of vibration is the suction vibration; in this the fingers at first spread out are gradually made to approach one another, vibrating all the time, increasing pressure being applied meanwhile. The pressure is then partially released and the fingers brought back to the original position, the process being repeated as often as necessary.

Different physiological effects will be produced according to the type of vibrations. made use of.

Vibrations may vary as regards

1. Rapidity (the usual rate of manual vibrations is 8—12 a second i. e. 480—720 a minute).

2. Intensity (according to the amount of pressure applied).

3. Direction (i. e., whether they are up or down or from side to side).

4. Amplitude.

5. Length of time of application, etc.

These variations are of course made on all kinds of vibrations, wheter stationary, running, suction etc. The chief cause of the efficiency of the vibrations is that a skilled operator can with great subtlety adapt all these variations to suit a particular case and can continue modification as the patient's condition changes. In this connection the value of experience is, of course, enormous.

Before proceeding to describe the effects obtained from vibratory methods, it will be necessary to consider briefly the use of machines in generating vibrations for medical purposes. There are many varieties of such machines, each of which, according to the inventor, has special advantages.

The one point on which all these inventors are agreed is that machine vibrations are much better than manual ones. But this is a grave error, for no such machine can equal the human hand, which, by having an intelligent brain to control it and the sense of touch to guide it, can modify the strength, amplitude, direction and rate of movement, and time and place of application, at any given moment should this become desirable. And this is a point I wish particularly to emphasize.

The whole argument that machine vibrations are

superior to manual ones has arisen from the fact that most medical gymnasts do not know how to vibrate properly and find that machine vibrations save a great amount of trouble. Even in Stockholm itself the use of the machine is becoming common, and is sanctioned by that degenerate modification of Ling's gymnastics advocated by Dr. Anders Wide.

Having dealt with this point, I pass to the results obtained from the exprimentes of various investigators. Of course they vary greatly according to the methods employed in producing the vibrations, whether machine or manual, the type of vibrator and vibration used, etc. The following is a brief summary of results. The great majority of the conclusions quoted are obtained from experiments with machine vibrations.

1. Effect on the cells of the human body. Fleisch v. Marxow [1]) set up the theory that the (vibrations) minute shocks imparted to the cells of the lungs by the heart beat were necessary for the gaseous interchange, that these were in fact a sine qua non for actual existence. Other observers have concurred in this. Buttersack [2]) concluded that the vibration of the blood in the arteries was a very important factor in the same connection. Buchheim [3]) considered that the vibration of the blood in the aorta acted on the cardiac nerves (cf. Matthews and Whitcher [4]).

[1]) Fleisch v. Marxow "Eine bisher unerkannte Wirkung des Herzschlages". Beitr. zum Phys. Carl Ludwig zu seinem 70. Geburtstage gewidmet 1887, pp. 29 etc.

[2]) Buttersack "Mechanische Nebenwirkungen der Athmung und des Kreislaufes. Eine nicht experimentelle Studie". Berl. Klin. Woch. 1902, No. 12, p. 260.

[3]) Buchheim "Die Bedeutung der Erschütterung und das Verhältniss derselben zu den übrigen Handgriffen der Massage". Deutsch. Zeitschr. f. Chir. 1892, Band XXXIV, p. 336.

[4]) Malthews and Whitcher "The importance of shock in protoplasmic activity". Amer. Journ. of Phys. 1903, Vol. VIII, pp. 300—306.

2. Effect on bacilli. Saquet[5]) found no change in the growth and characteristics of bacilli after eight days continued vibration, whereas Meltzer[6]) found a desstructive effect with shorter time of vibration. (In Meltzer's papers can be found a tist of the previous literature).

3. Effect on the temperature. Most authors (Taylor[7]), Laggrange[8]), Saquet[9]), etc.) found a rise of temperature after using vibrating machines. Bachterew and Tschigajew[10]), using vibration of the whole body, found a rise in the internal temperature and a fall in the skin and axillary temperatures.

4. Relation between speed and effect. Vigouroux[11]) considered that within wide limits the speed had no material influence on the physiological result; this view is, however, not usually held. Langendorff[12]) using a tuning-fork on a nerve found the maximum result with

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[5]) Saquet. Communication to the Congress at Paris in 1900 of the Association pour l'avancement des sciences.

[6]) Meltzer "Über die fundamentale Bedeutung der Erschütterung". Zeitschr. f. Biol. 1893—94, Band XXX, No. 4, p. 464, and "On the importance of Vibration to Cell Life", New-York Med. Journ. Dec. 24, 1892.

[7]) Taylor "Paralysis and other affections of the nerves" 1880, p. 33; "Massage at rapid or vibratory rates". New-York, Med. Journ. 1892, Vol. LV. pp. 371—379.

[8]) Lagrange, quotet by

[9]) Saquet "De la trépidation mécanique locale" 1898 and "Trépidation mécanique locale". Le nature 1901, p. 189.

[10]) Bechterew and Tschigajew "Über den Einfluss der durch Stimmgabelschwingungen herbeigeführten Erschütterungen auf den menschlichen Organismus". Neurol. Centrlbl. 1895, No. 5, pp. 194—199.

[11]) Vigourou "Les aesthésiogenes et la theorie des vibrations". Prag. med. 1880, Vol. VIII, Nr. 36.

[12]) Langendorff "Über Tetanisirung von Nerven durch rhythmische Dehnung". Centrlbl. f. d. med. Wiss. 1882, Feb. 18th, pp. 113—115.

4800 oscillations per minute; Axenfeld [13]) with the same kind of apparatus considered that up to a certain point the slower the rate the better, as the amplitude of the movements of the tuning fork was then greater. Lange [14]) concluded that a rate of 1100 - 1200 per minute produced the greatest effect. Mesnard [15]) found that 15000 vibrations per minute could produce a muscular tetanus, whereas a lesser number could not, a point in which he differed from Lavalette. [16])

5. Effect on the heart and blood vessels.

a) On the heart. That vibration can diminish an excited cardiac action has been shown by Winternitz [17]), Levin [18]), Hasebroek [19]), Nebel [20]), Ziegelroth [21]), and Achert [22]), Siegfried [23]) found very little effect, Bechterew and Tschigawej [10]) a varying one.

In stoppage of the heart during chloroform admini-

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[13]) Axenfeld "Vibrationen der Stimmgabel als Nervenreiz". Centrlbl. f. Phys. 1892, Vol. VI, pp. 299—300.

[14]) Lange "Über Vibrationsmassage speziell bei Frauenkrankheiten". Arch. f. Phys. Diat. Ther. 1899, Nos. 5, 6, 8, 9, 11.

[15]) Mesnard "De la vibration. Effets physiologiques et applications thérapeutiques" Rev. de cin. 1903, April, pp. 82—92.

[16]) Lavalette "De la sismothérapie" Thesis, Paris 1899.

[17]) Winternitz. Discussion at XI Balneol. Congr. March 2 a. 3, 1889.

[18]) Levin "Bidrag till kännedomen om sjukgymnastiska rörelsers inverkan på rytmen vid organiska hjärtfel". Tidskr. i Gymn. 1892, Vol. III, pp. 698—704.

[19]) Hasebrock "Über die Krankheiten des Herzens" 1896, see also "Die Erschütterung in der Zanderschen Heilgymnastik" 1890.

[20]) Nebel "Bewegungskur mittelst Schwedischer Heilgymnastik" 1889.

[21]) Ziegelroth "Die Massage des Herzens". Arch. f. Phys. Diät. Ther. 1901, Vol. III, p. 146.

[22]) Achert "Massage des Herzens". Die med. Woche, March 23, 1903.

[23]) Siegfried "Über Vibrationsmassage insbesondere bei Herzkrankheiten" 22nd Baln. Congress, March 7—12, 1901.

stration Strassmann [24]), Körte [25]), and Kumpf [26]) found a strong manual vibration on the heart one of the best methods of causing it to beat again.

Heitler [27]) found that vibration of the heart set up by the so-called "hacking" over it raised the tone of the cardiac muscle and diminished the size of the organ.

The theory that heart vibration acts chiefly in a reflex way through the sensory nerves and the vagus has been advocated by Heiligenthal [28]), Nebel [29]), Murray [30]) and Lorand [31]), Björkstén [32]) and Ziegelroth [21]) on the other hand, considered that it acted directly on the heart itself; Heitler [27]) and Hasebroek [19]) incline to this view.

a) On the blood vessels. Most authors (Björkstén [32]), Zander [33]), Bechterew [10]), and Colombo [34]), consider that

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[24]) Strassmann "Die Chloroformnarkose der Frau". Zeitschr. f. Geburtsh. u. Gyn. 1894, Vol. 1894, pp. 171—198.

[25]) Körte "Zum Vergleiche der Chloroform- und Aether-Narkose". Berl. Klin. Woch. 1894, No. 9, pp. 209—213.

[26]) Kumpf "Über die Behandlung chronischer Herzaffectionen" 1889.

[27]) Heitler "Über akute Herzerweiterung". Wien. med. Wochen. 1882, Vol. XXXII, June, Nos 22 a. 23, and "Über die Wirkung thermischer und mechanischer Einflüsse auf das Tonus des Herzmuskels". Centrlbl. f. d. ges. ther 1894, Vol. XII.

[28]) Heiligenthal "Die Anstalt für mechanische Heilgymnastik in Baden-Baden" 1884.

[29]) Nebel op. cit. p. 205.

[30]) Murray "På hvilka fysiologiska grunder hvilar en rätt gymnastik behandling af organiska hjärtsjukdomar". Tidskr. i gymn. 1887, p. 611.

[31]) Lorand "Über die manuellc Behandlung der Herzkrankheiten". Wien. Med. Pr. 1895, Nos 40 a. 41.

[32]) Björkstén "Om inverkan på cirkulationsorganen af med vibrator utförd vibrering". Finsk. Läk.-sälls. Handl. 1901, Oct. No. 10.

[33]) Zander, quoted by Nebel [20], p. 206.

[34]) Colombo "Die Massagetherapie und die Physiologische Begründung". Zeit. f. Diät. u. Phys. Ther. 1904, Junc, p. 131, also in Gazz. med. ital. 1903, Nos 50, 51; Rev. de cin. 1904, Feb.—April etc.

the effect of vibration is to cause the blood vessels to contract and the blood pressure to rise, though, according to some of these mentioned, a subsequent dilatation with fall of the blood pressure may result.

6. Effects on nerves.

a) Using tuning-forks on nerves laid bare in animals, Langendorff [12]) and Axenfeld [13]) induced muscular contraction; Uexkull [39]) with his "nerve shaker" got stimulatory effects; Borruttau [40]), using Uexkull's apparatus on the vagus nerve, caused slowing of the heart.

b) Using tuning-forks on neuralgic or irritated human nerves Vigouroux [11]), Boudet [35]), Jacoby [36]), and later on many others, found a resulting diminution of pain. Axenfeld [13]) failed to get a muscular contraction by applying a tuning-fork over the ulnar nerve in men.

The vibrating casque of Charcot [38]) has been extensively used in France to promote sleep. (I may here quote the well-known fact that the vibrations induced by driving in a carriage or train have an effect in producing sleep, especially in children.)

c) Bechterew and Tschigajew [10]) (by vibrating the whole body) induced sleepiness in about $^1/_4$ hour.

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[35]) Boudet "Traitement de la douleur par des vibrations mecaniques". Progr. med. 1881, No. 6.

[36]) Jacoby "Massage in Nervous Diseases". Journ. of nerv. and ment. Dis. 1886, p. 155.

[38]) Charcot "La médecine vibratoire". Prog. med. 1892, p. 149.

[39]) Uexkull "Der Neurokinet. Ein Beitrag zur Theorie der mechanischen Nervenreizung". Zeitschr. f. Biol. 18, Vol. XXXVIII pp. 291—299 and previous papers in the same periodical Vols XXXI, XXXII, XXXIII.

[40]) Borruttau "Weitere Erfahrungen über die Beziehung des nervus Vagus zur Athmung und Verdauung". Arch. f. d. ges. Phys. 1896 bis 97, Vol. LXV, pp. 26—40.

d) Granville's[41]) "electric percutor" caused diminution of pain; this has been observed by many others. Buchheim[3]) obtained stimulatory effects on the sympathetic and vagus in the neck according to the site of application. Zander's[42]) vibrator applied strongly over the sacrum brought about a desire to empty the rectum. Berminzone[43]) obtained a muscular contraction on vibrating the median nerve.

e) Various effects. Nebel[44]), Lenmalm[45]), and others found that in some cases paralysed nerves would re-act to mechanical (a vibratory nerve pressing), but not to electrical stimulus; Shtsherbak[46]) considered that the entire effect of nerve vibration was due to increased activity of the nerve-centres, i. e., that the resulting phenomena were of a reflex nature.

7. Effect on muscles. Rood[47]) found that vibration caused contraction of muscles; this was also found by Lavalette[16]), but only by Mesnard[15]) whenever very rapid vibrations were used, as stated above. Danilewsky[62])

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[41]) Granville "New Vibration and Excitation as agents in the treatment of Functional Disorders and Organic Disease" 1883, and papers in the Lancet 1880 June 10 1881 Feb. 19, and Brit. Med. Journ. 1882, p. 339, 359; 1883 march 10.

[42]) See Witthauer "Lehrbuch der Vibrationsmassage" 1905, p. 7.

[43]) Berninzone "Influenza della eccitazione meccanica sulla fatica muscolare dell' uomo". Boll. dell' accad. med. di Roma 1897, Vol. XXII, pp. 455—469.

[44]) Nebel "Briefe aus Schweden". Deutsch. med. Woch. 1887, nos 41—44.

[45]) Lenmalm quoted by Wide "Handbok i Medicinsk och Ortopedisk Gymnastik" 1902, p. 246.

[46]) Shtsherbak "Further experimental investigations concerning the physiological action of mechanical vibrations". Obozr. psichiat. 1903, pp. 641, 671, quoted in St. Peters med. Woch. 1904 Lit. Beilage p. 11.

[47]) Rood "On contraction of the muscles induced by Contact with Bodies in Vibration". Amer. Journ. of Sc. and Art. Series II, Vol. XXIX, 1860, p. 449.

found production of warmth in muscle, and Stenberg [48]) found reflex muscular contraction from vibration of the bony substance. Ewer [49]) states that vibrations can sometimes cause contraction in muscles which will not re-act to electrical stimulation.

8. Effect on the lungs. Fleisch v. Marxow's [1]) theory has already been mentioned. Hasebroek [21]) and many others found improved respiration. The effect of every mechanical stimulus to ciliated epithelium is to stimulate the cilia to increased waves of movement, (Kraft [50]), Verworn [51]), Roth [52]). The vibrations in the lungs set up by "hackings" stimulate the lung and facilitate expectoration (Thieme [53]), Friedlander [54]), Erni [55]), Cybulsky [56]).

9. Effect on glands. Colombo [57]) found that with a combination of petrissage, friction and vibration an increase took place both in the solid as well as in the liquid constituents of many of the glands of the body, i. e., those of the liver, stomach, etc

10. Effect on the lymphatics. The anatomical arrangements of the lymphatics in all tendons, fasciae

[48]) Stenberg "Über Sehnenreflexe". Congr. Inn. med. 1890, pp. 428—435.

[49]) Ewer "Kursus der Massage" 1901.

[50]) Kraft "Zur Physiologie des Flimmerepithels". Arch. f. d. ges. Phys. Vol. XLVII, pp. 196—235.

[51]) Verworn "Studien zur Physiologie der Flimmerbewegung". Arch. f. d. ges. Phys. Vol. XLVIII, pp. 149—180.

[52]) Roth "Über einige Beziehungen des Flimmerepithels zum contractilen Protoplasma". Virchow's Archiv, Vol. XXXVII.

[53]) Thieme "Gorbesdorfer Veröffentlichungen aus Dr. Bachmeis Heilanstalt" 1899.

[54]) Friedlander "Ther. der Gegenwart" 1901, No. 2.

[55]) Erni" Die Behandlung der Lungenschwindsucht". ibm.Vol. II, F 75.

[56]) Cybulsky "Beitrag zur Mechanotherapie der Lungenphtise". Ther. der Gegenwart 1903, Heft 9, p. 400.

[57]) Colombo "Action du massage sur la sécrétion des glandes". Compt. rend. Soc. de Biol. 1895, Jan. 19, p. 46.

and aponeuroses is such that the slightest pressure or stretching with subsequent relaxation promotes the onward flow of the lymph (Ludwig and Schweigger-Seidel [58]); therefore vibrations must have the effect of furthering the lymph flow in these parts; they no doubt act in the same wary on the lymphatics of other parts. Centrifugal running vibrations have the opposite effect. See below Ledermann [59]) found that vibration materially hastened the absorption through the skin.

11. Effect on the uterus, etc. Kumpf [60]) found very strong uterine contractions to arise from a vibrator, and a less marked contraction from the use of manual vibrations. Lange also obtained a stimulatory effect with his vibrator; he also induced contractiona in the oesophagus with it.

12. Effect on the nose, throat, etc. A satisfactory explanation of the effects of internal vibration of the mucous membranes of these parts has not yet been worked out, and, according to one great specialist in this line (Laker [61]) is not likely to be worked out at present.

Having given a summary of results from experimental investigation, I will now add a summary of the clinical effects obtainable by the commoner forms of vibrating

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[58]) Ludwig and Schweigger-Seidel "Die Lymphgefässe der Fascien und Sehnen" 1872.

[59]) Ledermann "Über die Verwendung der Vibrationsmassage zur Ausführung von Schmierkuren". Deutsch. med. Woch. 1904, No. 42, p. 1539.

[60]) Kumpf "Über den Einfluss mechanischer Reize auf den Uterus der Frau und einschlägige Thierversuche". Wien. Klin. Wochenschr. 1897, No. 5, p. 115.

[61]) Laker "Die Anwendung der Massage bei den Erkrankungen der Athmungsorgane" 1897, p. 22.

[62] Danilewsky "Thermodyamische Untersuchungen der Muskeln". Med. Centrlbl. (quoted Virchow u. Hirsch's Jahresber. 1880, p. 162).

which I specified earlier in my paper as belonging to the Kellgren method.

I. Effect of stationary vibrations given with fine or medium strength. Such vibrations are commonly used in the more acute forms of illness. On absolutely healthy organs and nerves they have very little effect, in marked contrast to what obtains in pathological conditions.

1. Effect on the heart and blood vessels.

a) Effect on the heart If the heart is weak, its contraction is strengthened; if irregular, it is made more regular; if in a state of palpitation, its action is quieted. In short, the vibration regulates the cardiac action and tends to bring it to the normal. This holds equally good for febrile conditions.

b) Effect on the blood vessels. Inflamed areas become less red and the amount of excessive blood is diminished; the arterial blood vessels contract.

2. Effect on the nerves.

a) Removal of hyper-excitability of nerves,

b) Diminution of any pain if originally present,

c) Removal, either partial or complete, of the signs and symptoms of neuritis or neuralgia (if present) and removal of lymph and venous stasis (if present) in the neighbourhood of the nerve, without, however, causing any paralysis of sensation,

d) Decrease of temperature (sometimes).

The effect on the brain is removal of congestion, and through this removal of headache, a sedative effect and a tendency to sleep. In febrile cases, the amount of fever is reduced (i. e., the temperature falls) and delirium, if present, can be removed.

3. Effect on muscles. Diminution of pain from rheumatism or stiffness after great exertion. The muscle

may in some cases relax and become softer than before (this may be seen in spastic conditions).

4. Effect on the lungs and air passages. Diminution of congestion or inflammation with the pain accompanying it; increase of expectoration and loosening of the mucus. All this will help in causing respiration to become deeper and fuller.

5. Effect in glands. Diminution of secretion if there is to much; decrease in size of enlarged glands. One of the best examples of this can be seen in connection with the thyroid gland of exophthalmic goitre; suction vibrations executed over the gland seem to be the only means that exist of effecting a cure.

6. Effect on the lymphatics. Promotion of the lymphatic flow on account of the anatomical arrangement of the vessels are already stated.

7. Effect on ulcers and wounds. Increased tendency to repair.

8. Effect on effusions such as are found in acute synavitis. Rapid absorption of the effused matter.

9. Effect on bladder, intestine etc. Diminution of irritable conditions that cause too much contraction in these organs. Analgesic for dysmenorrhoea.

10. Effect on the eye. The intraocular tension appears to be diminished in some cases.

From the foregoing it will be seen that in inflammatory conditions of an acute nature (where there is no abscess formation) vibrations can be very beneficial in consequence of diminution of congestion, improvement in the lymphatic flow and diminution of secretion. All this raises the vital activity of the part and thus enables repair to take place better and quicker.

II. Effects of stationary vibrations given with considerable strength so that the intensity and amplitude

of the movement are markedly greater than in the case just discussed. Such vibrations are those commonly used in the more chronic form of disease.

1. Effect on the heart and blood vessels.

a) On the heart. A failing heart can be revived; otherwise, as a general rule, these vibrations should not be given on the heart.

b) On the blood vessels. There is an increase in the quantity of blood in the part. i. e., the arterial blood vessels dilate. This may by preceded by a temporary contraction of these vessels.

2. Effect on the nerves. Sometimes pain can be removed by an energetic vibration when a fine or medium vibration has failed. Otherwise such a vibration is not often employed on nerves.

The effect on the brain is stimulatory, and is, therefore, of use in melancholia and depressed states generally.

3. Effect on the lungs. Same as before, only intensified.

4. Effect on the glands. Increase of secretion, whether this be normal or diminished.

5. Effect on the lymphatics. Increase in the flow, as before.

6. Effect on the ear. In some cases of deafness due to such conditions as thickening of the membrana tympani, improvement can result. Such vibrations help to remove pus from middle ear suppuration, etc.

7. Effect on ulcers and wounds. As before.

8. Effect on effusions. As before.

9. Effect on the bladder, uterus, intestine, etc. Contraction of this organs will result.

III. Effects of running vibrations given energetically.

Such vibrations are almost exclusively given on nerves or veins and lymphatics.

1. Effect on the nerves. Stimulatory. These vibrations are therefore employed directly,

a) To raise the nerve functionability,

b) To induce a sensory effect,

c) To induce a motor effect,

d) To induce a secretory effect,

e) To induce a vasomotor effect,

and indirectly to produce a vast number of reflex effects.

These results appear te be the same whether the vibration is towards the heart or away from it.

2. Effect on the veins. The venous return is hastened, and the vein, if dilated, may be caused to contract.

3. Effect on the lymphatics. Centripetal running vibrations cause increase in the flow and in the absorption by the lymphatics. Centrifugal ones have exactly the opposite effect, and therefore of immense value in the treatment of blood poisoning, i. e., when it is desired to prevent the absorption of the poisinous products; by gradually bringing the latter back to their starting point it is possible to remove them from the body by then expressing them through any opening in the skin, *e. g.*, an ulcer, wound, or other centre of infection.

IV. Effects of running vibrations given with fine or medium strength. These have the same effect as the last group (though much less marked) and would be used over extremely painful areas.

V. Effects of suction vibrations. The latter vibrations are used around abscesses and ulcers and similar conditions to prevent absorption of the products, and in the case of abscesses to enable them to come sooner to a head. After the abscess has opened, the manipu-

lation facilitates the removal of the pus, and hastens the healing process of the ulcer that is left.

I have now brought to your notice what can be effected by one small class of manual methods in treating disease; and in conclusion must point out the necessity of actual practice in them, so as to form a more intimate acquaintance with them than is possible from mere reading or hearing. As in all other branches of science, it is only truth to say "experentia docet". For further details on vibrations see the author's "The Elements of Kellgren's Manual Treatment", 1903.

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