JOHN HARVEY KELLOGG (1352-1943)

LECTURES, SPEECHES, NOTES, AND
ARTICLES, CA. 1890-CA. 1943
(UNDATED BY TOPIC)

EXERCISE

5/ Combined bar & chair vibrations. 20 minutes

613.71

Case I
Gen. Temp { Axilla { B ~~97~~$^{7}$ 98$^{2}$ ; a ~~98~~$^{2}$ 98$^{3}$ } ; Rectum { B ~~98~~$^{7}$ 99$^{7}$ ; a ~~98~~$^{1}$ 100$^{2}$ } }

Pulse { B 70 ; a 65 }

Case II
Gen Temp { Axilla { B 98$^{2}$ ; a 98$^{2}$ } ; Rectum { B 99$^{3}$ ; a 99$^{5}$ } }

Pulse { 48 ; 64 & heart beats very much more powerful

Surface circul$^{n}$ much increased generally.

Case III Gen Temp { Axilla { B 97$^{1}$ ; a 97$^{6}$ } ; Rectum { B 99$^{9}$ ; a 99$^{4}$ } }

Pulse { 76 ; 74

Surface circul$^{n}$ greatly increased generally.

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6/ Vibrating chair – Standing 20 minutes Both feet

Case I
Surf. Temp. { Rt foot { B 95$^{9}$ ; a 96$^{2}$ } ; Left foot { B 96$^{5}$ ; a 96$^{8}$ } }
Gen. Temp. { Axilla { B 97$^{4}$ ; a 97$^{4}$ } ; Rectum { B 98$^{9}$ ; a 99$^{3}$ } }

Pulse { 58 ; 58

Surface circul$^{n}$ locally increased

Case II
Surf. Temp { Rt foot { B 96 ; a 96$^{4}$ } ; Left foot { B 95$^{5}$ ; a 96$^{4}$ } }
Gen Temp { Axilla { B 99$^{6}$ ; a 99$^{6}$ } ; Rectum { B 99$^{8}$ ; a 100 } }

Pulse { B 80 ; a 70

Surface circul$^{n}$ much improved

7/ Vibrating chair. sitting – 20 minutes

Case I Surf. Temp – glutei { B 96$^{6}$ ; a 97$^{4}$ }
Gen Temp { Axilla { B 98$^{4}$ ; a 98 } ; Rectum { B 99$^{4}$ ; a 99$^{3}$ } }

* Pulse { B 58 ; a 80

Surface circul$^{n}$ locally much increased

Case II
Surf Temp – glutei { B 96 ; a 100$^{3}$ }

Gen Temp { Axilla { B 99$^{1}$ ; a 99$^{2}$ } ; Rectum { B 99$^{8}$ ; a 99$^{6}$ } }

Pulse { B 78 ; a 78

Surface circ$^{n}$ much increased

over.

Vibrating chair — Sitting — 20 minutes

Case III

Surface Temp of Glutei $\begin{cases} 96 & \text{Before} \\ 97^2 & \text{After} \end{cases}$

Gen. Temp $\begin{cases} \text{Axilla} \begin{cases} 97^2 & \text{Before} \\ 97^5 & \text{After} \end{cases} \\ \text{Rectum} \begin{cases} 99^8 & \text{Before} \\ 99^3 & \text{After} \end{cases} \end{cases}$

Pulse $\begin{cases} B & 76 \\ a & 76 \end{cases}$

Surface circ^n much increased

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P.S. I shall be glad to explain anything in the above, & regret that I could not finish it

Dr E. Caro

# Experiments

## Mechanical Swedish Movements

### Vibrating Bar. 20 minutes
One hand.

Case I Left hand

Surface Temperature
- Left Hand: 95 4/5 B; 97 5 a; ~~[illegible]~~ Before; ~~[illegible]~~ After
- Right Hand: 95 [illegible] Before; 95 [illegible] After

General Temperature
- Axilla: 97 [illegible] Before; $98^{4}$ After
- Rectum: 99 [illegible] Before; 99 [illegible] After

Pulse: 69 Before; 69 after

Surface Circulation increased

### Vibrating Bar
One hand

Case II Left hand

Surf. Temp
- Left hand: B $98^{1}$; a $98^{3}$
- Right hand: B $97^{0}$; a $97^{4}$

Gen. Temp
- Axilla: B 98; a 98
- Rectum: B $98^{7}$; a $98^{7}$

Pulse: B 54; a 54

Surf. Circulⁿ markedly increased

### Case III
Vibrating bar

Right hand

Surf. Temp
- Right hand: B $98^{3}$; a $98^{5}$
- Left hand: B $98^{3}$; a $97^{9}$

Gen. Temp
- Axilla: B $98^{3}$; a $98^{3}$
- Rectum: B $99^{5}$; a $99^{5}$

Pulse: 70 Before; 70 after

Surf. circulation much ~~increased~~ increased

### Case IV
Vibrating Bar

Right hand

Surf. Temp
- Rt Hand: B $97^{6}$; a $98^{8}$
- Left Hand: B $97^{6}$; a 98

Gen. Temp
- Axilla: B $98^{5}$; a $97^{8}$
- Rectum: B 100; a $99^{2}$

Pulse: B 74; a 64

Surface circulation much increased

3/ Vibrating Bar Trunk 20 minutes

Case I

Surf. Temp - small of back { B 97.2 / a 97.6

Gen Temp { Axilla { 98 Before / 97 After; Rectum { 99.3 Before / 98.8 After

Pulse { B 56 / a 56

Surface circulation locally increased

Case II

Surf Temp - small of back { B 95.8 / a 97

Gen. Temp { Axilla { B 97.8 / a 98.3; Rectum { B 98.8 / a 99.5

Pulse { 54 / 51

Surface circul^n locally much increased

Case III

Surf Temp - small of back { B 97 / a 97.4

Gen. Temp. { Axilla { B 97.8 / a 98.1; Rectum { B 99.2 / a 99.8

Surface circul^n locally increased

4/ Vibrating Bar. Feet. 20 minutes

Case I Left foot

Surf. Temp { Left foot { B 97.3 / a 97.6; Rt. foot { B 97.2 / a 97

Gen. Temp { Axilla { B 98.1 / a 98; Rectum { B 99.8 / a 99.4

Pulse { B 70 / a 90

Surface circul^n much increased

Case II Right foot

Surf Temp { Rt foot { B 95.7 / a 95.8; Left foot { B 95.7 / a 95

Gen. Temp. { Axilla { B 97.4 / a 98.4; Rectum { B 99.7 / a 99.6

Pulse { B 60 / a 66

Surface circulation increased

2/ Vibrating Bar. 20 minutes

Both Hands

Case I

Surf. Temp { Rt. Hand { B 99.2, a 99.4 } Left Hand { B 99.4, a 99.6 } }

Gen. Temp. { Axilla { B 98.7, a 98.9 } Rectum { B 100, a 100.2 } }

Pulse Rate { B 84, a 86 }

Surf. Circ.n Much increased

Both Hands.

Case II

Surf. Temp { Rt Hand { 95.7 Before, 96 after } Left Hand { 95.3 Before, 95.5 After } }

Gen. Temp { Axilla { B 98.8, a 98.7 } Rectum { B 98.9, a 99.4 } }

Pulse { B 58, a 58 }

Surface Circul.n greatly increased

Both Hands

Case III

Surf. Temp { Rt Hand { B 95.2, a 97.7 } Left Hand { B 95.4, a 97.9 } }

Gen. Temp { Axilla { B 97.4, a 97.2 } Rectum { B 99.7, a 99.8 } }

Pulse { 68, 68 }

Surface circulation very much increased

Both Hands

Case IV

Surf. Temp { Rt Hand { B 97.8, a 98.4 } Left Hand { B 96.1, a 98 } }

Gen. Temp { Axilla { B 98.2, a 98.6 } Rectum { B 99.5, a 99.6 } }

Pulse { 70, 70 }

Surface circulation much increased

613.71



Jump.

1. Free jump in place.

2. Jump forward and backward.

3. Jump, turning to 90° right and left.

4. Sideways jump.

5. Jump, turning to 180°.

6. Jump with one to three start steps.

7. Side jump, with one to three start steps.

8. Jump from (B) walk position, changing feet.

9. Jump from (A) walk position, turning right and left.

10. Jump with arms and legs sideways flinging.

# Slow Leg Movements.

1. Wing stride standing, knee bending.
2. Rest stride standing, knee bending.
3. Rest stride standing, heel raising.
4. Stretch standing, knee bending.
5. Stretch stride standing, knee bending.
6. Stretch standing, heel raising.
7. Wing walk (B), standing, heel raising.
8. Rest walk (B), standing, heel raising.
9. Stretch (B) standing, heel raising.
10. Rest forward fall out, standing, heel raising.
11. Stretch standing, heel raising, knee bending.

Leg Movements.

1. Wing standing, closing and opening feet.--Feet placing sideways.

2. Wing standing, foot placing in series.

3. Wing standing, toe raising, alternating .

4. Wing standing, forward and backward, fall out, forward outward and backward outward fall out.

5. Wing toe standing, knee bending. Wing stride toe standing, knee bending.

6. Wing standing, prepare to jump, knee bending.

7. Foot placing, ~~knee bending~~ heel raising in series.

8. Wing, forward outward fall out, stand, heel raising.

9. Rest, forward and backward fall out, ~~stand, heel raising~~, changing feet

10. Wing, foot placing, prepare to jump in series.

# Marching .

1. Common march .

2. Military march, thumbs out.

3. Backward march.

4. Sideways march.

5. Marching on toes.

6. Backward marching on toes.

7. Sideways marching on toes.

8. Double step, left (right) foot in advance .

9. Double step, changing feet.

10. Double step, changing feet, one-half cross (C), changing arms.

11. Double step, change feet, one-half reach, one-half stretch, changing arms.

12. Double side-step in(B) walk position.

13. Double side-step, changing feet.

14. Hop in (B) walk position.

15. Hop, changing feet.

16. Side hop.

17. Side hop, changing feet.

18. Double step and hop, changing feet.

19. Double side-step and hop, changing feet.

20. Long step.

21. Short step.

22. Swedish walk.

23. Balance step.

24. Spring step.

25. Walking on line

26. Prussian military walk drill.

27. Common walk.

No. 2.

1. Order Exercises, breathing, bend, wing and trunk stand, marking time.

2. Wing standing, foot placing in series.

3. Wing, stride stand, head alternate, side flexion, head rotation.

4. Rest stand, heel raising.

5. Wing, stride stand, forward bend trunk.

6. Wing, stride stand, heel raising.

7. Wing, stride stand, side bend.

8. Marching forward, ~~and~~ backward, sideways, and the same on toes.

9. ~~Half~~ ½ stretch stand, change arms.

10. Wing, stride stand, back bend trunk.

11. Stretch, prone, stride stand, arms sink to cross (D).

12. Cross (C), side twist.

13 a) 13. Jump forward and backward.

383) 14. Rest, stride standing, knee bending.

15. Arm raising, cross (a) arms sideways fling.

No. 3.

1. Order Exercises – Wing, trunk and rest stand, rear knee breathing. turn-facings.

2. Wing standing, toe raising, alternating.

3. Wing, stride stand, head twist and bend.

4. Arm extension, downward, forward, sideways, upward.

5. Wing, stride, prone stand, head rotate.

6. Wing, ~~[illegible]~~ ½ stand, leg forward and backward raise.

7. Wing, close stand, side twist.

8. Marching – facing – on toes – double step. Left (right) foot in advance.

9. Half stretch, half cross (C), stand, change arms.

10. Rest, stand, back bend trunk.

11. Reach, prone stride stand, arms sideways fling.

12. Rest stride stand, side bend.

13 a

13. Jump, turning to 90" right and left.

14. Stretch standing, knee bending.

4 S B

15. Arm raising – Cross (d) arms upward raising, Full breathing.

No. 4.

1. Order exercises — marking time - facings - breathing fall out

2. Wing standing, forward and backward, fall out forward outward and backward outward, fall out

3. Wing stand, trunk backward bend.

4. Cross (A), arm flinginf sideways.

5. Wing stride, prone stand, head rotate.

6. Wing, toe stand, knee bending.

7. Wing, close stand, side twist.

8. Marching - toe - marching - double step changing feet.

9. Half stretch, half reach, change arms.

10. Rest, stride stand, back bend trunk.

11. Reach, prone, ~~stand~~ side stand, arms sideways fling.

12. Wing, walk (B), stand, side bend.

13 a)

13. Sideways jump.

14. Stretch, stride standing, knee bending.

5 5 13)

15. Arms raising - arms circumduct - Cross (C) walk (b) stand, arms upward fling - changing feet.

No. 5

1. Order Exercises, Marking time, facing, breathing.

2. Wing, toe standing, ikree bending--wing stride, toe standing, knee bending.

3. Wing, stride stand, trunk backward bend.

4. Arm flinging, sideways, upward, and forward upward.

5. Prone stand, arms sideways raise, cross (D).

6. Wing, ½ stand, knee upward raise.

7. Wing, stride stand, side twist.

8. Marching ~~Double step~~ changing feet ½ cross (c) changing arms, ½ reach, ½ stretch, " "

9. Cross (C), stoop stride stand, head twist.

10. Rest, walk (B), stand, back bend trunk.

11. Cross (E), prone stride stand, arms upward stretch.

12. Wing, walk (A), stand, side bend.

13a) 13. Jump, ~~with one to three start steps.~~ turning to 180".

6 S 13) 14. ~~Wing, walk (B~~ Stretch standing, heel raising.

arm raising 15. Cross (c) walk (b) stand, arms upward fling, changing feet - arms circumduct.

No. 6.

—Facings.—

1. Order Exercises, Breathing Ex. 1–4, 6, 7.

2. Wing-standing, prepare to jump ~~knee bending~~. 9

3. Rest stand, trunk backward bend. ing

4. ½-Cross (C), stand, change arms. ing

5. Prone stand, arms sideways raise to cross (D). ing

6. Rest ½-stand, knee upward raise, foot flexing. ing

7. Wing, stride stand, side twist ~~ing~~

8. Marching. Ex. 5, 7, 8, 10, 12, 13, 20–22, 26, 27

9. Bend-Stand, Alternate to rest-stand.

10. Stretch-stand, ~~back bend~~ trunk. backward bending ing

11. Cross (E) prone stride stand, arms alternate, upward stretch.

HH 136 > 12. Rest close stand, side bend. ing

ing 13. Jump, with one to three start steps.

.75B > 14. Wing walk (B) standing, heel raising.

15. Breathing Ex. 2, 5, 3, 6 – 10

No. 7.

1. Order Exercises, Breathing Ex. 1-4, 6-8.
2. Foot placing, heel raising in series.
3. Rest-stride-stand, trunk backward bending
4. Arm extension backward, and from Cross (E) upward.
5. Prone-stride-stand, arm~~s~~ bending to cross (E).
6. Cross (C)-stand, leg sideways raise and backward raise.
7. ½ Wing-½ rest-stand, side bend, change arms.
8. Marching. Ex. 5 (neck firm), 7-14, 20-24, 26, 27
9. Cross (B)-stand, rotate to cross (E).
10. Stretch-stride-stand, ~~back bend~~ trunk, backward bending
11. Bend-prone-stride-stand, arms upward stretch.
12. Wing-walk (A)-stand, twist, side bend.
13. Side jumping with one to three start steps.
14. Rest-walk (B)-standi~~ng~~, heel raising.
15. Breathing Ex. 5, 2, 3, 8-14

13 b

8 5 13

No. 8.

1. Order Exercises, Breathing Ex. 1-4, 6-10

2. Wing, forward, outward-fall out, stand, heel raising.

3. Stretch, stride-stand, trunk backward bending

4. Swimming.

5. / Prone, stride stand, arms bending to cross (E).

6. Rest, stand, leg forward and backward raising ~~xxxxx,x xtxxx xkxx~~

7. ½ Wing, ½ rest, stand, side bending, change arms.

8. Marching Ex. 5 (neck firm), 8-15, 18, 21-23, 26

9. ~~Swimming movement.~~
Cross (A), stand, arms sideways fling.

10. ~~Rest, lean, stand, back bend trunk.~~
Stretch, Walk (B), standing, backward bending trunk.

11. Bend, prone, stride stand, arms upward stretch.

13 b 12. Stretch, stand, side bending

14 ~~13.~~ Jump, from (B) walk position, changing feet.

15 ~~14.~~ Stretch (B) standing, heel raising.

9 SB 15. Breathing Ex. 5, 2, 3, 12-16.

No. 9.

1. Order Exercises.— Breathing Ex. 1-4. 8 - 12

2. Rest stand forward and backward fall out, changing feet.

3. Bend-bow-stand.

4. ½ ~~upward~~ stretch stand. ~~½ backard~~ one arm backward raise, change arms, alternating, with forward bend position.

5. Cross (B) prone stride stand, arms rotate to cross(E).

6. ~~Raise,~~ Stretch-stand, leg sideways ~~stretch~~ raise.

7. Rest stand, side bending

8. Marching. Ex. 7 (neck firm), 10-19, 21-24, 26.27

9. Swimming.

10. Rest lean stand, ~~back bend~~ trunk backward bending

11. Reach prone stride stand, arms sideways flinging, turning hands.

13 6) 12. Close-walk(c) stand, side twist and bend.

14 ~~13.~~ Jumping from (A) walk position, turning to right and left.

10 Sm) 15 ~~14.~~ Rest forward-fall-out-standing, heel raising.

17 ~~15.~~ Breathing Ex. ~~5~~, 2, 3, 16-20

No. 10

1. Order Exercises, - Breathing Ex. 1-4, 10-16

2. Wing, stand, foot placing, prepare to jump in series.

3. Bend, stride, bow-stand, arms upward stretch.

4. ½ Reach, ½ upward stretch -stand, alternating with cross (C).

5. Reach, prone, ~~stride,~~ stand, arms upward flinging

6. Rest, stand, knee upward raise, alternating slowly.

7. Cross (C), close-stand, side bending

8. Marching. Ex. 5 (neck firm), 10, 11, 17-19, 21-24, 26, 27

9. Reach-stand, arms parting with resistance.

10. Stretch, stride, bow-stand, ~~back bend~~ backward bending trunk, arms sinking.

11. Stretch, prone, stride-stand, arms bend to cross (E).

136 12. Stretch, stride-stand, side twisting and bending.

4 13. Jumping with arms and legs sideways flinging.

5 14. Stretch standing, heel raising, knee bending.

16. ~~Swimming.~~ Toe-standing, swimming.

7 15. Breathing. Ex. 5, 2, 3, 12-20

Add to breathing Ex
same to excite thirst
in air
Jumping running
skipping etc

Arm Exercises.

1. Arm raising sideways; 1 to horizontal; 2 to stretch; Forward: 1 to horizontak; 2 to stretch: backward.

2. Arm flinging sideways, 1, 2; forward, 1, 2; from before backward; frem chest Cross A outward; from above shoulder outward.

3. Arm thrusting, singly, alternating, together:. from shoulder, 1 down; 2 out; 3 forward; 4 upward; 5 outward and forward, forward bend standing; 6 forward, in forward bend standing, trunk twisting. (Perhaps better omit last two movements from the arm series.)

4. Arm raising and bending, 8 positions: 1 . Arm at sides; 2. Arms half-flexed, hands opening outward; 3. Arms sideways stretch; 4. Arms sideways half bend, upward, cross D; 5. Arms upward stretch; 6. Arms half upward bend, forward reach; 7. Arms forward reach; 8. Elbows at sides, arms half bend.

5. Hand closing and opening in eight positions.

6. Wrist flexion and extension in eight positions.

7. Forearm rotarion, in eight positions.

8. Hands circumduction in eight positions.

9. Arm rotation in four positions: 1. Sides; 2 Extended at sides; 3. Upward stretch; 4. Forward reach.

10. Arms circumduction, large circle.

11. Swimming, 3--4 time.

12. Opposition arm exercise, 3--4 time.

13. Alternate swinging: 1. Forward, down; 2. Cross front of body; 3. Chest outward; 4. Striking by under arm.

19. Reach standing; breathing; arms upward moving; 2 to 6.

20. Reach standing; breathing; arms upward flinging; 1 to 7.

21. Cross C; standing, breathing; 2 to 6.

22. Cross A; breathing; arms sideways moving; 2 to 6.

23. Cross A; breathing; arms sideways flinging; 2 to 6.

24. Cross D; arms half flexing; breathing; 2--2.

Fundamental Breathing Movements.

1. Ordinary breathing; waist expansion.

2. Full breathing; slow inspiration and expiration, 4--4.

3, Full breathing, expiration in puffs, 2--6 and 1--7 .

4. Full breathing; prolonged expiration sounding the syllable "ah," 1--7.

5. Full breathing; prolonged expiration, sounding syllable "ah;" head rotation.

6. Full breathing; prolonged expiration uttering syllable "ah," explosively.

7. Full breathing; exhalation with scale exercise with syllables "ah," and "ha."

Lifting viscera

Exercises in Ordinary Standing Position.

1. Standing; head forward and backward bending.

2. Standing; arms backward raising.

3. Standing; arm raising sideways.

4. Standing; arms sideways flinging.

5. Standing; arms upward, sideways raising.

6. Standing; arms upward , sideways flinging.

7. Standing; arms circumduction.

Standing; arms forward raising.

9. Standing; arms forward, upward raising.

10. Standing; arms forward flinging.

11. Standing; arms forward, upward flinging.

No 2.

1. Stride standing; head forward and backward bending.

2. Stride-standing; arms backward raising.

3. Stride-standing; arms sideways raising.

4. Stride-standing; arms sideways flinging.

5. Stride-standing; arms upward-sideways raising.

6. Stride-standing; arms upward-sideways flinging.

7. Stride-standing,; arms circumduction.

8. Stride-standing; arms forward raising.

9. Stride-standing; arms forward-upward raising.

10. Stride-standing; armd forward flinging.

11. Stride-standing; arms forward-upward flinging.

No. 3.

1. Close-standing; head forward and backward bending.
2. Close-standing; arms backward raising.
3. Close-standing; arms sideways raising.
4. Close-standing; arms sideways flinging.
5. Close-standing; arms upward-sideways raising.
6. Close-standing; arms upward-sideways flinging.
7. Close-standing; arms circumduction.
8. Close-standing; arms forward raising.
9. Close-standing; arms forward-upward raising.
10. Close-standing; arms forward flinging.
11. Close-standing; arms forward-upward flinging.

No. 4.

1. A walk-standing; head forward and backward bending.

2. A walk-standing; arms backward raising.

3. A walk-standing; arms sideways raising.

4. A walk-standing; arms sideways flinging.

5. A wlak-standing; arms upward-sideways raising.

6. A walk-standing; arms upward-sideways flinging.

7. A walk-standing; arms circumduction.

8. A walk-standing; arms forward raising.

9. A walk-standing; arms forward-upward raising.

10. A walk-standing; arms forward flinging.

11. A walk-standing; arms forward-upward flinging.

No 5.

1. Forward-fall-out-standing; head forward and backward bending.

2. Forward-fall-out-standing; arms backward raising.

3. Forward-fall-out-standing; arms sideways raising.

4. Forward-fall-out-standing; arms sideways flinging.

5. Forward-fall-out-standing; arms upward-sideways raising.

6. Forward-fall-out-standing; arms upward-sideways flinging.

7. Forward-fall-out-standing; arms circumduction.

8. Forward-fall-out-standing; arms forward raising.

9. Forward-fall-out-standing;arms forward-upward raising.

10. Forward-fall-out-standing; arms forward flinging.

11 Forward-fall-out-standing; arms forward-upward flinging.

No. 6.

1. Toe-standing; head forward and backward bending.

2. Toe-standing; arms backward raising.

3. Toe-standing; arms sideways raising.

4. Toe-standing; arms sudeways flinging.

5. Toe-standing; arms upward-sideways raising.

6. Toe-standing; arms upward-sideways flinging.

7. Toe-standing; arms circumduction.

8. Toe-standing; arms forward raising.

9. Toe-standing; arms forward-upward raising.

10. Toe-standing; arms forward flinging.

11. Toe-standing; arms forward-upward flinging.

No. 7.

1. Standing; head forward and backward bending; feet closing.

2. Standing; arms backward raising; feet closing.

3. Standing; arms sideways raising; feet closing.

4. Standing; arms sideways flinging; feet closing.

5. Standing; arms upward-sideways raising; feet closing.

6. Standing; arms upward-sideways flinging, feet closing.

7. Standing; arms circumduction; feet closing.

8. Standing; arms forward raising; feet closing.

9. Standing; arms forward-ipward raising, feet closing.

10. Standing; arms forward flinging; feet closing.

11. Standing; arms forward-upward flinging; feet closing.

No. 8.

1. Standing; head forward and backward bending; heels raising.

2. Standing; arms backward raising; heels raising.

3. Standing; arms sideways raising; heels raising.

4. Standing; arms sideways flinging; heels raising.

5. Standing; arms upward-sideways raising, heels raising.

6. Standing; arms upward-sideways flinging; heels raising.

7. Standing; arms circumduction; heels raising.

8. Standing; arms forward raising; heels raising.

9. Standing; arms upward-forward raising; heels raising.

10. Standing; arms forward flinging; heels raising.

11 Standing; arms forward-upward flinging; heels raising.

No. 9.

1. Stride-standing; head forward and backward bending; heels raising.

2. Stride-standing; arms backward raising; heels raising.

3. Stride-standing; arms sideways raising; heels raising.

4. Stride-standing; arms sideways flinging; heels raising.

5. Stride-standing; arms upwards-sideways raising; heels raising.

6. Stride-standing; arms upward-sideways flinging, heels raising.

7. Stride-standing; arms circumduction; heels raising.

8. Stride-standing; arms forward raising; heels raising.

9. Stride-standing; arms forward-upw rd raising; heels raising.

10. Stride-standing; arms forward flinging; heels raising.

11. Stride-standing; arms forward-upward flinging; heels raising.

No. 10.

1. A walk standing; head forward and backward bending; heels raising.

2. A walk-standing; arms backward raising; heels raising.

3. A walk-standing; arms sideways raising; heels raising.

4. A walk-standing; arms sideways flinging; heels raising.

5. A walk-standing; arms upward sideways raising; heels raising.

6. A walk-standing; arms upeard-sideways flinging, heels raising.

7. A walk-standing; arms circumduction; heels raising.

8. A walk -standing; arms forward raising; heels raising.

9. A walk-standing; arms forward-upward raiaing; heels raising.

10. A walk-standing; arms forward flinging; heels raising.

11. A walk-standing; arms forward-upward flinging; heels raising.

No. 11.

1. B forward-fall-out; head forward and backward bending; heels raising.

2. B forward-fall-out; arms backward raising; heels raising.

3. B forward- fall-out; arms sideways raising; heels raising.

4. B forward-fall-out; arms sideways flinging; heels raising.

5. B forward-fall-out; arms upward-sideways raising; heels raising.

6. B forward-fall-out; arms upward-sideways flinging; heels raising.

7. B forward-fall-out; arms circumduction; heels raising.

8. B forward-fall-out; arms forward raising; heels raising.

9. B forward-fall-out; arms forward-upward raising; heels raising.

10. B forward-fall-out; arms forward flinging; heels raising.

11. B forward-fall-out; arms forward-upward flinging; heels raising.

No. 12.

1. Standing; head forward and backward bending; heels raising; knee bending.

2. Standing; arms backward raising; heels raising; knee bending.

3. Standing; arms sideways raising; heel raising; knee bending.

4. Standing; arms sideways flinging; heel raising; knee bending.

5. Standing; arms upward-sideways raising; heel raising; knee bending.

6. Syanding; arms upward-sideways flinging; heel raising; knee bending.

7. Standing; arms circumduction; heel raising; knee bending.

8. Standing; arms forward raising; heel raising; knee bending.

9. Standing; arms forward-upward raising; heel raising; knee bending.

10. Standing; arms forward-upward raising; heel raising, knee bending.

11. Standing; arms forward upward flinging; heel raising; knee bending.

No. 13.

1. Stride-standing; head forward and backward bending; heel raising; knee bending.

2. Stride-standing; arms backward raising; heel raising; knee bending.

3. Stride-standing; arms sideways raising, heel raising; knee bending.

4. Stride-standing; arms sideways flinging; heel raising; knee bending.

5. Stride-standing; arms upward-sideways raising; heel raising, knee bending.

6. Stride-standing; arms upward-sideways flinging; heel raising; knee bending.

7. Stride-standing; arms circumduction; heel raising; knee bending.

8. Stride-standing; arms forward raising; heel raising; knee bending.

9. Stride-standing; arms forward-upward raising; heel raising; knee bending.

10. Stride-standing; arms forward flinging; heel raising; knee bending.

11. Stride-standing; arms forward-upward flinging; heel raising; knee bending.

1. A walk-standing; head forward and backward bending; heel raising; knee bending.

2. A walk-standing; arms backward raising; heel raising; knee bending.

3. A walk-standing; arms sideways raising; heel raising; knee bending.

4. A walk-standing; arms sideways flinging; heel raising; knee bending.

5. A walk-standing; arms upward-sideways raising, heel raising, knee bending.

6. A walk-standing; arms upward-sideways flinging; heel raising; knee bending.

7. A walk-standing; arms circumduction; heel raising; knee bending.

8. A walk-standing; arms forward raising; heel raising; knee bending.

9. A walk-standing; arms forward-upward raising; heel raising; knee bending.

10. A walk-standing; arms forward flinging; heels raising; knee bending.

11. A walk-standing; armd forward-upward flinging; heel raising; knee bending.

1. Yard standing; arms upward raising.

2. Yard standing; arms upward flinging.

3. Reach standing; arms backward moving.

4. Reach standing; arms backward flinging.

Reach standing; arms upward moving.

6. Reach Standing; arms upward flinging.

7. Yard standing; breathing.

8. Yard standing; arms circumduction.

9. Cross A; arms sideways moving.

10. Cross A; arm sideways flinging.

11. Cross D., arms half flexing.

12. Air pumping.

13. Standing; swimming.

Combine with the preceeding, heels raising.

Also combine Heels raising and knee bending.

Also combine Heel raising, and heel raising and knee bending with stride standing.

Also combine the above with A walk, heel raising, and also with heel raising and knee bending.

Combine also with the forward fall out.

Also combine with the forward fall out.

Also combine with forward fall out and heels and toes--------

Combine breathing with arm movements, with toe standing, also with toe stride standing.

Also combine the arm, breathing movements with feet closing and opening.

Forward fall-out, heels raising &c.
walking &c. with breathings
Assisted breathing.
Also leg movements
Vocal Exercises

Hips firm standing
Forward bend standing

Breathing Exercises.

1. Ordinary breathing; waist expansion---4.

2. Full breathing--slow inspiration and expiration--4--4.

3. Full inspiration, expiration in puffs; 2--6.

4. Full breathing, exhalation in puffs; 1--7.

5. Full breathing, slow exhalation sounding syllable "ah."

6. Full breathing, slow exhalation, sounding syllable "ah," head rotating.

7. Full inspiration; slow expiration, sounding syllable "ah," slow head rotation; 2 to 6.

8. Full inspiration, uttering "ah" explosively, four times to the measure; time 2 to 6.

9. Breathing; head forward and backward bending--back, inspiration; forward expiration; 1 to 7.

10. Breathing; heel raising; 2 to 6.

11. Breathing; feet opening and closing; 4---4; feet movements two each measure.

12. Breathing; arm raising sideways.

13. Breathing; arms sideways flinging; 1 to 7.

14. Breathing ; arm upward sideways raising; time 4--4 and 2 to 6.

15. Breathing; arm upward sideways flinging; 1 to 7.

16. Breathing; arms circumduction; 4--4.

17. Cross D; breathing; arms upward raising; 2 to 6.

18. Cross D; breathing; arms upward flinging; 1 to 7.

613.71

1-12

For Single Lateral Curvature to the Right,

(Right shoulder higher than Left)

1. Arms alternately upward and sideways stretch, with forward bend intermediate. Repeat three to fifteen times.

2. Neck firm, bend to right; pressure on most prominent part of curve. Repeat three to twenty times.

3. Arms upward stretch, knees bend, knees stretch. Repeat three to eight times.

4. Lying on ~~left~~ side, bend to right; one to six times.

5. Arm circumduction, four to twenty-five times.

6. Neck firm, foot raising in alternation, six to twenty-four times.

7. Forward lean, forward bend, arms upward stretch, one to six times.

8. Lying on left side, bend to right.

9. Hanging by hands, bend head backwards two to eight times.

10. Neck firm, bend to right with pressure on curve.

11. Forward bend, arms sideways stretch, palms up, arms half bend, forward stretch, half bend, upward stretch; repeat one to four times.

12. Neck firm, deep knee bending; breathing.

For Single Lateral Curvature to the Left.

(Right Shoulder lower than Left).

I. Arms alternately upward and sideways stretch, with forward bend intermediate. Repeat three to fifteen times.

2. Neck firm, bend to left; pressure on most prominent part of curve. Repeat three to twenty times.

3. Arms upward stretch, knees bend, knees stretch. Repeat three to eight times.

4. Lying on right side, bend to left: one to six times.

5. Arm circumduction, four to twenty-five times.

6. Neck firm, foot raising in alternation, six to twenty-four times.

7. Forward lean, forward bend, arms upward stretch one to six times.

8. Lying on right side, bend to left.

9. Hanging by hands, bend head backwards two to eight times.

IO. Neck firm, bend to left with pressure on curve.

II. Forward bend, arms sideways stretch, palms up, arms half bend, forward stretch, half bend, upward stretch; repeat one to four times.

I2. Neck firm, deep knee bending; breathing.

-:-:-:-

Single Curvature to Right, with Rotation Spinous

Process Vertebrae Directed to the left.

1. Arms upward and sideways stretch, forward bend intermediate.

2. The patient sitting, neck rest~~ing~~, feet sideways place, trunk forward bend to 45", raises trunk with resistance and pressure on prominence of curve. Repeat three to fifteen times.

3. Arm circumduction, four to twenty-four times.

4. Neck firm, bend to right with pressure on curve, three to twenty-four times.

5. Forward lean, forward bend, arms sideways raise and upward stretch, three to fifteen times.

6. The patient sitting, neck rest~~ing~~, feet sideways placed, trunk forward bend to 45", raises trunk with resistance and pressure on prominence of curve. Repeat four to twenty-four times.

7. Neck firm, on left side lying, bend to right with pressure, one to six times.

8. Feet sideways place, swimming movements with arms, three to twenty-four times.

9. Hanging, backward bending of head, two to eight times.

10. The patient sitting, neck rest~~ing~~, feet sideways placed, trunk forward bend to 45", raises trumk with resistance and pressure on prominence of curve. Repeat four to twenty-four times.

11. Arms upward stretch, deep knee bending, two to eight times.

12. Arm circumduction, four to twenty-four times.

Single Curvature to Left, with Rotation,

Spinous Processes of Vertebrae, Directed to the ~~Left~~. Right

I. Arms upward and sideways stretch, forward bend intermediate

2. The patient sitting, neck rest. Feet sideways place, trunk forward bend to 45", raise trunk with resistance and pressure on prominent part of curve. Repeat three to fifteen times.

3. Arm circumduction, four to twenty-four times.

4. Neck firm, bend to left with pressure on curve, three to twenty-four times.

5. Forward, lean, forward bend, arms sideways raise and upward stretch, three to fifteen times.

6. The patient sitting, neck rest. Feet sideways placed, trunk forward bend to 45", raises trunk with resistance and pressure on prominence of curve. Repeat ~~four~~ three to ~~twenty-four~~ fifteen times.

7. Neck firm, on right side lying, bend to left with pressure, one to six times.

8. Feet sideways place, swimming movements with arms, three to twenty-four times.

9. Hanging, backward bending of head, two to eight times.

10. The patient sitting neck rest. Feet sideways placed, trunk forward bend to 45", raises trunk with resistance and pressure on prominence of curve. Repeat four to twenty-four times.

II. Arms upward stretch, deep knee bending, two to eight times.

12. Arms circumduction, four to twenty-four times.

## Single Curve to Right, with Rotation

## ~~Left~~ Scapula Lowered.

1. Arms alternate upward stretch and backward raise, changing with forward bend, arms sideways stretch; repeat three to fifteen times.

2. Patient sitting, with left arm upward stretch, right hip firm, feet sideways placed and body bent forward to 45", raises trunk while an assistant resists, pressing upon the curve. Repeat two to eight times.

3. Left arm upward stretch, bend to right, assistant resisting, two to twenty times.

4. Patient sitting, feet sideways placed, stretches left arm upward, assistant pressing against curve, two to fifteen times.

5. Feet sideways place, swimming movements with arms, three to twenty-four times.

6. Hips firm, left foot forward place, twist to left, bend to right, assistant resisting, one to six times.

7. Neck firm, foot raising.

8. Forward lean, trunk forward bend, arms sideways raise, upward stretch; repeat three to fifteen times.

9. Patient lying on left side, left arm upward stretch, right hip firm, bend to right. Repeat one to six times.

10. Patient sitting, feet sideways placed, trunk forward bend left arm upward stretched, raises trunk, assistant pressing against curve, one to twelve times.

11. Hanging by hands, bend the head forward, assistant resisting, one to six times.

12. Forward lean, trunk forward bend, arms sideways raise, palms turned upward, arms half bend, upwards stretch; repeat three to twelve times.

Single Curve to ~~Right~~ Left with Rotation, Right Scapula Lowered.

I. Arms alternate upward stretch and backward raise, changing with forward bend, arms sideways stretch; repeat three to fifteen times.

2. Patient sitting, with right arm upward stretch, left hip firm feet sideways placed and body bent forward to 45", raises trunk while an assistant resists, pressing upon the curve. Repeat two to eight times.

3. Right arm upward stretch, bend to left, assistant resisting, two to twenty times.

4. Patient sitting, feet sideways placed, stretches ~~left~~ right arm upward, assistant pressing against curve , two to fifteen times.

5. Feet sideways place, swimming movements with arms, three to twenty-four times.

6. Hips firm, right foot forward place, twist to right, bend to left, assistant resisting, one to six times.

7. Neck firm, foot-raising.

8. Forward lean, trunk forward bend, arms sideways raise, upward stretch; repeat three to fifteen times.

9. Patient lying on right side, right arm upward stretch, left hip firm, bend to left. Repeat one to six times.

10. Patient sitting, feet sideways placed, trunk forward bend, left arm upward stretched, raises trunk, assistant pressing against curve, one to twelve times.

11. Hanging by hands, bend the head forward, assistant resisting one to six times.

12. Forward lean, trunk forward bend, arms sideways raise, palms turned upward, arms half bend, upwards stretch; repeat three to twelve times.

Single Curvature to Right, Lowering of Left Scapula,

Elevation of Left Hip.

1. Forward lean, trunk forward bend, arms upward and sideways stretch, alternating with forward bend two to fifteen times.

2. Hanging by hands, separation of legs, with resistance, one to twelve times.

3. Circumduction of arms, three to twenty-four times.

4. Patient lying on left side, left arm upward stretch, raise right hip four to twenty-four times.

5. Arm raising; breathing.

6. Patient sitting, with feet sideways placed, trunk forward bend, xxxxxxxxxxxxxxxxxxxxxxxxxxx left arm upward stretch two to six times, assistant pressing against curve.

7. Forward lean, trunk forward bend, arms sideways raising and upward stretching, two to twelve times.

8. Patient lying on left side, left arm upward stretch, bend to right four to six times.

9. Feet sideways place, swimming movements with arms.

10. Lying on left side, left arm upward stretch, raise right hip four to twenty times.

11. Left arm upward stretch, bend to right, assistant pressing against curve.

12. Left arm upward stretch, right arm, hip firm, feet sideways place, sitting, trunk forward bend, raise trunk, assistant resisting with pressure on curve, one to six times.

13. Hanging, separation of legs with resistance.

14. Arm raising, heel raising, knee bending; breathing.

## Single Curvature to Left, Lowering of right Scalpula,

## Elevation of Right Hip.

I. Forward lean, trunk forward bend, arms upward and sideways stretch, alternating with forward bend two to fifteen times.

2. Hanging by hands, separation of legs with resistance, one to twelve times.

3. Circumduction of arms, three to twenty four times.

4. Patient lying on right side, right arm upward stretch, raa raise left hip four to twenty-four times.

5. Arm raising; breathing.

6. Patient sitting with feet sideways placed, trunk forward bend, right arm upward stretch two to six times, assistant pressing against curve.

7. Forward lean, trunk forward bend, arms sideways raising and upward stretching, two to twelve times.

8. Patient lying on right side, right arm upward stretch, bend x to left four to six times.

9. Feet sideways place, swimming movements with arms.

10. Lying on right side, right arm upward stretch, ~~bend to left four to six times.~~ raise left hip four to twenty times.

II. Right arm upward stretch, bend to left, assistant pressing against curve.

12. Right arm upward stretch, left arm, hip firm, feet sideways place, sitting trunk forward bend, raise trunk, assistant resisting with pressure on curve, one to six times.

13. Hanging, separation of legs with resistance.

14. Arms raising, heels raisi ng, knee bending; breathing.

Double Lateral Curvature (Dorsal to Right, Lumbar to Left)

With Rotation; Lowering of Left Scapula.

1. Forward lean, trunk forward bend, arms upward and sideways stretch, two to twelve times.

2. Hanging, neck backward bend, assistant resisting, two to twelve times.

3. Patient sitting, left arm upward stretch, feet sideways placed, trunk forward bend, raises trunk, assistant resisting, two to twelve times.

4. Forward lean, trunk forward bend, arms sideways and upward raise, two to twelve times.

5. Hanging, separation of legs, with resistance, one to ten times.

6. Feet sideways place, swimming movements with arms.

7. Forward lean, trunk forward bend, left arm upward stretch, raise trunk, assistant resisting.

8. Hanging, neck backward bend, assistant resisting, two to twelve times.

9. Lying on right side, left arm upward stretched, two assistants grasping the patient by the wrist and ankles. and stretching

10. Patint sitting, left arm upward stretch, feet sideways placed, trunk forward bend, raises trunk, assistant resisting, two to twelve times.

11. Hanging, separation of legs, with resistance, one to ten times.

12. Forward lean, trunk forward bend, left arm upward stretch, right arm backward raise.

13. Neck firm, deep knee bending; breathing.

14. Feet sideways place, arms sideways stretch, palms upward, arm raising; breathing.

## Double Lateral Curvature (Dorsal to Left, Lumbar to Right) With Rotation; Lowering of ~~Left~~ right Scapula.

1. Forward lean, trunk forward bend, arms upward and sideways stretch, two to twelve times.

2. Hanging, neck backward bend, assistant resisting two to twelve times.

4. Forward lean, trunk forward bend, arms sideways and upward raise, two to twelve times.

3. Patient sitting, right arm upward stretch, feet sideways placed, trunk forward bend, raises trunk, assistant resisting, two to twelve times.

5. Hanging, separation of legs with resistance, one to ten times.

6. Feet sideways placed, swimming movements with arms.

7. Forward lean, trunk forward bend, right arm upward stretch raise trunk, assistant resisting.

8. Hanging, neck backward bend, assistant resisting two to twelve times.

9. Lying on left side, right arm upward stretched, two assistants grasping the patient by the wrist and ankles and stretching.

10. Patient sitting, right arm upward stretch, feet sideways placed, trunk forward bend, raises trunk, assistant resisting, two to twelve times.

11. Hanging, separation of legs, with resistance, one to ten times.

12. Forward lean, trunk forward bend, right arm upward stretch, left arm backward raise.
13. Neck firm, deep knee bending; breathing.
14. Feet sideways place, arms sideways stretch, palms upward arm raising; breathing.

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Apr. 19,'92.

MEMORANDA respecting Swedish Gymnastics.

The special characteristic of Swedish gymnastics, is that they are executed without apparatus--the body itself is used as the weight.

Though known as "Swedish Gymnastics", the elements of this system have existed from ancient times.

Chinese work on military gymnastics.

Describe 12 figures--Wy Ho Hon Choie--1st, 2nd, and 3d positions.

Star-grasping----Chunt Chow Lung Chee,--movements similar to swimming exercises--hands together at chest--first forward--arms down--fists closed -move sidewise like wings of bird--elbows brought to sides as in carrying package--repeat.

Exercise in ancient Greece--active, as in use of spade, driving four horses, holding out weights, hill-climbing climbing rope, closing fists with arms stretched out, holding as long as possible-walking slowly--stretching legs--walking on toes--walking in the sand.

Passive exercise, as riding--exercises in cradle or nurse's arms.

French translation of Chinese work on gymnastics--made early last century.

Ling, a Swede born in 1766--fencing-master and lieutenant in Swedish army, gathered data from various sources, and organized what is known as Swedish Gymnastics early in the present century.

Central Institute of Gymnastics founded at Stockholm in 1813.

In advocating the value of gymnastics, Ling maintained that the body is a unit, and every impression made upon veins and nerves of one part, are reflected to other parts , just as a ripple travels on the water until it extends over the whole surface of a great lake.

Ling's system became popular in Sweden --is now taught in every school in all the cities and towns of Sweden .

The Director of the Central Institute visits every school--any teacher not efficient is discharged.

Swedish gymnastics aims at equable development--does not seek to make muscles hard but strong and flexible---aims to expand chest and waste, and to lengthen the levers.

Heavy apparatus tends to render muscles hard, and stiffen joints--mention cart-horse, and S. American porters--also tends to distort the body.

Swedish gymnastics renders the body strong and supple, elastic and graceful.

Heavy gymnastics useful for special purposes.

Swedish gymnastics better for growing children who require general development.

Swedish gymnastics a powerful means of modifying vital conditions through its influence upon the chest and abdominal cavities.

2

~~E~~ducational gymnastics

~~Passive~~

active - ~~active~~ resistive

Medical gymnastics

active - passive

~~Assistive~~ assistive & resistive

Swedish Gym. Safe.
Heavy Gym. dangerous.
English women

## Teaching Swedish Gymnastics.

Standing poise, fundamental

all movements of parts, as arms, etc., confined to acting part.

The rest of the body acts in keeping the position.

Work done consists in lifting the body at a disadvantage.

Work increased by combining movements.

Muscles stretched by contracting them well, then executing a movement which increases the strain.

First Gazes

A. B. C. D. Zed bee

Swedish Gymnastics.

Standing poise, fundamental.

· All movements of parts, as arms, legs, etc.,confined to acting part.

The rest of the body acts in keeping the position.

Work done consists in lefting the body at a disadvantage.

Work increased by confining movements.

Muscles stretched by contracting them well, then executing a movement which increases the strain.

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The system of exercises with relation to expression known as Delsarte, a sort of aesthetic gymnastics.

Delsarte is graceful--develops coördination, but not enough energizing to develop the body.

One of the great excellencies of Swedish gymnastics is the principle of progression which is carried out with the greatest exactness--even so slight a movement as turning the hand has its place in the regular graded series of movements--begins with the simplest primary movements--gradually progresses to complex and difficult movements.

Primary movements :

Standing.
Wing-standing.
Think-standing.
Shelter-standing.
Rest-standing.
Bend-standing.
Cross-(a)-standing.
Cross-(b)-standing.
Cross-(c)-standing.
Cross-(d)-standing.
Cross-(e)-standing.
Reach-standing.
Stretch-sanding.
Close-standing.
Stride-standing.

Walk-(a)-standing.
Walk-(b)-standing.
Walk-(c)-standing.
Walk-(d)- standing.
Toe-standing.
Knee-bend-standing.
Deep-knee-bend-standing.
Half-hook- (a)-standing.
Half-hook-(b)-standing.
Bow-standing.
Twist-standing.
Prone-standing.
Stoop-standing.
Fall-out-(a)-standing.
Fall-out-(b)-standing.
Fall-out-(c)-standing.
Prone-falling.

Starting from these different primary positions, a great variety of movements may be executed.

Combining with the 27 standing positions, 5 trunk positions 11 arm positions, and 4 head movements we have 6000 different movements.

All these numerous movements are classified--

1. Introductory movements--simple and easy movements to get muscles under control--correct standing position--respiratory movements to get lung-cells freely acting.

2. The act of flexing trunk. trunk flexions,

3. Heave-movements--exercises to expand upper-chest--arm-exercises.

4. Balance-movements--standing on toes on one foot, half-hook, etc.

5. Shoulder-blade movements--neck-firm--cross (e)--rotation from cross (b) to cross (e).

6. Back movements--prone-standing, etc.

7. Lateral movements of the trunk,--side-flexion-twistings.

8. Jumping.

9. Slow-leg-movements--foot-placing.

10. Respiratory movements. Correct breathing

Day's order--mode of arrangements.

Swedish movements recently introduced into this country--rapidly gaining ground,--universally used in Sweden--advantages--requires no apparatus--no especial gymnasium--requires only thoroughly instructed teacher--especially adapted to children and women

women.

Of great use as an aid to dress-reform--women cling to their old modes of dress because of their discomfort on discarding them--their muscles have wasted and they have come to depend upon stays--when stays are renounced, muscles must be developed.

Missionaries wanted to preach the gospel of good health by exercise in every city, town, and village in the United States.

## Exercises for Patients in Bed.

Hand and foot exercises, flexion and extension, singly and together.
Hand and foot rotation singly and together.
Arm flexion singly and together.
Leg flexion ,, ,,
Arm flinging, from Cross A and Cross F to yard.
Arm rotating--swinging.
Arms parting, together.
Legs parting ,,
Arms raising ,,
Legs raising ,,
Lying on side, arm and leg raising, singly and together.
One sided movements, simultaneously.

### Exercises Lying on Back.

Head rolling
Head raising.
Trunk raising, hands on loins, thumbs xx forward, hips raised (abdominal cases) shoulders raising to yard wing, rest, shelter lying positions (abdominal cases.)
Lying on xxxx face, head backward raising, with arms downward stretched shelter,xxxxx, wing, rest and yard positions.
Hips raised in alternation,(repeat with feet and shoulders in line.)
Feet and shoulders lying, hips rotating.
Turn on side.
Turn on face.
Roll over and over.

# Exercises for Patients in Bed.

Hand and foot exercises, flexion and extension, singly and together.
Hand and foot rotation singly and together.
Arm flexion singly and together.
Leg flexion ,, ,,
Arm flinging, from Cross A and Cross F to yard.
Arm rotating--swinging.
Arms parting, together.
Legs parting ,, ,
Arms raising ,,
Legs raising ,,
Lying on side, arm and leg raising, singly and together.
One sided movements, simultaneously.

## Exercises Lying on Back.

Head rolling
Head raising.
Trunk raising, hands on loins, thumbs xx forward, hips raised (abdominal cases) shoulders raising to yard wing, rest, shelter lying positions (abdominal cases.)
Lying on xxxx face, head backward raising, with arms downward stretched shelter,xxxxx, wing, rest and yard positions.
Hips raised in alternation,(repeat with feet and shoulders in line.)
Feet and shoulders lying, hips rotating.
Turn on side.
Turn on face.
Roll over and over.

## ACTIVE MEDICAL SWEDISH GYMNASTICS.

1. Trunk swinging with vertical support. (H.H.B. fig. 234).
2. Lying, leg raising with head flexing--one leg, both legs, legs and arms.
3. Side lean standing, wall support. (Fig. 239).
4. One-half lying, leg raising. (Fig. 243).
5. Ladder climbing with feet.
6. Forward bending, wall support, assistance. (Fig. 236).
7. Lying, head and heel support. (Fig. 242).
8. Forward falling, kneeling, heel support. (Fig. 235).
9. One-half supine lying, trunk raising (forward flexing.)
10. Back bending, wall support.
11. Lying, toe-hand support, head flexing.
12. One-half prone lying, trunk raising, (Back flexing.) (Fig.245.)
13. Spring to rest (horizontal parallels).
14. Lying, toe and elbow support, hips raising and lowering. Fig.241
15. Sitting, leg rotating. (Fig. 248).
16. Lying, toe-hand support, arm bending.
17. Hanging, ~~toe-hand-support~~ feet seperating.
18. Lying, toe-hand support, feet placing.
19. Spring to rest (horizontal parallels) rest, horizontal parallels, feet seperating.
20. Knee bending, toe wall support. (Fig. 247.)
21. Hanging, arm bending.
22. Knee chest breathing.
23. Pelvic breathing.

Special Series of Exercises.

Lying-head raising

1. Knee chest breathing

2. Lying, leg raising

3. Sitting, leg rotating

4. Lying, toe and knee support

5. Knee chest breathing

6. Lying, arms and legs raising

7. Ladder climbing with feet

8. Sitting, arm raising, breathing

9. Prone lying, toe and elbow support, hips, raising and lowering.

10. Pelvic breathing, lying, legs flexed, hips raising, knee support, breathing.

11. Lying, head forward flexing. Combine this with Nos.______

12. Knee chest breathing.

13. Lying, head flexing.

Exercises.

1. Trunk swinging with vertical support. (H. H. L. Fig. 234).
2. Forward falling, kneeling, heel support. (Fig. 235).
3. Forward bending, wall support, assistance. (Fig 236).
4. Back bending, wall support.
5. Side lean standing, wall support. (Fig. 239).
6. Lying, toe hand support, arm bending. (Fig. 240).
7. Lying, toe elbow support, trunk raising and lowering. (Fig. 241).
8. Lying, toe and hand support, feet placing.
9. Lying, head and heel support., (Fig. 242).
10. Lying, leg raising (one leg, both legs, legs and arms). (Fig. 243).
11. One-half lying, leg raising. (Fig. 243).
12. One-half lying, trunk raising (backward and forward flexing).
13. One-half prone lying, trunk raising. (back flexing).
14. Foot placing, knee bending, toe wall support. (Fig. 247).
15. Sitting, leg rotating. (Fig. 248).

Exercises.

1. Trunk swinging with vertical support. (H. H. B. Fig. 234).

2. Forward falling, kneeling, heel support. (Fig. 235).

3. Forward bending, wall support, assistance. (Fig. 236).

4. Back bending, wall support.

5. Side lean standing, wall support. (Fig. 239).

6. Lying, toe and hand support, arm bending. (Fig. 240).

7. Lying, toe and elbow support, trunk raising and lowering. (Fig. 241).

8. Lying, toe and hand support, feet placing.

9. Lying, head and heel support. (Fig. 242).

10. Lying, leg raising one leg, both legs, legs and arms). (Fig. 243).

11. One-half lying, leg raising. (Fig. 243).

12. One-half lying, trunk raising (backward and forward flexing).

13. One-half prone lying, trunk raising (back flexing).

14. Foot placing, knee bending, toe wall support. (Fig. 247).

15. Sitting, leg rotating. (Fig. 248).

# DIRECTIONS
# for
# Administrating
# MECHANICAL MASSAGE and PASSIVE MOVEMENTS.

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## VIBRATION.

A BAR.

(1) Stand about one foot from the bar, palmar surface of hands resting on bar, fingers widely separated. Move hands back and forth across the bar, arms loose.

(2) Stand close to the bar, grasp the bar firmly with the hands, arms loose.

(3) Straighten arms, grasp bar, with wrist and elbow joints rigidly extended.

(4) Stand close to bar, erect, chest forward, grasp bar firmly with hands, wrist, elbow and shoulder joints rigid. In this position the vibratory movement is extended to the spine and head.

(5) Stand close to the bar, grasp it, advance left foot, bend the knees so as to bring the ~~[illegible]~~ lower stomach and abdomen against the side of the bar. Do not lean forward over the bar.

(6) Turn upon the toes toward the right, grasp the bar and flex the knees so as to bring the bar opposite the lower spine or small of the back. Do not bend over the bar.

(7) Sitting facing the bar, grasp it with the hands, and rest the side of the head against the hands.

<u>Remarks</u>.--Feeble patients may take a portion of the movements while sitting in a chair, reaching forward grasping the bar, or sitting in such a position as to lean against the bar.

B CHAIR.

(8) Sit upright in the chair, chest forward, chin drawn in, hands resting upon arms. Affects chiefly the lower spine and abdomen.

(9) Lean back to an angle of 45°, maintaining the position by grasping the ends of the chair arms. Affects chiefly the spine.

(10) Bend forward to an angle of 45°, hands resting on the chair arms. Affects chiefly the lower abdomen.

C PLATFORM.

(11) Stand erect on platform in normal poise, facing front; first, balance on the toes, then take erect position, chest forward, chin well drawn in, muscles tense.

(12) Stand on platform, same as (11), only facing side.

D TRUNK.

(13)Lie upon the right side so that the middle of trunk will fall in the half circle. Affects especially the stomach and liver.

(14) Lie upon the left side with the middle of trunk in the half circle. Affects stomach, bowels, and spleen.

E (15) Lie upon the face in such a manner that the abdomen rests upon the elliptical pad. Affects especially the bowels.

F (16) Lie upon the back across the padded back-piece. Affects the lumbar spine and kidneys.

G ABDOMEN.

(17) Lie upon the apparatus face downward, in such a position that the abdomen rests upon the oscillating pad. Useful as a means of stimulating peristaltic actifity.

FEET and LEGS.

H (18) (Endwise) Sit in chair opposite end of bar, and place the feet in the foot rests at the end of the bar, legs flexed to an angle of 30°

I (19) (Sidewise) Sit in chair facing the side of the bar, with one foot resting in goot-piece, leg extended, muscles held rigid.

J (20) (Rotary) Facing the side of apparatus, place one foot in the rotating foot-piece, leg extended, muscles held rigid.

K (21) Rotary) Sitting with side to apparatus, grasp handle, arm fully extended, muscles held rigid.

KNEADING.

ABDOMEN.

L A(22) Lie face downward on the apparatus, the abdomen resting over the opening, the machine adjusted to suit the individual. For fleshy persons the top must be raised more than for thin persons. Position of patient should be with the head at the lower end of the incline.

M B(23) Lie upon the table with the face downward in such a position that the rotating kneaders will strike the abdomen at the lower part, lifting upwards. Useful in cases of prolapse of the abdominal organs.

ARM.

N (24) Place one arm between the rubbers, controlling the pressure with the other hand resting upon the lever. Slip the arm back and forth between the rubbers.

LEG.

O (25) Place first the thigh and then the lower leg between the rubbers, regulating the pressure to suit the individual case.

TRUNK.

P (26) (Standing) Stand in such a position as to rest some portion of the lower part of the trunk against the rubber, turn the body around to adapt the rubber to different surfaces.

(27) (Sitting) Sitting in a chair, place the shoulder, chest, or upper spine against the rubber. Regulate the force of the application by pressure.

Q (28) (Rolling) Stand facing the apparatus. Throw the strap over the head, adjust it in such a way as to bring the central portion of the trunk within the grasp of the loop. The vigor of the movement may be increased by leaning backward, and by pressing the straps together in front of the body so as to increase the grasp of the loop. This movement affects chiefly the abdominal organs.

FRICTION.

HANDS.

R (29) Stand facing the revolving rubber drum, resting the hands upon it. The force of the pressure may be modified so as to secure the decided effect.

FEET.

S (30) Sit facing the drum with the shoes removed, resting the feet against the revolving drum, which should be covered.

ARMS.

T (31) Friction of the arms may be obtained by the use of the same apparatus with which kneading is administered to the arms, taking care to make the pressure light so that the rubber will slip upon the surface instead of moving the deeper tissues.

LEGS.

U (32) Use same apparatus as for kneading legs, with less pressure.

PERCUSSION.

SLAPPING.

V (33) Standing upon the floor or the platform, allow the revolving straps to play upon different portions of the legs.

(34) Sitting in a chair, allow the blows of the straps to fall upon the shoulders, chest, or back.

Remarks.--The force of the blows of the strap is determined by the distance from the revolving shaft.

BEATING.

W (35) With the side facing the machine, either standing upon the floor or platform, allow the beaters to play upon the abdomen and

(36) Standing with the back to the machine, allow the beaters to play upon the spine and shoulders, regulating by the hand wheel.

Remarks.--The force of the application in using this apparatus is regulated by the degree of pressure made against them.

MECHANICAL PASSIVE GYMNASTICS.

RESPIRATORY APPARATUS.

X (37) Patient sits with back to apparatus, arms over the shoulder rests, the back rest adjusted properly, and the height of the stool regulated so that the shoulder rests press firmly against the axilla when the machine is at rest, the arms hanging by the sides.

(38) Position as in (37), except that the seat is made a little lower, and the hands grasp the handles over head, being carried upward with each inspiratory movement.

TILTING TABLE.

Y (39) Patient lies upon the back with the head at the stationary end of the table. Useful in pelvic and rectal congestions.

(40) Patient lying on back with feet at the stationary end of the table. Useful in cerebral congestion.

Remarks.--The purpose of this apparatus is to administer vasomotor gymnastics. In the parts elevated, the blood vessels contract vigorously.

PELVIS TILTING.

Z (41) The patient lies upon the apparatus in such a position that the rest which supports the pelvis when elevated falls across the body at the level of the pubic bone. The head should be down. This apparatus is of great value in cases of chronic pelvic congestion and downward displacement of the pelvic and abdominal organs.

TRUNK FLEXION.

AA (42) Seated on the apparatus, facing front, chest held well forward, chin drawn in, hands resting on the hils, endeavor to hold the head and shoulders erect while the pelvis is flexed forward and backward by the tilting of the seat.

(43) Seated on the apparatus, facing side, maintain the ~~xxxxx~~ erect position while the pelvis is alternatelt flexed. Hands by side.

BB (44) HIP ROTATION.

BB (44) Sitting upon the seat and supporting the body by the hands grasping the handles, hold the trunk erect, chest well forward, chin drawn in, feet resting on platform. By a properly directed effort the seat will be made to rotate, the head and shoulders being held erect. During the rotation of the seat, the hips perform a circular or rotary movement. An excellent means of exercising all the muscles of the trunk

(45) Same as (44) except that the knees are extended instead of being flexed, and feet held free instead of resting on platform.

<u>Remark</u>.--The apparatus may be operated by power, the patient simply balancing during rotation of the seat.

## EXERCISES WITHOUT APPARATUS.

### For Arms and Hands.

Position--arms downward reach, fingers held close together, hold position. Separate fingers slowly, resisting. Counting 1-8. Hold position, fingers extended, closing with resistance, counting. Rest--relaxation.

Position. Arms outward reach, thumbs turned upward. Flex fingers with resistance beginning at extreme ends, turning the thumb in to the palm of the hand. Hold hand tightly closed and extend fingers with resistance, counting. Rest. Relax arms.

Position. Arms downward reach, hold position, rest, flexion with resistance, counting. Hold position return to position slowly with resistance. Rest.

Arms downward reach, elbows at sides, thumbs ~~taxthx~~ outward, hold position, forearm flexion, with resistance, counting. Hold position, forearm extended with resistance, count,--relax.

Arm downward reach, thumbs out, hold position, forearm pronating, counting. Hold position. Forearm supinating, counting.

Arms downward reach, extended, arms forward raised, hold position, arms crossing chest with resistance, counting. Position, count.

Arms dow nward stretch, forward raise, upward raise with resistance, counting. Position with resistance.

Arms-sidewise -raise, upward-raise with resistance, counting. Position.

Arms downward reach, thumbs out, rotating arm. Hold position. Rotation with resistance, counting. Hold position, rotation outward, counting Relax. Rest.

Left-hand half-wing standing position, right hand circumduction. Right arm downward reach, counting.

Right one half wing-standing, left arm circumduction. Left arm downward reach, circumduction with resistance, counting. Relax.

# ARM AND TRUNK MOVEMENTS.

Arms upward stretch with resistance, backward bend with resistance, upward raise, with resistance. Rest.

Arms upward stretch, to left, bend with resistance. Rise with resistance, right, bend with resistance, relax. Rest.

Feet sidewise placing, forward bnding with resistance, start, backward bending with resistance, looking u p, hand on floor, upward raise, position. Rest. Position.

Arms sidewise raise, combining movements. Fingers separated widely, keeping fing rs separated and extended much as possible, flex and close fingers with resistance, flex, raise with resistance, flex arm, resistance arms across chest as faras possible. Relax and extension with resistance, holding hands close down, elbows back as far as possible, rise to the toes.

Stretching movement.--

Right-foot-forward-and outward -place, right arm forward, upward reach, left arm backward, upward reach, extending arms and legs as much as possible, fingers separated widely, fled fingers, flex wrists, flex forearm, relax with resistance, position.

Reverse.

EXERCISES FOR HEAD.

Head forward flexion with resistance, counting. Hold position, moving head backward with resistance, counting.

Head backward moving with resistance, counting, return to position with resistance.

Head to left, bend with resistance, holding head up straight, count, upward-raise, counting.

To right, the same.

Head rotating, first to left, thento right with resistance, return to position with resistance.

## EXERCISE FOR LEGS, FEET AND TOES.

Wing-standing--press toes upon the floor, hold position, flex with resistance, counting. Hold toes in position, flex, relax with resistance, counting.

Toes extension with resistance, holding position extend with resistance, counting. Hold and relax with resistance.

Wing-standing. Ankle flexion, right foot, hold position, flexion with resistance. Count. Hold position and relax with resistance, count.

Wing-standing. Left foot flexion, counting. Relax with resistance, count.

~~Right ankle extension~~ Wing-standing position. Right food sidewise place, distance of one foot, throwing weight on left foot, flex right ankle with resistance, count. Hold position. Relax with resistance, count Position.

Left food sidewise place, hold position, left ankle extension with resistance, count. Position.

Wing-standing position, left flexion with thigh with resistance. Hold leg rigidly straight while bending backward, counting. Catch leg and hold it while counting 8. Stretch of thigh, return to position, count. Left leg flexion with resistance, counting.

Right leg same as left.

Right-foot-forward-inward-place, heel toward left toe, thigh rigid, with resistance, start, counting 1-8. Turn, count. Foot-placing, heel opposite instep, rotation, counting, hold position,-return, relax, count. Position.

Right leg circumduction with resistance. Star, counting.

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Head backward moving with resistance, counting, return to position with resistance.

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Right leg circumduction with resistance. Star, counting.

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# Rules Pertaining to Exercise.

1. Movements must be slow and uniform.

2. Follow each movement by an interval of rest.

3. Movements of the same limb or group of muscles should not be repeated twice in succession.

4. Movements should be immediately interripted if any of the following symptoms appear,-- The patient must be watched closely to avoid the development of these signs which indicate exhaustion.

(a) Accelerated breathing.

(b) Marked movements of the nares in breathing.

(c) Slight drawing of the corners of the mouth.

(d) Palor or duskiness of the cheeks or lips.

(e) Palpitation of the heart.

(f) Sweating.

(g) Yawning.

If any of the above signs should appear in the midst of the movement, the movement must be instantly suspended, the limbs being carefully placed in a state of rest.

5. The patient should not be allowed to hold the breath, to prevent this the patient should count in a whisper from 1 to 8 while the movement is being executed, or during each half of it.

6. Constrictions of the lumbs, or any other portion of the body whereby the blood vessels may be compressed, must be carefully avoided.

7. The force of the movement must be very carefully graduated to the strength of the patient. It is sometimes necessary to employ only the very gentlest resistance. Patients who are bedridden, and very feeble patients, cannot at first take all the movements-- take such as are adapted to their condition or strength.

8. Examination of the heart should be very carefully made in every

case before beginning treatment. In cases of emphysema, asthma, and in obstruction of the aortic orifice, great care must be taken, especially with the arm raising movement, to avoid producing syncope on account of the obstruction of the pulmonary circulation. The same rule applied to any condition in which the respiratory area is diminished, as in pleurisy with effusion, consolidation of the lung, dropsy of the chest, pyo or pneumothorax.

9. In these cases, the movements must be executed very slowly so as to give time for distribution of the blood. It may have to be taken with the patient lying down. The right side of the heart being overloaded in these cases, the arm movement should not at first extend above the level of the shoulders, unless the patient is lying down, as the extention of the right heart would be increased by giving the blood the down grade in the arteries.

10. Special attention should be given also to the patient's regimen and diet in enforcing an aseptic dietary. Exercise such as graduated mountain climbing is too severe for patients requiring this treatment. It is only adapted to cases which have been improved by this method. The object of the method is not to strengthen the muscles, but to regulate the circulation.

11. The patient may, to some extent, administer the exercises himself by executing the various movements, inducing the resistance by hardening the muscle.

File

## Bacteriological Technics used to determine the General Character of the Intestinal Flora.

The bacteriological examination of the stool consists of cultural and microscopic methods, and the character of the flora is determined by the findings, the emphasis being laid on the cultural findings. In other words, the diagnosis is made from the summarized results by checking one against the other.

The intestinal bacteria are classified under the following groups:--

(a) Colon like bacteria.
(b) Acidophilus like bacteria.
(c) Spore-bearing bacteria such as B. Welchii.
(d) Streptococci.
(e) Yeast.

For diagnostic purpose the feces are classified as follows:

(a) Normal--the type containing a large % of B. acidophilus.

(b) Fair--the stool contains quite a large % of B. acidophibus, but slightly inferior to the above.

(c) Mixed--the stool contains a small % of B. acidophilus with a large % of Coli-like bacteria.

(d) Bad -- the stool contains either a very small % of B. acidophilus or none with a large % of Coli-like bacteria with or without B. Welchii.

(e) Very bad--the stool contains no B. acidophilus with the presence of B. Welchii coupled with a lagge % of Coli-like bacteria.

(1). Fecal emulsion is made by thoroughly mixing about a pea-sized lump of feces, or 1c.c. of liquid stool, with 10c.c. of sterilized normal saline solution.

(2). Microscopical examination:--The smear is made directly from the emulsion, and dried either by flame or air. Stain the slide according to Gram method which is as follows:--Gentian (anilin) Violet 1minute, wash, Gram Iodine solution 2 minutes, decolize by 95% alcohol about one minute, and wash and counterstain by Safranin.

Examine at least 10-15 fields, and calculate approximately % of Gram positive and negative bacteria. Special attention should be paid to the presence of irregular rod shaped Gram positive bacteria.

The higher the % of Gram positive bacteria, as a rule, the better the condition of the intestinal flora, while the higher the % of Gram negative bacteria, the worse the condition provided the cultural findings coincide with microscopical examination.

The higher % of Gram positive bacteria does not necessarily indicate in all cases fermentative - good flora, as it happens the microscopical fields are often crowded with Gram positive bacteria of spore-bearing type and diplococci.

(3) Cultural Examination.

(a) Litmus milk culture - This is prepared from skimmed milk. Add a sufficient quantity of tincture of Litmus to give a decided blue color to the milk. Distribute the media in culture tubes and insert a small inverted tube in each tube. Sterlize in autoclave at 15# pressure for 20 minutes.

Inoculate one c.c. of fecal emulsion into milk culture and incubate at 37 degree C for 48 hours.

Interpretation is made upon reaction, coagulation, peptonization, and gas formation of the culture at 48 hours incubation. Briefly, in bad or very bad flora, the culture shows either stormy fermentation or soft curd with a considerable whey and gas bubbles accompanied by a large % of gas in inner tube, while in normal flora, the culture shows a firm massive coagulation with some whey and a small % of gas in inner tube with a distinct acid reaction.

(b) Lactose Broth - This is made by the following formula:--Peptone 10 grams, meat extract- 3 grams, lactose - 10 grams, NaCl - 5 grams with 1000c.c. of distilled water. The reaction of the medium is adjusted to pH 6. 8-7. Distribute the media into test tubes, and insert a small inverted tube in each. Autoclave at 15 pounds of pressure for 20 minutes. Inoculate one half C.C. of fecal emulsion into broth culture, and incubate at 37 degree C for 48 hours.

Interpretation:--it is made upon cloudiness scum and pellicle formation and amount of gas. In good flora, there is a cloudiness to a small extent with or without scum and a small % of gas in the inverted tube, while in bad flora, the culture shows the intense cloudiness with scum and pellicle with a large % of gas, over 60% of gas indicative of presence of B. Welchii.

(c) Veillon tube.

A long tubing of at least 12 inches in length is used for this culture. One end of the tube is tightly plugged with an unperforated rubber cork, and the other end with a ball of cotten. The media used is lactose agar. The composition is the same as lactose -broth except the addition of 10 grams of agar-agar. Reaction is the same. Distribute the media into tubes. Fill the tube with media for the length of 10 inches from rubber cork end. Sterlize in the autoclave at 15 pounds for 20 minutes.

Inoculate 2-3 loopfuls of fecal emulsion when the media is cooled down to 42 degree C. and tilt the tube back and forth in order to diffuse the inoculum throughout the entire tube. Incubate at 37 degree C. for 24-48 hours.

Interpretation:-- If B. Welchii is present there is a stormy fermentation characterized by number of large gaps formed in lower half of the tube. Coli gas is characterized by small bubbles. In good flora, the culture shows no gas formation, and instead there are numerous fuzzy (minute) colonies scattered throughout the culture.

(d) Lactose agar plate--The media is prepared as the above. Distribute the media about 7c.c. into each test tube. Sterilize as above.

Inoculate one half c.c. of fecal emulsion and prepare aerobic and anearobic plates. Incubate at 37 degree C for 48 hours.

Interpretation:--the search is made for the colonies of B. acidophilus. The colonies of acidophilus have two types:--type X is characterized by a fuzzy colony resembling to bits of wool interlaced with radiating threads. The colony is similar to that of B. Tetani. Type Y is characterized by an oval or round colony with one or two hair like projection on its side or often with perfectly smooth edge.

The % of B. acidophilus colonies is taken in proportion to the number of other colonies present in the plate. If there are Io acidophilus colonies with 90 other colonies, the % is 10%.

Interpretation:--A very good or normal flora should show a large percentage of acidophilus colonies 85-95 %. A bad flora shows none.

The presence of Welch's bacillus always indicates a bad flora. In such a flora the stools have a very pubrid or rancid odor.

(Good Health)

BARREL EXERCISES.

It is surprising what a great variety of useful and thoroughly efficient exercises can be taken with the very simplest apparatus. Indeed the body alone furnishes apparatus for a trained, Swedish gymnast. By putting the body in different positions and exercising the muscles in a systematic way, the strongest man can in ten minutes do enough work to make himself thoroughly tired.

A complete system of gymnastics has been worked up in which the only apparatus required are a perpendicular wall, a chair, and the floor.

With an ordinary flour barrel a very complete and practical system of exercises may be executed. These exercises are especially valuable as a means of developing the muscles of the arms and trunk. The legs also come in for a fair share of work.

The barrel itself should be a strong one but not too heavy. An ordinary flour barrel with both heads securely in place will answer the purpose very well. It is a good plan to cover the outside of the barrel with strong canvass. Leather is preferable but is perhaps unnecessarily expensive.

The following brief description of exercises to be taken with a barrel will be readily understood by the aid of the accompanying cuts:

Fig. 1. Barrel, man lying across it, supporting hands on chair, toes resting on the floor.

Fig. 2. Lying across barrel, toes and hands support.

Fig. 2,1/2. Lying on face with ankles supported on barrel, drag body forward, rolling barrel along.

Fig. 3. Ankles resting on barrel, hands on floor, arms extended.

Fig. 4. Lying on back across barrel, supporting body with extended arms one side, feet on the other.

Fig. 5. Head and heels support, neck resting on barrel. Barrel placed against wall.

Fig. 6. Lying on side, feet resting on floor, one arm thrown over, side resting on barrel, one hand on floor the other on hips.

Fig. 7. Sitting astride barrel, hands resting on hips, bend backward.

Fig. 8. Standing, barrel resting on floor at feet. Seize the barrel at both ends, raise it up straight close to the body until it is straight above the head. Raise and lower the barrel, raising to head and lowering again. Barrel in front of body with arms extended straight forward, then raise above head.

Fig. 9. Standing on the barrel and with arms placed ~~upon~~ at the hips, alternately raise and lower, heels, r~~a~~ising as high as possible.

Fig. 10. Standing on the barrel, roll it across the room by movements of the feet.

The positions described above are not merely passive attitudes. Each is the position of the beginning of an exercise which consists of rolling the barrel back and forth by movements executed by the arms and the trunk.

613.7

# H E A L T H   B Y   E X E R C I S E .

-o-o-o-o-o-o-o-o-o-o-o-o-o-o-o-o-o-

How to be healthy by exercise, and how to keep healthy by exercise is the question. There is no question but that a person who leads an active, muscular, out-of-door life enjoys longer life than a person who lives in a sedentary way. I do not mean to argue this point very long because it is self evident. We see the evidence of it in our domestic animals. Everyone knows that a horse in order to be strong must be exercised. If a farmer pays a thousand dollars for a horse he takes good care that a man takes him out every day for exercise. He puts him through a certain amount of work every day, and just the right amount of work, and as the muscles get stronger the work will be increased. So the horse will be kept in good condition. When a horse has been shut up for some time it sweats easily, and the driver says it is soft. If he drives that horse regularly every day, at the end of six weeks it will not sweat so easily and will have a better wind, and will be a stronger and better traveler. This is a common observation. And what is true of the horse or the ox is true of the man. The college boy comes home to the farm for vacation, and as he goes out to the field to work with the harvest hands, he finds himself very uncomfortable. The first day he cannot very well keep up. The next day his muscles are sore. It takes two or three weeks for him to get into working order. At first his hands are blistered, but a new skin forms and not only a new skin but new muscle.

If a man is going to enter for a prize fight, a pugilistic encounter, or a boxing match, or row in a boat race, or play foot ball--- if he is going to do anything that requires muscular effort, he goes into training for it. He thinks it worth while to train for weeks and even months. People are even in training for six months or more.

Why does a pugilist train about six weeks for a boxing match? He knows that it takes about that length of time for muscle to ~~g~~grow. They will grow only as a result of being worked and used. Some experiments made some years ago by an eminent physiologist showed that after three weeks of hard muscular work the muscles were~~/~~weaker. Because the work had the effect of breaking down the muscle, and there had not been the time for the growth of new muscle. It requires time for development. It takes time for muscle to grow the same as it does for potatoes to grow. If you want a crop of muscle to grow you must sow the seed and wait patiently for the crop to grow. If you want a crop of potatoes you do not expect them all at once. You sow the seed and it is watered and gradually grows and grows, and at the end of four months you have a crop. That is exactly so with muscular work.

Let us see what exervise does for a man. Let us go back a little farther and see how it is we live. The Bible says we should not eat blood because the life is in the blood. It is the blood which makes the body. It is the blood which heals the body. It is the blood which takes care of the body. It is the blood that creates the body. It is surprising to see how dependent we are upon this ~~xxxxxx~~ red fluid we call blood. This blood is really a living thing. Put a drop of it under a microscope and look at it and you will see a multitude of little specks of life swimming and moving about like fish in water, like the birds in the air. There are some called red cells, and others called white cells, of which there are various kinds. The little ones catch microbes and the big ones act as scavengers. This blood is in every part of the body. The blood vessels themselves are kept alive by this fluid tissue, the blood.

When a man gets diabetes the real cause of it is that there is something the matter with his blood; when a man has Bright's disease the trouble is something the matter with his blood. It would be absolutely impossible for a man to have diseased kidneys or Bright's disease and have a healthy blood. If a man has rheumatism,or gastric catarrh or nasal catarrh,it is due to a diseased state of the blood. Because as long as the blood is healthy no disease can locate itself anywhere within the body.

If you cut yourself anywhere in a few days it is healed. There is a little puncture made in the skin,but it very quickly heals up. How does this happen? It is the blood. If we cut off the blood supply there would be no healing at all. Healing would be absolutely impossible. And what is true of a large wound is equally true of a small wound. suppose you get some poison on your hand,it destroys a portion of the skin,but in a little while these little living cells in the blood have come outside and healed the wound.

Suppose for instance this represents the skin (Here drawing diagram on the board). Here is a place where a portion of the skin has been wounded. There is a blood vessel running beneath here ~~ix~~,and this blood is guided by an Intelligence--a Living Intelligence--that is,an Intelligence wiser than you or I, which leads the living cells circulating in the blood just beneath this wounded part. These living cells directed by this Intelligence puncture through the wall of the vessel. Here is one for instance (Illustrating). This is the way it gets through the wall. It puts out a little awl-like projection and punctures a little hole and works itself through that little hole until it gradually appears on the outside. So in this way the little cell punctures an opening and gets out on to the outside. Here are some of them coming out here (Illustrating). They spread over the whole surface completely covering it so that you cannot see the raw surface itself. They work disease the trouble is something the matter with his blood. It would be absolutely impossible for a man to have diseased kidneys or Bright's disease and have a healthy blood. If a man has rheumatism,or gastric catarrh or nasal catarrh,it is due to a diseased state of the blood. Because as long as the blood is healthy no disease can locate itself anywhere within the body.

If you cut yourself anywhere in a few days it is healed. There is a little puncture made in the skin,but it very quickly heals up. How does this happen? It is the blood. If we cut off the blood supply there would be no healing at all. Healing would be absolutely impossible. And what is true of a large wound is equally true of a small wound. suppose you get some poison on your hand,it destroys a portion of the skin,but in a little while these little living cells in the blood have come outside and heald the wound.

Suppose for instance this represents the skin (Here drawing diagram on the board). Here is a place where a portion of the skin has been wounded. There is a blood vessel running beneath here ~~ix~~,and this blood is guided by an Intelligence--a Living Intelligence--that is,an Intelligence wiser than you or I, which leads the living cells circulating in the blood just beneath this wounded part. These living cells directed by this Intelligence puncture through the wall of the vessel. Here is one for instance (Illustrating). This is the way it gets through the wall. It puts out a little awl-like projection and punctures a little hole and works itself through that little hole until it gradually appears on the outside. So in this way the little cell punctures an opening and gets out on to the outside. Here are some of them coming out here (Illustrating). They spread over the whole surface completely covering it so that you cannot see the raw surface itself. They work the small ones that destroy microbes, and the ones that destroy rubbish--that act as scavengers. Here (Illustrating) are the small red corpuscles which are the most numerous in the body. When the white cells are left to accumulate in the liver or the spleen they find nothing to do. They are the same as ants and bees and just as independent. The blood is simply the liquid in which they live. They get hungry and must have something to eat; they are active and must have something to do. Suppose the liver is crowded with all these large cells, and the little red cells are among them--when this is the case these large cells pounce upon the red cells and eat them up. So the blood becomes anaemic. Whenever you find a person that is anaemic, this state of things is going on. To remedy this take a hot bath followed by a cold bath, and that brings the white ~~blood~~ cells out into the blood again. They will leave the liver or the spleen or wherever they are accumulated and go out into the blood again. Now there is one other thing that will accomplish that object and that is exercise. When a person sits or lies still all the time these microphages accumulate in the internal parts and they eat up the red cells, and the person becomes anaemic--he gets paler and paler. That is the reason a sedentary life makes people pale. The big fish eat up the little ones, so to speak. And the large cells actually devour the living red cells.

These cells may be increased wonderfully. They may be increased as much as 300% in half an hour. If a man takes a walk of ~~th~~ half an hour--walking vigorously--he will find that they have increased 300%. You see what an enormous difference that makes. In the first place it saves the life of the red cells, and besides this it brings the white cells out into the blood where they can work combating disease. That is one of the main things exercise does. It maintains the natural processes of the body. One of the most important of the natural processes of the body is kept in operation by exercise which keeps the blood in motion.

There is another important thing. Of course, you know that exercise makes a person breathe more and increases the appetite. I am not going to tell you that to night. I will tell you something I think you do not know. There is something wonderful. We can hardly imagine anything wiser, and yet anything more surprising, perhaps. It has been after years and years and scores of years when physiologists have been puzzling this thing: to know where blood was made. We know that the dinner is digested in the stomach and intestines--but where was the blood made. Here were the blood vessels which consisted of tubes which are ramifying all through the body, and always filled with their red fluid. It has been found that the blood does not live more than six weeks--that after six weeks there must be an entire renewal. So where does blood come from? where is its origin? It has not been known where this stream of blood came from. The answer to that question could not have been given twenty years ago. But to day it is known that this wonderful blood is made in the bones--in what is known as the red marrow of the bones. In the end of a large bone you can see the red marrow --in the sternum. If you cut the breast bone of an animal you can see it looks red. That red in the marrow is due to the red blood corpuscles. This is known--that the bones make blood. This seems a wise arrangement for all. There are arteries going to these bones, and as the blood is made it is brought into these arteries and carried to the body. It goes into the bones poor in red cells, and comes out rich in red cells. There are muscles all around the bones,and the artery that goes to the bone sends a branch to the muscle. So the bones are nourished by the same artery that nourishes the muscle.

Now when I raise my arm that is a motion of the bone, and this below (Illustrating) is made to pump. Blood is pumped into the muscles and the bones. So exercise,you see,is a blood making process. Every increase~~d~~ in the movements of the bones increases the blood-making process. So the more the muscles are exercised, the more the bones and muscles are ~~xxxx~~ nourished. If a man or woman sits indoors all the time they get thin and pale,their muscles get limp,and their figure bent; but if they get out of doors into the fresh air,soon the rosees begin to bloom on the cheeks,the lips get red,the eyes sparkle with health,and there is an increase in life power. That means an increase in blood. Increased blood gives him increased nutrition to muscle and bone where the blood is manufactured.

Exercise is a fundamental and necessary thing for health. Man cannot be well while inactive. No animal can. Shut up an animal in a cage and it will speedily die. Most animals cannot live in confinement at all. The human animal is naturally active. Back in the ages man was the fleetest animal that lived,and there is no reason why he should not be. Man has marvellous powers of endurance and wondrous activity of muscle. We find to day that some of the animals most like the human species are wonderfully active and fleet. Wild men,savages,are sometimes able to outstrip most wild animals in running. A man can travel farther in a day than a horse can. Weston,the pedestrian,used to tire out several horses every day. An ordinary horse cannot keep up with a man if the man has a well developed body. Mann,the well known pedestrian,recently travelled

I25 miles in twenty-four hours, and I think no horse could do that, and he was none the worse for it. After the twenty-four hours he was as well as when he started, and was able to travel 25 or 50 miles more. After a little sleep he then resumed his work as usual. Mann is not an athlete, is not even a trained pedestrian, but he is a vegetarian, so is in training all the time. He entered this with 25 beef eaters and came out ahead of them all. There were I4 vegetarians and they all came out ahead except one, and he was an old man of 60, and he would have come out ahead had he not lost his way. As it was he came out better than most of them, and he had only been in training about six weeks. The German authorities were interested in this walk and watched them, and at the end of the walk they were surprised to find them in such perfect condition. It was because their bodies were not filled with Uric Acid, or with fragments of the bodies of other animals. It is a body full of rubbish that puts a man out of training. It was because their blood was pure. It is the blood that makes the difference between the sick and well man. As long as the blood is healthy no part of the body can remain sick. The blood has creating and healing power in it. Even though a piece of the body is torn away, the blood can actually make a new piece to take the place of that which is torn away. The great trouble with American people to day is lack of exercise. A man said to me once, "I have not been exercising in that way, I have been doing other work". I asked him what other work he had been doing, and found he had been sitting in a little banking place in Chicago counting money. There is no hard work about that. The trouble was he had not done enough work. He was simply suffering from lack of work. At the end of two weeks he came to me and said, "Doctor, I think I will go home. I thought I came up here for a rest, but I have done more work in the two weeks I have been here than in any other two weeks in my life." Well,he went home,and I suppose he is dead by this time,for he was certainly in a good way to die from lack of work.

When the Almighty made man He told him to work for a living. After he had sinned and fallen and become depraved,He told him to earn his bread by the sweat of his brow. It was not enough just to work,he had to sweat now--to sweat the depravity out of him,I suppose,and to keep it out. It is now impossible for anyone to be healthy unless they sweat.

I was in Scandinavia some years ago,up near the land of the Midnight Sun,and I noticed that all the houses had little huts behind them,close to them. I said to a gentleman who was with me,"What is that little shanty there? Is it a wood shed, or what is it?" "No,"he said,"that is a sweat house." You will find that way up in Lapland every house has a sweat house. If a young man marries up there and has not enough money to build both a cottage and a sweat house,he has to have a sweat house first,and they live in that until they can get a cottage.

In this sweat house,once a week regularly,they have a fire and heat some stones--this is in winter time,and it is mostly winter there--as I said,they heat these stones until they are very hot,and then they pour water on them,filling the house with very hot steam. In a little while they are perspiring very freely. After sweating there until their skin is as red as a lobster they run out and take a roll in the snow. They repeat this several times. Then they end up with a roll in the snow,and a good reaction,of course. The Laplander finds that he is compelled to do ~~xx~~ that to keep well. He has no occupation,nothing to occupy his time, and if it were not for this weekly sweating, he would become sick. So he substitutes sweating of the skin for sweating of the muscles. Now this practice of sweating is not necessary here because one sweats easily with exposure to air and exercise.

In Chicago there is a man who is teaching the art of non-bathing. I should think he must be taking up this thing just to make himself conspicuous. He brought in the case of a man who remained in health notwithstanding the fact that he had not taken a bath for sixty years. He himself has not taken a bath for twenty years or more. He simply rubs himself with a dry cloth. He says that his skin gets a little dingy, but a dingy skin is not necessarily an unhealthy skin. But if a person sweats freely--sweats enough to keep his body in a healthy state, and ~~took~~ takes no baths, although it would not be very sanitary yet it might not bring on disease. It is more important for the inside of the skin to be clean than the out side to be clean. But in this very cold country people find that they must sweat and have these sweat houses in order to keep themselves from getting sick.

This sweating is only a very poor substitute for the sweating that comes from muscular exercise. It is better to sweat muscularly because then the whole body is benefited, and filled with new, fresh, clean blood.

One thing is very necessary, that is, that the body should be kept purified by this sweating process--by exercise.

There is one more important reason why systematic exercise should be taken every day, and that is in order that the muscles may be properly developed. The muscles of the body are like a travelling trunk. The organs of the body are kept in place by being held tightly. If you want your trunk to go to a place safely, you have the trunk full. If you have not enough clothes and necessary things, you will stuff in paper or something to fill up. Then you have to press the lid down tight, and you know that everything will stay in its place. One thing is held in place by the thing adjacent to it. And the lid holds everything in place. So it is with the abdominal muscles. The only reason why the organs in the upper part of the abdominal cavity stay in their place is because there is no other place for them. Suppose we have here, for example, a trunk (Illustrating). Here is the diaphragm, and here the lower part of the trunk. Here under the diaphragm is a big brown lump we call the liver. Right close to it, running up underneath it is a hollow organ we call the stomach. Here is another organ known as the pancreas. The rest of the space is filled up with the large and small intestines. So there is no empty place anywhere at all. Now when the abdominal muscles are strong, they hold all these parts in so snugly that each part is just where it belongs. Suppose the abdominal muscles get weak these organs move. The spleen goes off down here (Illustrating). The liver goes off down here. The stomach gets down under it, and the intestines get way down here--hanging over here. That is a condition we find very often. I have seen thousands of cases just like that--where the stomach is altogether out of its place, and the kidneys are just wandering about--that is what is called a floating kidney. When the organs travel about in that way great inconvenience results.

Here (Illustrating) for instance, is a kidney in its proper place. Here is a tube which goes down from the kidney to conduct the secretion of the kidney to the bladder. Suppose this kidney falls down over here. Then this tube becomes twisted all the way along. Suppose the kidney falls down here like this, and the tube is up here like this, and goes up like that (Illustrating), the consequence is the tube gets filled with this secretion, and the kidney begins to swell and swell and a little pocket is formed. Then this pocket gives way, and the secretion escapes. Then it forms again, and again, and accumulates continually, until by and by the kidney gets diseased. When the secretion does not pass away, as I said, the tubes swell, and little pockets form, a sediment accumulates, and stones are formed. I have had cases so bad that I have had to remove the kidney. I had one case of a stone that weighed four and one third ounces. I will bring over some specimens of stones that I have removed from different kidneys.

Suppose the liver gets out of place. A liver that is out of place must necessarily become congested. If you tie a string around your finger, you know that the finger becomes congested-- the blood cannot circulate. So a liver out of place gets congested, and interferes with the circulation of the blood.

Suppose it is the stomach that falls out of place. Here (Illustrating) is the back bone, and the spinal cord goes down here. The spinal cord sends off different branches, and here is a branch that goes to the stomach. When the stomach falls down here you see what happens. That nerve is stretched way over from here to here. (Illustrating). When the stomach is prolapsed it is all the time pulling on this stretched nerve. And here let me mention that the same nerve that goes to the stomach sends a branch to the back. So the patient will say, "I have such a pain in my back. I think I must have kidney disease. A pain in the small of the back is nearly always due to a prolapsed stomach, brought about by the strain upon these nerves. In the same way the patient has pains in the muscles of the lumbar region. I have seen thousands of cases where this has been relieved by putting on a bandage.

I knew a travelling man once who got along very well. But by and by he did not get along so well, he had such a pain in his back. Then he had to have some one carry his bag for him.

his back. And he had to have some one c-arry his bag for him. Finally he got so bad that he could not walk at all. So he went to a hospital,and told the doctor he thought he must have a diseased kidney. ~~Wekk~~ Well,the Doctor examined him,and after he had stayed there three months,the Doctor said,"Sir,your disease is wholly imaginary. There is nothing the matter with you. You are simply a hypochondriac. He came here,and I examined him,and found that these nerves were very tender and sensitive. He had that peculiar shape of the abdomen that always indicates a prolapsed stomach,or prolapsed bowels. So I told him to put on an abdominal support. I did not see him again until the next day,when he said "I have ridden fifteen miles on my bicycle right off. After I put on that abdominal support I felt so much better,I had this ride". Before he left he said, "Doctor,what a fool I have been. Here I have been going around three years holding up my stomach,and could not think of having ~~ta~~ something to hold it up for me." I told him that he should not expect to be wiser than his doctors.

I could cite thousands of cases where patients have been relieved by this abdominal support. This,of course,is only temporary relief. You will hear people say"I feel as though I must hold my stomach up all the time". Women cannot take off their corsets because they think that if they were to do so they would fall to pieces right away. Their organs need to be held tightly,and as soon as they take off their corsets they feel uncomfortable .

These abdominal muscles have a very important part to act in supporting these internal organs,and keeping them in their proper places. When they lose their power,there is an abnormal power brought to bear on the nerves and they are overstretched. The result is pain in the back and head,pain in the small of the back, dizziness,and so forth,and the whole thing is due to the pain in the sympathetic nerves. Nothing else will afford permanent relief but getting these organs back into place, and keeping them there. So we should exercise to strengthen our abdominal muscles--to develop them. This is a thing worth knowing, and if I tell you nothing else to night, I shall feel that I have told you something worth talking about. It is something that will be of value to you if you recognise the importance of it. The question is, how can we develop these muscles after they have become weak? You never find an invalid who has not weak abdominal muscles. If you let me put my hand upon the abdominal muscles of any person, I can tell you whether they are weak or strong. That is sufficient answer to the question whether a man is sick or well. It is impossible for a man or woman to be well with a weak abdomen--with weak abdominal muscles.

The average business man has weak abdominal muscles. It is impossible to help it. And not only the business man but some artisans as well, such as jewellers, watchmakers, and tailors. They sit at their desk or bench in this position (Illustrating), and it is impossible for them to help their abdominal muscles becoming weak. I wish I had a model of a man here so that I could make this plain to you. I will make a little diagram which will make it a little plainer to you. Here is the breast bone and the pubic bone. You will readily see that when a man is bending over in this way the sternum is depressed. The sternum presses on the diaphragm, the diaphragm presses down on the liver and the stomach, and they are crowded down.

The circulation of blood through the body depends upon the pressure of these abdominal muscles. The trunk is capable of holding all the blood in the body. Then why does it not all run in there and stay there? Because the abdominal muscles press on the organs and keep it running. So when a person sits bent over in this way for some time, the blood accumulates in the abdominal cavity, and after a while it is found necessary to straighten up. When a visitor comes in, the business man involuntarily tilts back his chair, and throws back his head, so as to compress his abdomen and let the blood out.

When a man dictates a letter you never see him sit in his chair in the ordinary position, he always puts his chair back, and throws up his head, and if that is not enough he puts his feet up on his desk. This brings more blood to his head and he can think better. The blood gets out of the liver and the stomach and comes up to his brain. The distribution of the blood through the body determines the activity of its various parts. The activity of the head, the stomach, or the liver, depends upon the amount of blood in them. The business man gets into the habit of sitting at his desk in this stooped position, his chest drops, his abdominal muscles become weakened, and the blood accumulates in the abdomen. Then the man gets hyperpepsia or something of the sort.

It is almost impossible to sit in a proper position in the ordinary chair unless one is constantly thinking about it--unless I am contracting my muscles and keeping my chest up so I can breathe. But the muscles get tired, and little by little down they come. In this way, in order to get rest, one must take such a position that the breathing capacity of the chest is diminished, and there is congestion of the liver and stomach.

I was speaking to a man some time ago, and I said, I see you have a habit of sitting in a cramped position. I sat down, and said, I see you have a habit of sitting in this way in your chair.

Wrinkles across stomach

No proper chairs

"How do you know?" he said. I said I can see that there are wrinkles across your stomach. He looked, and sure enough there were two or three great wrinkles right across his stomach. I observed this many years ago.

I said to a young lady one day, I notice you are in the habit of sitting all doubled up. I showed her what I meant, and she said "Oh, I am not as bad as that." But, I said, you are, because I can see that you have corns on your back. I showed them to her in the mirror. There were places where the spinal vertebrae had been rubbed against the back of the chair and the skin had become callous.

We are not much to blame for this because our chairs are wrongly constructed. You cannot find a proper chair anywhere. I have been through the largest establishments in the large cities, and could not find a single chair in the whole establishment that was fit to sit on. When one sits down he sits down to rest. If one sits down in a chair without leaning back, he must still keep at work. He can rest his legs but not his trunk. The muscles of the back are tired, but he must keep them contracted so as to keep himself up. In order to rest in the ordinary chair this is the position he has to take (Illustrating). I see most of you are sitting that way. Yet if I sit in this way you see what a pitiful posture I have. But that is the common position. If one sits eight hours of the day, and sits in this position, he ~~ix~~ will probably carry that same position the remainder of the twenty four hours. So one grows into the shape of his habitual attitude.

I have studied this subject for many years. I remember~~xxx~~ some time ago a young lady came to me and said, "Doctor, Mother sent me to see you." I said, "Well, what is the matter?" She said, "Mother wants me to see you about my lungs. She thinks I am going to have comsumption." "Why?" I said. "Why, don't you see", she said, "I haven't any chest." I had noticed that her chest was not very prominent. I said, "I am not so sure about that. Let us see." I said, "Stand up," she stood up, I said, "Look up to the ceiling", she did so; I said, "Now bend over." Then I put my hands between her shoulders and said, "Rise." She did so and had a lovely chest. The only trouble was she had been wearing her chest behind instead of in front.

Many years ago I tried to solve this problem of sitting. It is a difficult problem to solve. I saw that it was impossible to make a chair that would fit everybody's back. I finally discovered the way to do it, and had constructed what we call the "Sanitas chair". In the ordinary chair the head gets tired of holding itself up and falls down, then it pulls the chest down, and throws the hips out behind. In this chair the chest is kept up. The chair fits right into the back, and has the tendency to throw the head back, thus supporting the chest. There is just as perfect rest as though I were lying down. The muscles are completely at rest. The reason ladies like the rocking chairs is because it supports the whole trunk, and gives the largest proportion of rest. We have several rocking chairs constructed on the same plan. Now, I am not advertising chairs, but I want to call your attention to how you can reform the heathen chairs at home. Just put a small cushion in the lower part of the chair about two or three inches from the seat. Then you must do something more. Cut off the back legs of the chair about ~~two~~ half an ~~inches~~ inch causing the seat to incline backwards a little. The rocking chairs especially should be fixed in this way, because the ordinary rocking chair is a very unhealthful thing. See how what shape this rocking chair gives me as I sit. As I rise I will keep the same shape. You see how injurious that would be. If a person sits in one of those chairs for many hours,his internal organs will soon get out of place--the liver,stomach,kidneys,bowels, all the internal viscera. The ordinary rocking chair is simply an instrument of torture.

Now I have a chair of either kind here,and I will show you the difference in effect. Now in this hygienic chair. I will rise keeping the same position I have while sitting. Now,you see,I have a correct position. I have already shown you the position given by the other chair. So reform all the chairs at home. Put the cushion in in this way,and cut off about half an inch from the back legs,or else there will be a tendency to slip off.

Have a chair just the right height for every member of the family,especially if they are short.

Now exercise should be taken to strengthen these abdominal muscles. First,a correct position should be taken and maintained to prevent the muscles getting any weaker. Then active exercise should be taken to develop the abdominal muscles. Walking is an excellent means for doing that. There are some simple exercises which are to be preferred because they are a little more vigorous, and give a little more actual work .

(Here were given three illustrated exercises).

Rowing,and best of all,swimming,are exercises for the abdominal muscles that are singularly helpful,and the most effective means I know of developing these most important muscles of the body. These abdominal muscles have an important relation to the brain, spinal cord,and all the nervous system,and it is important that they should be kept strong and vigorous.

So do plenty of walking and swimming. Patronise the swimming pool. It is worth five dollars a day to everyone of you to have access to this swimming pool. I will not tax you longer. I thank you for your patient hearing.

~~X~~-- Lecture in Sanitarium Parlor By Dr.J.H.Kellogg. March 3I,I904.

# THE SECRET OF ATHLETIC SUCCESS.

It does not take a very deep scientist or philosopher to discover the secret of athletic success. Only a superficial knowledge of ph.-siology will be necessary for one to probe into this secret, and I propose in as few words, and as simply as possible, to make plain for the benefit of my hearers that for which we have come together.

Since the highest degree of muscular activity and endurance is largely dependent with the ease with which the muscular organism re-acts at the command of the will, in the study of fatigue, its causes and the best methods of prevention, will be found the interesting facts to which we shall first directyour attention.

It has been very clearly shown that muscular fatigue is the result of the oxidation of glycogen, a sort of a muscle starch or sugar derived from saccharin or the farinaceous elements of the food. The flesh of animals, of course, contains a certain amount of unused glycogen, and the fat of animals is also capable of supplying energy to the body; nevertheless, it is now known to physiologists that fats and oils can become a source of muscular energy only after they have been converted into glycogen, or muscular starch. It is thus evident that the products of the vegetable kingdom lend themselves more readily and efficiently to support the energies of the body than does the flesh of animals or animal product.

The popular notion that lean meat is particularly valuable as a force producer was long ago recognized by physiologists as an error. The inferiority of meat as a flesh producer is very cle rly presented in the following table, based upon the most recent ~~xxxxxxxxxx~~ re-searchesm, the results of which are presented at length by Landois and Sterling and other reliable authorities.

(Food units per pound)

| | |
|---|---|
| Beef | 512 |
| Potatoes | 445 |
| Milk | 339 |
| Corn | 1915 |
| Rice | 1944 |
| Peas | 1711 |
| Bread | 1088 |
| Chestnuts | 1696 |
| Walnuts | 2953 |
| Hazelnuts | 3553 |
| Almonds (Sweet) | 2853 |
| Peanuts | 2560 |
| Cocoanuts | 1728 |

By this we see that lean meat really contains only about one fourth as many food units as cereals and nuts. In other words, the value of beef as a source of energy, is only one seventh to one fourth that of the best foods of purely origin.

But flesh food is not only inferior to the products of the vegetable kingdom in the quantity or proportion of energy--producing elements which it contains, but it is also inferior in quality.

The proteid or albuminoid substances of which flesh food is largely composed--lean meat almost altogether, in fact-- are chiefly useful in replenishing or repairing the wastes of the body, and are decidedly inferior to vegetable fats in energy producing value.

For example an ounce of meat contains 31 food units, while an ounce of rice contains 121 food units, and an ounce of almonds 177 food units. It thus appears that flesh food is inferior in force producing qualities even to those cereals that are regarded as a light diet, such as rice, an ounce of which contains fourtimes as many food units as are contained in a like weight of lean meat, while an ounce of almonds is over five times as great as an ounce of beef.

But to this fact must be added a still more important consideration namely, that flesh food, while inferior as a source of energy to the leading constituents of a vegetable dietary, at the same time they contain certain toxines, or poisionous substances, which interfere materially with the degree of muscular activity, and which limit to a great extent the flesh-eater's power of endurance. These substances are the waste or excrementitious elements, consisting largely of an intensely poisonous substance known as Fatigue poison, uric acid etc. which naturally results from muscular effort. In the body of an animal the wastes which accrue from muscular exercise act as a muscle- or tissue-poison. This same substance also acts as a nerve irritant to accelerate respiration and skin action.

The weariness experienced after severe exertion is really due to the accumulation of these products. If these wastes could be carried off as rapidly as formed it would be impossible to get tired. In old age on account of the inability of the eliminative organs to carry off wastes there is susually a sensation of weariness on making the least exertion. The same is true of those afflicted with Bright's disease; the elimination by means of the kidneys being defective, these wates accumulate rapidly and constant weariness is experienced.

Extract of beef is really a solution of tissue-poison. In animals, as is man, these wastes are constantly forming and life depends on their constant elimination. There are in the body two streams of blood in constant circulation, one carrying to the tissue life, gathered from food, air and water, the other removing the waste products that cannot be appropriated. All the energy that sustains animal life is stored up in the vegetable kingdom - the fruits, nuts, seeds and herbs. The animal does not store up life or energy - it breaks it down. The dead products resulting from this tearing-down process necessitates the means by which they may be swept out of the system. This process of elimination is carried on by means of what is known as the venous circulation, which is the private sewerage system of every individual.

When an animal is killed the life is literally taken, for the life is the blood that flows out, which is the bright red arterial blood.

The venous blood containing the dead matter, or tissue poison, is retained. In squeezing or extracting the juices out of flesh we extract the dead or effete products that were on their way to the kidneys, lungs, skin and liver for elimination.

To prove this take a small amount of beef extract and urine in separate glasses and after allowing them to stand with for a short time then with the eyes closed try to differentiate between them by their aroma. You will find that the task is well-nigh impossible, for the reason that they are identical. In the one case the urea, uric acid etc. have reached the kidneys and have been eliminated; in the other case they were on their way to the kidneys for elimination when the animal was killed. In fact it has been found that beef extract contains more poison than urine, for it contains in addition to the waste thrown off by the kidneys, the wastes naturally eliminated by the skin, lungs and liver.

By experiment made upon animals of the same weight and, so far as could be determined, the same inherent power to resist poison, it was found that not only was beef extract highly poisonous, but when injected into the veins of a rabbit the beef-inoculated animal succumbed sooner than the other into which the urine had been injected

Muscles from the leg of a frog have been carefully dissected and to one end of the muscle a thread attached, to which a weight is suspended. Upon stimulating the muscle by means of electricity, it contracts and raises the weight. After several repetitions of this muscular contraction the muscle no longer responds to the stimulation; it is now in a state of poisoning or fatigue. The tissue has been broken down by exercise , and as the muscle is apart from the body of the frog there is no natural means of elimination of these wastes, and paralysis of the muscle ensues. But, after carefully bathing the muscle in a mild saline solution, thus washing out the wastes, we find that upon applying the electricity that it contracts and lifts the weight as before.

Place upon it a few drops of beef extract and it will not respond to stimulation by electricity. Why is this? The beef extract and the poison formed by exercise are identical, proving beyond a doubt that beef extract causes muscular fatigue.

It is therefore one of the worst substances that could possibly be taken by athletes It is not a food but a ~~veritable~~ solution of poisons. The athlete who depends upon flesh meats or their extracts, has by their use thrown into his circulation products responsible for his defeat, for the eliminative organs are not equal to the task of keeping the muscles freed from these wastes in addition to the wastes normally formed. Muscular fatigue must follow.

It has no doubt often been observed by athletes that in running, or riding the bicycle, that the first half-hour or hour is very difficult. After this period the "second wind" as it is called, is reached, and they do not feel as tired at the end of the fifth hour as after the first.

The first stage is due to the eliminative organs not being properly adjusted to the sudden increase in the waste matter formed, but after perspiration has begun freely, the pores of the skin allow the escape of these wastes and there is a feeling of well-being, instead of fatigue, for the muscle poisons are now eliminated nearly as fast as they are normally formed.

It is evident then that the future must be with the athlete who eschews a flesh diet, beef extracts etc.; the one who keeps his system free from all unnecessary wastes that cannot be eliminated; the one who takes his food direct from the laboratory of nature, and not second-handed or after being filtered through an animal. It is possible for him to run and not grow weary, to walk and not faint.

In the light of these facts it needs no argument to show that an animal or man feeding upon flesh food and thus adding to the poison generated in his own body those developed in the body of another, must accumulate within his system an abnormal amount of waste substances or fatigue-poisons sooner than the one, who, with other conditions identical, abstains from flesh food.

The quantity of fatigue poisons generated in the body of an animal by its activities is so great that physiologists have found it possible to produce in a fresh animal, all the symptoms of fatigue by simply injecting the blood of another animal greatly fatigued by prolonged and violent exercise.

These facts afford scientific explanation of many very interesting observations in relation to the comparative strength and powers of endurance of flesh-eating animals and non-flesh-eating animals. The elephant, the hippopotamus, which are among the strongest of all living animals, subsist upon the coarsest of vegetable foods. The reindeer, the fleetest and perhaps the most enduring of all living animals, replenishes its stores of vital energy from the inhospitable region in which it lives.

The horse and the ox, those magnificent magazines of energy, which have rendered such priceless service to the human family, are strict vegetarians in habit, as are also the orang-outang, the chimpanzee and the gorilla that rules the forest in which he lives, but never slays to eat. The gorilla is said to be a match for a lion or a leopard in strength. He has often been known to kill a hunter with a blow from a club or his fist and will snap a rifle barrel in his hands as if it were a twig; but although he slays the hunter he never eats him.

Would the horseman with an extra long drive or ride think of adding to the ordinary diet of the horse a beef-steak or a mutton chop, as a means of preparing him for the extra exertion required. Hunters feed their dogs upon corn-meal mush or some similar food, knowing well that the flesh fed dog has poor wind and little power of endurance, from which it appears that even carnivorous animals are able to manifest more energy and great endurance when fed on a non-flesh dietary.

Without going further in this direction, I will now try to outline in a general way what I believe to be some of the more essential features conducive to athletis success.

1st. The dietary must be pure and unadulterated, whether by artificial sophistication, or by the toxic matters which accumulate within all animal bodies. It should be eaten at first hand rather than through the organism of another animal, and should consist of fruits, grains and nuts, all of which are suitably prepared. Soft foods should be largely discarded. Grains should be eaten chiefly, if not wholly, in a dry state, cooked at sufficiently high temperature to be slightly brown in color, thus bringing the starch into acroodextrine, the third step in the process of transforming starch into sugar.

The fats and nitrogenous principles found in properly prepared nuts furnish not only nutrient elements, but also the flavors, and to a certain degree the gustatory satisfaction supplied by flesh foods.

The diet should include an abundance of fresh fruit, the acids of which stimulate gastric digestion, and encourage the action of the liver and kidneys, thus securing purity of blood and tissue. It is important that acid fruits be taken at the close of the meal rather than at the beginning or along with it, as salivary digestion is greatly interfered with by acids.

Fluids should be taken only sparingly if at all at meals, but should be taken abundantly at other times especially on arising in the morning and on retiring at night. Tea and coffeee should be discarded, for the reason that they are not only harmful narcotics, but interfere seriously with the digestion of both the proteid and starch, as is clearly shown by the experiments of Sir Wm. Roberts and other investigators.

The old English custom of eating twice a day, according to Thomas Tyron, between eight and nine in the forenoon and three and four in the afternoon was in every way preferable to the modern method of four and five meals. The Bedouins eat twice per day, and are perhaps the toughest and most enduring men on earth. The natives of India, Spain, South America, China and Japan eat twice a day, which is without question the prevailing question in ancient as it is in modern times in these countries.

2 nd. In training and in taking daily exercise for mere health's sake sufficient work should be gone through daily to produce vigorous perspiration, and muscular weariness. However, exercise to the point of exhaustion is not necessary.

3rd. During athlettic training and while possible while performing feats of endurance massage has its place and is a most valuable aid. The manipulation of the muscles together with rubbing and friction applied in such a way as to mechanically aid in the carrying off of waste products is the most important effects, while th the secondary effects are upon the skin, the nerves and glands of the body, in stimulating them to greater activity.

4th. The daily cold or cool bath should be taken on rising and should be followed by vigorous rubbing so as to produce redness of the skin, which is an indication of a good reaction of the surface circulation.

5th. The dress should be such as to allow perfect freedom of movement of every muscle and limb of the body.

To reduce weight, do so by an extra amount of clothing with vigorous exercise. I have seen one 182 lb. (13-stone) bicyclist reduced to 154 lbs (11-stone in this way in six weeks, and while losing in weight, at the same time gaining in strength and endurance.

6th. Tobacco, tea, coffee and alcoholic and all other stimulants must be discarded as means which produce artificial felicity the practice of which must put to sacrifice future comfort and health, and the premature failure of the faculties of the vital functions. Even in athletics, the body cannot be treated as a harp of pleasure, upon which one can play with impunity, so long as some gratifying sensations may be elicited , without incurring the sure penalty of suffering, disease and premature death.

It was the honor of the reader to personally attend to the dietetic supplies of the winner of the much-talked-of six-day bicycle race held in New York city a little over a year ago, when Mr. Chas. W. Miller demonstrated the superiority of a simple vegetarian fare as quite sufficient to enable him to carry off the honors and to establish new records. During the six days of the race his diet consisted of oatmeal, rice pudding with raisins and figs, apples, oranges and grapes. He drank considerable koumiss. During the race he ate over a peck of apples and three dozen oranges. He had nine hours sleep from fifteen to thirty minutes at a time. One hour was the longest continuous sleep allowed him during the one hundred and forty-two hours. He was off his cycle just fifteen hours all together, and during the time not asleep he received vigorous general magsage. The first day of the race Mr. Miller lost three pounds in weight. At the finish he had not only gained this back but had added another pound. The distance traversed by this winner was 2007-4/10 miles.

The second best man in this race was Mr. Frank Waller of Boston/ who rode 1985 miles and trained in the same manner as Mr. Miller. These two men not only came out freshest in the race, but at once began riding at exhibitions.

Mr. Miller's trainer, Mr. Jno. West of Chicago, a man of twenty-five years experience as trainer of athletes, is a staunch vegetarian and attributed the success of his man to the diet and the massage. The latter he considers even better than sleep, as its beneficial effects are realized more quickly.

Two months later in San Francisco Mr. Miller again entered a six days' race in which he triumphed, and even broke his New York record by nearly 150 miles, while at the finish he rode fifty miles ahead of the second man. This, too, was accomplished on a vegetarian diet.

These races were certainly a most severe trial of endurance, and the fact that the vegetarians came out ahead is a practical lesson of no small value in dietetics.

It is remarkable, however, that athletes and sportsman are the quickest to seize hold of every new point which offers aid to physical development and endurance. Why should not business men, lawyers and preachers of the gospel be equally anxious to adopt a dietary which will secure the keenest mental activity and physical endurance. Success in business, professional or political life, depends upon physical endurance quite as much as does success to a contestant in the prize ring or on the race-course. Some sharp-witted people are beginning to see this fact, and not a few are turning from old ways to the new, and earnestly laying hold of the good, pure, strength-imparting food substances which nature's bill of fare affords, and the secret of athletic success is coming to be recognized as not only the most beneficial for the training of athletes, but actually necessary as a means most potent for the recovery and maintenance of those who desire to keep above the miasma of colds and influenza.

EXERCISES FOR SPECIAL PHYSICAL DEVELOPMENT.

Four groups of muscles on Physical Chart arranged by Frank E. Miller.

__Height.__ Lying on floor, stretch arms up well over head, touching floor. While walking keep head, and chest raised well. Hang in canvass loop, by head, and under arm pits, several minutes daily.

__Weight.__ __To increase,__ exercise all muscles daily. Avoid excess mental or physical. Rest after meals. Do not hurry. Sleep all you can. Avoid haste and excess in eating. See Sanitarium Diet List.

__To reduce,__ exercise vigorously, dress warmly, induces profuse and prolonged prespiration, fast walking. Exercise muscles for waist and abdomen, especially those lying down -- to--Avoid fats and variety of food at meals. See Sanitarium Diet List.

__Arms.__

__Hand Flexors.__ Closing hands tightly 12 to 18 times.

__Hand Extensors.__ Open hands and spread fingers 12 to 18 times.

__Forearm Pronators.__ Rotate arms backward with resistance. 12 to 18 times.

__Forearm Supinators.__ Place hands on shoulders, rotate arms foreward, and move arms to sids - horizontal with resistance 12 to 18 times.

__Arm Flexors.__ Place hands on shoulders, then to side, or horizontal then under arm pits, with resistance, 12 to 18 times.

__Arm Extensors.__ Place hands on shoulders, and move arms to side - horizontal with resistance. 12 to 18 times.

__Latissimus Dorsi.__ Raise arms to side - horizontal, and bend arms to front of chest, and draw elbows well back with resistance 12 to 18 times.

**Pectoral.** Raise arms to side – horizontal, with resistance; draw arms to front – horizontal. 12 to 18 times.

**Shoulder Retractors.** Arms front – horizontal, with resistance. Draw arms to side – horizontal, with hands in close to chest. Localize movement as much as possible back of shoulders 12 to 18 times.

**Legs:**

**Foot Flexors.** Raise up on heels, resist with muscles on front of legs 12 to 18 times.

**Foot Extensors.** Raise up on toes slowly; resist with muscles on back of legs 12 to 18 times.

**Leg Flexors.** Bend knees slowly, with resistance as you lower the body, 12 to 18 times.

**Leg Extensors.** Bend knees, raise on toes, sink the body as low as possible, Raise left leg – then right resisting as you straighten the body, 12 to 18 times.

Raise L. & R. leg alternately

**Thigh Flexors.** Bend knees as low as possible; raise and lower the body while the legs are flexed with resistance going down, 12 to 18 times.

**Thigh Extensors.** Repeat exercise of thigh flexors, with resistance going up, 12 to 18 times.

**Thigh Abductors.** Stand with the feet about twenty inches apart; move left leg sideward; left slowly with resistance, raising foot from floor about six inches; localize resistance on outside of thigh. 12 to 18 times then repeat the same for right leg.

**Thigh Adductors.** Same as for abductors, with resistance on inside of thigh, while closing the legs. Swing left across in front of right, then repeat same right.

Trunk:

*Lying on back.*

Trunk Anterior. Bend trunk forward with hands on hips; bend from hips, with resistance. 12 to 16 times. *Lying on floor, Raise left leg, repeat with right Then both*

*Lying face downward.*

Trunk Posterior. Straighten trunk with hands on hips, with resistance while straightening. 12 to 16 times. *Raise left leg, repeat with right.*

Trunk Laterial. Bending trunk sideward, left and right, with hands on top of head, with resistance. 12 to 16 times.

Neck Anterior. Bend head forward,- hands on front of forehead, with resistance. 12 to 16 times.

Neck Posterior. Bend head backward, hands on back of head, with resistance. 12 to 16 times.

Neck Lateral. Bend head sideward, left and right, hands on sides of head, with resistance. 12 to 16 times.

Respiration. Take a full inspiration through the nostrils, making an effort with abdominal muscles to force the air into the upper part of chest. Exhale, and relax abdominal muscles, holding chest up by the intecostal muscles (muscles that raise and depress the ribs in expiration and inspiration). 10 to 20 times.

Total Strength.

The all-round exercises that are taught in the 7 A. M. 9:15 A. M. and 3:00 P. M. classes will improve the total strength from 10 to 20 per cent in from two to four weeks.

Coefficients:

All the points in the chart which fall below 100 indicate relative inferiority of strength. See formula on Page 2 of physical chart.

Object of this course of Gymnastics.

To provide a course of exercises simple in character, and of the highest hygienic value for individual home practice.

Exercise from 10 to 15 minutes daily, in the morning, preferably on arising. Finish with a cool or cold shower, spray, or wet towel rub. The exercises are in harmony with groups of muscles tested on Dynamometer for the purpose of developing, strengthening and giving endurance to the larger groups of muscles of the body.

1. Stand erect, feet eight inches apart, head and neck drawn well back; hips back, chest up.

(1) Flex and (2) extend fingers (
( arms down to sides
( " side - horizontal
( " front - horizontal
( " vertical. 12 to 16 times.

2. (1). Hands on shoulders. (2) Rotate arms forward, and move to side - horizontal, palms up. (3) Rotate arms backward from side horizontal. (4) Palms turned backward. 12 to 16 times.

Return to starting position.

3. (1) Hands on shoulder. (2) Move to side horizontal, and under arm pits to shoulders. (1). Repeat with arms to vertical (2) and under arm pits. 12 to 16 times.

Deep breathing exercises. Abdominal breathing, force air to upper part of chest, relax abdominal muscles and exhale. 10 seconds inhaling. 10 seconds exhaling.

4. Raise arms to side - horizontal(arms straight), bend arms with—

1. Hands front of chest; elbows well back.
2. Straighten arms over head to vertical.
3. Same as 1. 4. Starting position, arms down to sides. 12 to 16 times.

5. 1. Raise arms to front - horizontal, fists clinched.

2. Move arms to side - "
3. Same as 1. 4. Starting position, arms down to side. 12 to 16 times.

6. (1) Stoop stand. (Bend trunk forward from hips (45 degrees), legs 20 inches apart, hands in front of chest, elbows well up and back. 12 to 16 times.

(2) Swing arms to side- horizontal, and back in horizontal plane as far as possible.

Repeat deep breathing exercises.

7. Hands on hips; rock on heels and toes. 16 to 40 times.

8. Hands on top of head; bend knees (full squat) 14-20 times.

9. Jump to stride- stand slowly, feet about 24 inches apart, and return feet together. 20 to 30 times.

Breathing exercises.

10. Place hands on floor, jump backward, drawing knees well up between arms. 16 to 24 times.

11. Bend trunk forward and straighten upper front of back going down and coming up.

12. 1. Arms over head to vertical; bend trunk to left side (feet 24 inches apart), touching floor with left hand, right arm up overhead.

2. Straighten body and repeat to right. 12 to 24 times.

Repeat breathing exercises; try to lengthen time of inspiration and expiration.

13. (1) Squat, placing hands on floor. (2) Extend left leg sideward.
" right " " 12 to 24 times
" both legs "

Execute same forward then backward.

14. Front rest; arms straight, body facing downward and toes resting on floor.

Chin 3 to 10 times. Raise left leg. 12 times.
" right " " "

15. Lying face downward, arms at sides of body.

Raise left leg, knee straight
" right " knees "
" both legs knees "

16. Hands on hips; Raise body from floor with chest well off the floor.

17. Bend head forward and backward. 12 to 16 times.

Turn head sidewise left and right. 12 to 16 times.

18. Lying on left side, raise right leg. 12 times.

" " " " raise hips. 12 times.

" " " " " body, with right hand on hips. 12 times.

Repeat same to other side of body.

19. Lying on back; breathing exercises.

Draw left knee well up to chest, assisting with hands 12 to 16 times.

" right " " " " " " " " " " " "

" both " " " " " " " " " " " "

20. Lying back;

1. Arms over head; swing body up to sitting position.

2. Let body fall slowly to lying position. 12 to 16 times.

21. Raise both hips, body resting on heels and shoulders. 12 to 16 tim

Breathing exercises.

22. Raise left leg, keeping knees stiff. 12 to 16 times.

" right " " " " " " " "

" both legs " " " " " " "

23. Place hands on floor; raise body, resting on heels.

" " " " " left leg, resting body on right heel.

" " " " " right " " " " left heel. 8 to 12 times.

Breathing exercises while sitting on floor; inhale while raising arms to vertical; relax, dropping arms to sides.

24. (1) Sit on floor; hands back of body about eight inches.

(2) Raise heels about eight inches and spread legs (Abducting and adducting legs) 12 to 24 times.

25. (1) Lying on floor, swing body to sitting position, drawing knees up in front of chest. (2) Let body fall slowly to lying on floor. 12 to 16 times.

## PHYSICAL CULTURE.

### Rules for Breathing.

When exercising, be sure to have the room well ventilated, and breathe nothing but pure air, as the purer the air the better the results.

Use this system of exercises wisely, as out of it you can make Slow, Light, Quick or Heavy Work, as the state of your constitution and temperament may demand. To illustrate: If you are of a nervous temperament, practise exercises slowly. If very fat, or of a phlegmatic temperament do your work more quickly. If you are in a fairly normal condition, work strong and fast enough to make the body perspire. If you wish to grow very strong and gain showy muscular development, work hard, slowly and long and put strong action into all parts of each exercise.

Take a cool sponge bath immediately after exercising; after drying with an ordinary towel spend five minutes massaging the body, especially the upper and lower limbs. This assists the circulation of the blood, andsoothes the nerves.

To prevent any soreness, practise very lightly and for short periods of time the first week; afterward moderately increase your working time, until you can do the exercises the number of times as suggested. If you practise these exercises daily, you will become more Active, Stronger, and more Enduring, and you will have Good Health. The parts of the exercises that weary you the quickest are the muscles that need the exercises the most. These exercises are for the average Man or Woman. Take them quickly and vigorously in the morning, followed with a quick, cool sponge bath, and they will stimulate. Taken before going to bed and done slowly, they will prove a good sedative, especially if they be supplemented with a bath.

## SPECIAL DEVELOPMENT.

Take for your special development the exercises that affect the weakest portion of your body, because the body should be developed by moderate and light exertions rather than dangerous ones, the weakest portions always receiving chief attention, and being more frequently subjected to movements adapted to their invigoration and growth. Exercise each part of the body until slightly fatigued. Do not tire out a muscle. Avoid unequal development.

Better health, greater strength of body, development of the will, self-control, grace, improved circulation, respiration and digestion, are all yours if you take these exercises daily.

The action of the heart is made weak by too much or too little exercise. Overwork, either mental or physical, makes one cross and irritable. Be temperate in all things.

## B R E A T H I N G.

Incorrect Breathing is the cause of nine-tenths of all diseases of the present day.

Correct Breathing cures all diseases that are caused by improper circulation and lack of proper supply of oxygen.

## CORRECT BREATHING.

THe first principle of this system is to breathe correctly. THe correct method of breathing is the abdominal or diaphragmatic, which is assisted by the ribs. The diaphragm is a dome-shaped partition separating the chest above and the abdomen below. As soon as we take a deep breath the diaphragm descends and flattens out at the sides, thus pressing down the abdominal organs below; as a consequence of this, the exterior surface of the abdomen assumes a rotund, convex appearance. When expansion occurs, the pressure on the abdomen is released and its surface loosens its roundness of outline as a result of the diaphragm resuming its original position. We wish to lay great stress on the shape of the abdomen during respiration, as one frequently sees people take an inspiration, hunch their shoulders up, draw in their abdomen, and then expire and force their stomach out, and they are under the impression that they are breathing correctly, whereas the exact opposite should take place. In correct breathing there should be no movement of the collar-bones or shoulders, merely a forward movement of the breast-bone, more especially the lower part, combined with rib movement, and the alternate enlargement and diminution of the abdominal walls.

The reason why the diaphragmatic form of breathing should be cultivated is not difficult to understand, for below we have the broad bases of the lungs resting on and encompassed by soft and resilient structures. Here the lungs have full play, for their movements are not hampered as they are above by close opposition to great bloodvessels and are not surrounded by a casement of bone.

## EXERCISES.

### Breathing.

Hold arms at side-horizontal, knuckles upward, weight of body on balls of feet, heels together. As you stretch your arms sidewise as far as possible, take a quick, deep breath, inaudibly, always through the nostrils, pushing the abdomen out as you inhale for a few seconds; as you exhale, draw the abdomen in, at same time bring arms to front-horizontal. (See Fig. 1) Also take as deep a breath as possible, then bear down for a few seconds, so as to increase the tension of air in upper chest. On exhaling use a small tube, as blowing through the tube increases the depth of respirations. Ordinary inhaling does not reach the lungs, and scarcely enters the upper third at all; holding the breath forces oxygen to the remotest parts, bringing the air closer to the blood and aiding in its exchange of gases; it brings active pressure to bear on all diseased, weak, unused or inflamed portions of the lungs and air passages. Whenever oxygen and carbon meet in the lungs, it is fatal to diseased germs. Repeat exercises 8 to 12 times.

DATA RELATING TO GYMNASIUM, STAIRS, EXERCISES, ETC.,

Travelling 13 feet on a level is equivalent to lifting the body one foot high.

Amount of energy required to carry one pound one mile, walking at the rate of about three miles an hour is .4 calories. The amount required to lift one pound one mile high is 5.5 calories.

The consumption of 1 c.c. of oxygen represents 4.7 small calories.

Stair climbing: Stairs 12 feet high, 53 feet from landing to landing.

Going over the stairs once is equivalent to lifting the body 20 feet.

Walking back on a horizontal from landing to landing is equivalent to four feet of vertical lift.

The trip over the stairs and back on the horizontal, touching the wall on either side is equivalent to lifting the body 25 feet.

Twenty excursions over the stairs is equivalent to travelling a mile on the horizontal.

Sixteen round trips from stairs to stairs and wall to wall is equivalent to a mile on horizontal.

3,000 foot pounds are equivalent to 1 calorie. (To be exact --3080 f-p))

A pound of fat is equivalent to about 250 calories, hence to burn a pound of fat requires a person to do work amounting to 750,000 foot pounds. Four-fifths of this work is done in the body and appears as heat, so the actual number of foot pounds of muscular work required is ony 150,000 foot pounds, one fifth of the total work.

To ascertain the amount of work on the stairs required to burn an ounce of fat, multiply the person's weight by 20 to determine the amount of work done in passing once over the stairs. Divide this number into 150,000. This will show the number of times a person should pass over the stairs to burn one ounce of fat. Or when the round trip is made from wall to wall, multiply the person's weight by 25 and divide this result into 150,000. This wouldindicate the number of round trips to be made from wall to wall. That is, over the stairs touching the wall and back on a horizontal to the wall on the opposite dide.

In going over the stairs in ten seconds one is doing work equivalent to travelling on a level at the rate of 18 miles an hour.

If the work is done in 12 seconds, the work is equivalent to 15 miles an hour on the horizontal.

Work done in 15 seconds would be the equivalent of 12 miles an hour. Work done in 30 seconds, six miles an hour.

When using this exercise obese person's pulse rate and breath rate should be taken before they begin the exercise.

Thepulse and respiration should be taken after one excursion over the stairs. If the pulse is more than 100 or the respiration more than 24, the person should rest until the pulse and breathing have returned to nearly normal rate.

If the patient's lips are blue and dusky, and there is much shortness of breath this exercise is contra-indicated. It is also contra-indicated in cases of weak heart, fatty heart, and in cases of myocarditis and serious organic disease af the heart.

It is chiefly valuable for young persons and persons in middle life who show no evidence of organic degeneration.

Each time the exercise is taken a record should be taken of the foot pounds of work done.

## THE THERAPY OF EXERCISE.

Exercise a therapeutic measure of great value.

Regarded by many as being the greatest therapeutic agent.

Benfits of in deplacement of internal organs.

Utility of in indolent ulcers, chronic rheumatism, surgical sounds of long standing.

## ATHLETIC EXCESS.

## DEEP BREATHING.

## EXERCISE FOR INVALIDS.

Necessity of.

Oxygen the most powerful of stimulants.

What kind of exercise is best?

Ans. That which is suited to the aged.

Must begin gradually.

Exercise for invalids in bed.

## MANUAL TRAINING AN AID TO MENTAL BALANCE.

## HOW TO WALK.

## PHYSICAL EDUCATION AS A MEANS OF PREVENTING DISEASE.

The best preventation of disease is a good constitution.

Cholera, typhoid fever etc, do not attack perfectly healthy people.

## WHAT TO DO FOR EXERCISE.

## PHYSICAL SPORTS FOR WOMEN.

## HOW A WOMAN MAY RETAIN HER BEAUTY.

## THE ART OF BREATHING.

## CORRECT POSITION AS A REMEDIAL AGENT.

The most efficient remedial agents neglected because of simplicity.

Recumbent position in fainting .

Elevation of injured member in hemorrhage.

Elevation in congestion of dependent organs.

Sitting work for the tired house-wife.

Babies and helpers invalids should be frequently turned over in bed.

Friends and nurses often fail to "disturb" patients in stupor. Patient often loose their lives as the result.

Bed-sores result of continuous pressure.

Diseases in which the patient can breath in only one position.

Upright position in asthma.

Position in nosebleed.

Improper seats for children.

## EXERCISE AS A REMEDY FOR OBESITY.

No calss of patients need exercise more.

Fat men find exercise difficult. Why?

An accumulation of fat about the heart.

Accumulation of fat in abdominal cavity.

Deficient oxygenation.

Excessive accumulation of heat within.

Why exercise as generally employed often fails in the treatment of obesity.

Too rapid deminuation of fat must not be looked for.

Fatigue as an element in reducing flesh.

The effect of walking may be increased.

1. By walking a little faster than usual.

2. By walking up a hill or mountain-side.

The time when exercise should be taken.

# S A N I T A R I U M L E C T U R E S.

## Physical Exercise.

J.H.Kellogg,M.D.

I will talk to you a little while to-night about physical exercise for aged persons. Aged people need exercise more than any other class of persons but have less capacity for exercise,--in the first place they have less facilities for exercise and less aptitude for movements; in the second place they have less capacity to endure exercise,--and why? Because there are certain changes which take place as the result of advancing age--certain structural changes, as the result of which the individual becomes less able to engage in active exercise. What are a few of these? First in early life the pulmonary artery is larger than the aorta. This is because we have in the lungs a higher blood-pressure than in any other part of the body. Of course more blood enters the aorta and corresponding area than any other part of the body, and so the blood-pressure is higher there. In a house supplied with a large water-pipe the pressure is high and in a house supplied with a small water pipe the pressure is low. The same is true of the body--if the pulmonary artery is larger than the aorta the blood-pressure will be greater there and if the aorta is larger than the pulmonary artery the blood-pressure in the aorta will be the stronger. The blood is more perfectly purified in a young child than in the adult or aged person because there is facility for the removal from the blood of the $CO_2$ as the result of exercise.

What would be the natural result or consequence of an accumulation of poisons in the blood and tissues? The first effect would be breathlessness, because breathlessness is a symptom of poisoning. When a person is breathless he is in a condition of poisoning.. You can make an animal breathless by bleeding him; the first symptom of hemorrhage is breathlessness; when a person has lost a great deal of blood in a surgical operation we notice that he breathes quickly. If a person is likely to die from hemorrhage--as the result of hemorrhage of the lungs--he says, "I can't get my breath." I have seen cases in the hospital in which persons die from internal hemorrhage; there was such a great loss of blood that the patient died in consequence, and breathlessness was the first symptom. I have been present at a post mortem examination in a case in which the breathlessness had been very great,--the patient was taking great breaths of air; the amount of blood present was too small to carry away the poisons and the blood pressure was so low that the poisons could not readily escape.. Now the pulmonary blood-pressure of the old man being low and the poisons accumulating, breathlessness from blood-poisoning comes very readily. Again, the arteries of the old man wither or shrink up, and this withering of the arteries causes a less supply of blood. This shrinkage of the arteries is such that they disappear, so that where there may be a dozen small arteries in the young man there may be only five or six in the old man, and in consequence of this there are more poisons accumulating in the tissues as well as in the blood, so the old man so the old man gets out of breath very quickly; this is not because his lung capacity is not so large as it was but because his blood does not remove poisons quickly enough because the pulmonary artery is so small and the blood pressure is too low.

This change in the size of the pulmonary artery begins at the age of about forty and becomes marked at the age of fifty and for this reason we say that old age begins at fifty. We must remember/ however, that some persons are as young at sixty as others are at forty, hence age is entirely relative. An eminent French phiologist says "Every man is as old as his arteries." The arteries really determine the age, from a physiological standpoint.

There is another change of the arteries; they not only become withered and lessened in size, but the walls of the artery undergo a change. The connective tissue increases in the arterial walls, in consequence of the change in the nutritive conditionof the body the arterial walls contain a large amount of fibrous tissue and this tissue gradually contracts and so the arteries diminish in size, and this gradual contraction continues and is the real cause of this withering of the arteries, and by and by they shrivel up and disappear entirely. But this cicatricial condition of the arteries destroys their natural elasticity and the consequence is that the blood vessels cannot readily dilate so as to allow a large amount of blood to pass directly through the system. When the heart's action is accelerated , if in a normal condition, the blood goes to the lungs, the blood-pressure upon the tissues is increased while the beating of the heart drives the blood through the arteries. In consequence of the shrinkage of the arteries the blood pressure rises in the body because the aorta is larger than the pulmonary artery so that this increased work of the heart disproportionately increases the bloodpressure in the brain and all the other tissues in consequence of the inability of the blood to pass right through. If the water is to pass through the water pipe and the mouth or orifice of the pipe is closed or made verysmall, than the pressure of the water will rise, and the water will be carried off. The same thing is true of the bloodvessels of the body,--the pressure rises in consequence of increased heart activity; there is a greater resistance at the heart, as the pressure of the bloodvessels increases the resistance of the heart's activity increases so that the labor of the heart increases with exercise and breathlessness arises from the inability of the heart to unload itself of blood.

There is a danger in connection with this which should be noticed, and that is, the sudden increase of blood pressure which is due to the increased tension of the peripheral blood vessels,--an increased danger of rupture of bloodvessels or arteries which have not been able to expand--which have become rigid and unable to dilate--there is an increased tension upon the walls of these vessels and they are more liable to rupture from these causes; the same changes which take place renders the walls rigid and brittle in the case if the old man so that he becomes liable to apoplexy and so there is danger when the heart's action is increased by exercise and correspondingly increased blood pressure.

Now there is another reason why the old man has but little ability to exercise and becomes quickly breathless when he engages in exercise is, because all the eliminative organs also diminish; his liver becomes small, his kidneys are small, his skin becomes fibrous and rigid,--that is why the old man becomes wrinkled. The condition of the lungs is also the same,--the lungs become somewhat shrunken, and every organ of the body--all the excretory organs diminish their activity.

The result of this shrinkage of the excretory organs is accumulation of poisons in the blood; the blood becomes poisoned. So, in the old man, the poison-level, as we would say, is raised. Suppose, for example, in a healthy person the poison-level is down here (diagram) , and in the old man it is up here,- in the old man exercise raises the poison-level up here, and then breathlessness indicates that he must stop and rest until the poisons are eliminated. Now in the old man the poison-level is high all the time--the level of the poison is continually high so that it requires but little exercise to raise it so that the accumulation of poisons--so that nature warns the individual by these symptoms of constantly accumulating poisons within the body. So the old man easily gets out of breath because he is unable to take certain kinds of exercise. The very conditions which require exercise in the old man are all exaggerated by exercise. What must he do then? He must take a large amount of exercise, but it must be very slow exercise--a great amount of exercide but slow exercise.

But there is another thing that must be considered in the old man, and that is, while he requires a great amount of exercise he becomes easily fatigued. What then is fatigue? It is simply a state of poisoning. Fatigue is a condition in which poison has accumulated to such a degree that one must rest and allow the poisons to be eliminated. If we could extract from the tissues of an individual the poisons which induce fatigue and inject them into a dog, the dog would become tired. An experiment of this kind has been tried with the result of making the dog tired by means of a hypodermic injection of this kind, hence fatigue is due to poison. Now the old man has in his tissues, all the time, an accumulation of tissue poisons, so that he requires but little exercise to add to them so as to induce fatigue so as to induce fatigue and inability to exercise .

But there is another fact in reference to fatigue in the old man which must be considered, and that is, that while he more easily becomes fatigued by exercise he is not warmed,--although he exercises too much he is not warned, so he goes on with his exercises; he feels no fatigue; he feels as fresh as when he began, but to-morrow he is completely exhausted and he does not easily recover from it and the next day he is still exhausted. Several days will be required for him to recover from the effects of an effort from which a young man would recover in a few hours. This is what is termed consecutive fatigue , and it is a matter of importance to understand this because the old man is liable to suffer much from this kind of fatigue which comes on the next day. . We often ask an old gentleman after he has been making a special effort, if he feels exhausted. "O no," he answers, "I am not exhausted, but I shall pay for it to-morrow." He knows this by his own experience , but he does not feel it to-day because his nervous sensibilities are not fatigued to-day . So we must remember when prescribing exercise for the old the feelings of the individual must not be the guide and he must be instructed to take only a certain amount of exercise.

Now what exercise should the old man have? Horseback riding walking, and any other exercise which requires slow movements of the arms and legs. Swedish gymnastics are admirably adapted for the man of advanced age; it is the only system of exercise which is adapted to the aged man. Aside from these exercises we have walking, riding,--and for aged persons carriage riding is of great davantage. There is very much more to be said on this part of the subject.

Exercise for Invalids.

~~Now let us consider exercise for invalids.~~ (There is no one thing which is so important, for chronic invalids, from a therapeutical standpoint-- ~~and I am satisfied of this the more I see of chronic invalids--~~ as exercise. ~~I have already called attention to the fact that~~ exercise is the most important of all the means of vital regulation in the body~~,--it is a vital regulator~~; it regulates ~~the supply and demand~~ the relations of the supply and demand of the system; if there is too much ~~supply~~ of material taken in, exercise will compensate for it. ~~The~~ exercise also regulates the vital processes of the body --excretion, elimination, etc.,--~~I have not time to review all the physiological effects of exercise~~, but all these physiological effects of exercise are as necessary ~~may be brought to bear therapeutically~~ in the case of a sick person as of a well one. If ~~you want~~ we wish to know what is the value of medicine for a sick man, ~~we~~ we first ascertain ~~what~~ its effect ~~is~~ upon a well man, and when we find that the agent used is able to powerfully modify the vital processes of a well person, we know that it may control those processes in a diseased person. So the most powerful ~~drugs~~ agents of any kind ~~those which have the greatest effect in cases of sickness and~~ in disease are those which ~~most~~ have most powerful~~ly~~ influence ~~him when~~ in health; there is no doubt about that.

For example, there is no agent that will reduce fever like cold water, and there is no agent by which persons can be more easily cooled than by cold water; cold water is a very powerfully depressing agent, it is also a powerful stimulant,--according as it is used,--but we will talk about that at another time.

Exercise for convalescents is particularly useful--exercise for those who are weak and convalescent is good to build them up. What kind of exercise is needed for this purpose? We need exercise for vital stimulants. ~~We need~~ oxygen~~, which~~ is the most powerful of all stimulants, ~~hence we need it for the purpose of~~ quickening the vital activities.) An old doctor whose son was suffering from epilepsy asked advice as to what was best for his son, and was told that oxygen would build up his system and be an excellent nerve tonic, so he bought an apparatus and fitted it up at home for the special benefit of his son. He consulted me about it and I asked him about how much oxygen he would expect, to administer to his son in the course of a day by the use of his instrument; he thought perhaps two or three gallons--a gallon two or three times a day, he thought, would be a pretty good dose,--and I suppose that is about as much as is ordinarily used for a dose for medical purposes. Then I sat down and showed him how much more oxygen the young man would take in by increasing his lung work by exercise, and he saw at once that the young man would get at least a hundred times as much oxygen by work on a farm, using his arms and legs, than he would by taking it as a medicine. I have already stated to you how much more oxygen (a person takes into his lungs seven times as much oxygen when exercising ~~than~~ as when lying quiet, while ~~that~~ the amount of carbon dioxide eliminated is about four times as great when a person is exercising vigorously as when he is lying down) the amount of oxygen taken in being seven times as great. So, as I have said, exercise is one of the very best means of getting the vital stimulant into the body.

(It may be asked, ~~Now~~ what kind of exercise is ~~good~~ best for ~~weak persons~~ invalids and convalescents? ~~For this class of patients we~~ They require just that kind of exercise which ~~we require for~~ is suited to aged persons; as there is in them the same lack of capacity for exercise ~~that we find in aged persons~~, so the exercise must be slow and sufficient, but

(Great care must be taken in these cases, ~~We must be very careful~~ to avoid fatigue because exercise ~~is a thing which~~ involves the use of the nerves as well as the ~~and~~ muscles) ~~also~~,--it is not confined to the muscles alone, so we must be careful to avoid fatigue for (and the convalescent or the weak person ~~because he~~ becomes discouraged when his vital forces are exhausted. Thus it is very important to remember that the ~~The~~ invalid and the old man must always stop short of fatigue in exercise) it is very important to remember that.

For a very feeble person ~~we must begin~~ exercise must be begun very gradually; ~~it is a very serious fault which I have noticed in the treatment of feeble persons,--~~ especially with those who have been long in bed-- must the most extreme caution be observed in this respect ~~the great difficulty is to get them out of bed.~~ I once met a conductor on a train and when he took my pass he said, "I have often met you before; I have; I have brought many persons here on their beds and carried them away well--I have carried more than forty of them away well whom I brought here on their beds,--most of those whom I have brought here, I am glad to say, I carried away well." I was glad to get his testimony. Now why was it that they were brought here ? It was very necessary to get some of them on their feet for the sake of the exercise; that was all that was necessary, but their friends could not get them out of bed because when they got on their feet they suffered so much pain and so much inconvenience,--their blood vessels were distended, and they had tingling and crawling sensations--sensations of all sorts--their limbs would become rigid and they would go back to bed and could not be induced to undertake anything for two or three weeks and thus they lost all the good they had got by their exercise.. What was the difficulty? (Standing or an attempt at walking ~~was~~ too much exercise for ~~the~~ such a patient to undertake at first. When he had been in bed, lying in a horizontal his blood vessels ... become ... tingling or numb ... sensations, or even bowels ... rigid upon being ... brought ... at once

position for a long time, ~~then,~~ in putting him on his feet there is too great a change; there ~~is~~ must be a long series of steps between lying in a horizontal position and getting on one's feet and walking off. ~~But what is the first step?~~ The first thing to do is to teach the patient while in bed how to use the arms and legs; have ~~the patient~~ him pull the ~~arms and~~ legs up in the bed and then stretch them out again and continue this exercise until the muscles of the legs ~~becomes stronger until they~~ have sufficient strength to allow the patient to ~~rise~~ get up and stand and take a few steps by the help of an attendant; ~~but~~ it is too big a ~~jump~~ step for the patient to pass from entirely his position in bed to ~~the exercise of even~~ a standing position. So he should begin with exercise in bed. ~~With such a patient we always begin with a special~~ massage ~~or with~~ and manual Swedish movements are of great value in such cases, as they furnish to a degree the results of exercise without effort on the part of the patient. Now I did not find that out until I had tried the exercise of standing up unsuccessfully in several cases,--but that is not the next step by any means; that is about like starting from A B C to three-or-four-lettered words.

(stop here)

~~Now~~ another ~~very important~~ class of patients who very much need exercise, but for whom it is rather difficult are very fleshy persons. Yet ~~are obese persons,--persons who are very fat--they must be made to exercise for in such cases~~ exercise is the only thing which will accomplish practical results for them. ~~But~~ The trouble in this respect with the obese person is that he carries ~~a~~ so much greater a load than ~~most~~ other ~~men~~ people. When we look at him and see ~~what~~ his condition, ~~is~~ we can see why he cannot take much exercise.) In the first place, who is the fat man? A man is a fat man or an obese man who weighs fifty pounds more than he ought to weigh. A man who ~~ordinarily~~ naturally weighs 140 or 150 pounds and who weighs, instead, 250 pounds, is an obese man; he is pathologically fat; he might weigh 175 pounds without suffering inconvenience, but when he weighs 250 pounds he is over-fat. Now consider his condition,--we will suppose that

A man who ~~he~~ weighs 250 or 300 pounds when ~~and~~ he ought to weigh 150 pounds, but

What is his condition? ~~Why he simply~~ has to carry around ~~this~~ to carry

~~150 pounds that~~ weight that naturally belongs to him, and, besides, ~~he carries~~ on his

shoulders another man who weighs 150 pounds. In doing this

he will find himself very much embarrassed ;he has to carry at

least a hundred pounds of dead weight,--just like a man with a

100 pound weight hung to him and he must carry that wherever he

goes. If you put a dead weight of a hundred pounds upon him

he would think it was a pretty hard piece of work to carry this

load everywhere he goes; he would say that he was very badly

treated. Thus ~~The~~ obese man must do ~~does~~ an enormous amount of work in simply carry-

ing this extra load . You will remember, as I have told you,

that the amount of work done is determined by multiplying the

weight of the man by the distance through which he travels (if

he travels at the rate of ~~xxxxxx xx~~ three miles an hour,) and

divide it by twenty; it is the same thing if a man walks at

the rate of three miles an hour on a level surface,--it is the

same as if he lifted himdelf through 1/20th of the same dis-

tance--so, if such a man weighs 150 pounds the amount of work

which he can do will be represented by $\frac{250x}{20}$ walking a given

distance represented by (x); that will give us the amount of

work that he does in feet . Now if the man increases his weight

to 250 pounds and walks at the same rate his work is increased

by $\frac{100x}{20}$ and we must add this to the amount of work which he

does, the amount of his ability to work remaining the same.

There is another thing peculiar to the over-fat man, and

that is, his tissues are all the time overloaded with imperfectly

oxidized tissue in a state of disintegration; that is what gives the secre-

tions of the extremely fleshy person ~~over-fat man~~ their peculiarly offensive odor. ~~the~~

so much room to expand as formerly, and the lung capacity is diminishing all the time. So the over-fat man is all the time bordering upon a state of breathlessness,--the extra weight he carries, the extra tissue poisons in the body, and particularly the accumulation of fat within the chest-cavity ~~, xxx~~ and the intra-thoracic cavity, all keep ~~being~~ him at ~~down to~~ the point of breathlessness continually ~~,-- he is nearly there all the while.~~

Then the over-fat man has great need of exercise although he so easily becomes breathless. What should be done for him? Get He must ~~be made to~~ exercise, even if he does get out of breath. He ~~The over-fat man~~ must get ~~be made~~ thoroughly tired; his exercises will do him no good unless he becomes ~~gets~~ thoroughly fatigued, as fatigue is one of the essential things in reducing fat. I have seen persons who said it did not do them any good to walk, but that they got fatter all the time ,--it only improved the activity of the vital processes and increased the power of assimilation so that they got fat instead of thin by their exercise. Now we must go beyond that . Over-fat people must begin with passive exercise, with massage, with resistive exercises, with manual Swedish movements, etc ., --he must have a great amount of it--half an hour of massage won't amount to anything; the over-fat person must have two or three hours passise exercise every day.

But the fat man for whom there is any hope at all can do a little himself; he can be on his feet ~~xx~~ a little one day, he can take a few steps the next day and a few more the next, and so the exercise can be gradually increased.

One more important point in reference to the exercises of the fat man,--they must be slow, but it is important that at first they must be very gradually increased; they must not be butyric and other odors, the result of the imperfect oxidization which is going on in the tissues,--overloaded tissues with these odorous substances. Now the tissues, being always filled with these imperfectly oxidized products, when the over-fat man begins to exercise, in a very short time the increase of the waste substances produced by the exercise cause the poisons which produce the breathlessness,--there are two things that make him out of breath,--one is that he has so much more work to do than another person does, because he carries so much dead weight, and another thing is, these tissues are already contaminated with poisons to such a degree that it takes but little more to produce a state of poisoning which produces breathlessness.

There is another reason why the fat man is breathless,--why is it ? (The class:" He cannot expand his chest.") That is the trouble; the lungs cannot act very well. Another reason is that there is such a great load of fat on the outside. We will suppose here (diagram) are the lungs inside of the chest, and down here is the heart. In a healthy person the chest lies right against the pleura. Now in the over-fat man, fat accumulates not only in the skin but in these internal organs as well,,--it accumulates in the mucous membrane and in the pleura. Some of you have seen fat oxen and you notice that when the lungs themselves are crowded with fat it accumulates in this space, and a great layer of fat sometimes an inch thick is found in the pleura. There is an accumulation of fat on the outside of the ribs and on the inside of the ribs. Now this accumulation of fat decreases chest capacity; the chest is unable to expand,--the ribs limit the size of the chest and there has been such an accumulation of fat in the media spinum etc. that the lungs have not carried to the point of excessive breathlessness at any time in consequence of the impeded state of the heart--the overloaded state of the heart and the accumulation of fat around it, but at the same time it must be carried to the point of fatigue, and in order to make the over-fat man fatigued--that it may make him breathless the exercise must be made difficult. Exercise by walking is very difficult for the obese person because he must walk so far and so fast that he will get thoroughly out of breath. Rowing is another kind of exercise. If he can do his exercise, give him something more difficult; if he can do that, something still more difficult,--for instance make him walk a crack--a thing that is very difficult for a fleshy person to do; make him walk on a straight line or do some other exercise requiring skill,--such as playing lawn tennis,--such exercises are excellent; bicycle riding would be good for him --if the bicycle could stand it. The exercises in the gymnasium are valuable. In France fencing is very much recommended; in some of the watering places--Baden Baden and Carlsbad, for instance, fencing is one of the exercises which is recommended as essential in reducing flesh. But it is not considered a valuable exercise in this country; I have never thought it was a proper thing to introduce here because it would perhaps become too popular among those who don't need it,--but it is very good exercise for it brings every muscle of the body into play and takes the nervous system more than any other form of exercise that I know of, and those who practice it become more tired in three minutes than by the hardest kind of gymnastic exercise in half an hour. We need not use that, but we may use instead, some of the more difficult exercises of the Swedish gymnastics,--the exercise must be as difficult as possible.

There is another thing that I must mention: There is great danger of consecutive fatigue. This must be very carefully guarded against and we must be very careful to know the condition of the heart before beginning very violent exercises.

613.7

# EXERCISES FOR DEVELOPING THE ABDOMINAL MUSCLES.

Exercises for developing the abdominal muscles should be taken in the horizontal position. The exercises should begin with breathing movement in which the lungs should be freely inflated. In breathing out, the abdominal muscles should be well drawn in. One to three deep breaths should be taken after each movement before the next is made . In the following table, the exercises are made progressive.

Position. Patient lying on back, hands grasping support above head.

1. Leg flexing-----(a) Each leg, 2 to 8 times.
   (b) In alternation.
   (c) Both together.

Remark: At the beginning of this exercise the feet should be drawn up as close to the thighs as possible. When the patient becomes stronger, the knees may be drawn still nearer to the chest the feet being raised from the couch.

2. Leg flexing, knee extension--(a(Singly
   (b)In alternation.
   (c) Together.

Remark: The movement is executed in four counts:

(1) Legs flexed until thighs are at right angles.
(2) Leg extended till as straight as possible.
(3) Knee flexion.
(4) Leg extension.

3. Knee-half-flexing, leg extension.
   (a) Singly.
   (b) In alternation.
   (c) Togetner.

Remark: Legs are drawn to half-flexing position, that is, an angel of 45 degrees. Knee extended as allowed to sink to the table while extended without flexion of knee.

4. Leg raising a. Singly, 1 to 8 times. b. Inalternation. c. Together.

Remark: In leg raising, the tow should be pointed as much as possible, and the leg should be raised higher and higher as the patient gains strength. After the patient has gained sufficient strength, slight resistance may be made either with the hands or by means of weights. The vigor of the exercise may be increased in all the above movements by arresting the leg in its downward movement just before ir reaches the position of rest sudently extending it, repeating this 2 to 8 times.

5. Knees half flexed, abduction, adduction. 2 to 8 times.

Remark:---The patient may at first be assisted, thus securing as wide separation of the knees as possible. Later, resistance should be added with the hands.

6. Knees half flexed, hips raising.

Remarks:---The legs should be vertical in relation ot the table, and the hips should be raised to such a position that the thighs and trunk will form the hypothenuse of a right-angel triangle. This exercise is for strengthning the muscles of the back.

7. Head raising.

Remark: The head should be raised without the aid of the arm. This requires vigorous saction of the abdominal muscles. It will be noted that the recti muscles are especially brought into play when the head is raised. When the legs are raised, all the muscles of the anterior trunk are brought into vigorous action.

8. Head raising, leg raising.

Remark:--When the patient becomes sufficiently strong, most vigorous action of the abdominal muscles may be secured by combining head raising with various leg raising movements described above.

In giving the above movements, it is well to alternate the hand raising and leg raising. The order should be (1) leg movement, (2) breathing, (3) head raising, then breathing, leg raising, breathing, head raising, etc. The movement should be executed by taking a deep instpiration. This secures the greatest possible increase of intra-abdominal pressure, thus thoroughly emptying the visceral blood vessels of the abdominal and pelvic cavities.

Position----On face lying grasping support above head.

1. Knee flexing. (a) Singly, (b) in alternation, (c) together.

Remark:---As the feet are raised, the hand should grasp the support firmly, and flexion movement of the arm should be executed. That is, a downward pull should be made with the arms. As the feet are lowered to position, the movement should be repeated just before the foot reaches the table, the leg suddenly returned to a vertical position. This secures vigorous contraction of the lumbar muscles. This same plan should be followed in all the backward leg movements. This movement should be executed in two counts, (1) Raising vertical, (2) Lowering.

2. Knee 1/2 flexing, leg backward raising. (a) Singly, (b) In alternation, (c) Together.

Remark:---The thighs should be raised backward by forcible contraction of the muscles of the back, lifting the knee from table. This movement is executed to counting as follows: (1) Knee flexion, (2) Thigh raising, (3) Thigh sinking, (4) Knee ext.

3. Knee flexion, leg backward raising (a) singly, (b) in alternation, (c) Together.

Remark:----The leg should be flexed upon the thigh as completely as possible. An attendant may assist at the end of movement by pressing foot down against thigh. In making flexion muscles of the back will be brought into vigorous action.

4. Legs backward raising. (a) Singly, (b) in alt. (c) together.

Remark: This is a difficult exercise, and care should be taken to aboid straining the muscles of back. Patient may at first simply lift leg free from table and allow it to return to Pos. In very veeble patients, leg may be raised and lowered while sinking to pos. Later, will be able to raise leg. When patient acquires a little strength, slight resistance may be made with hand placed upon ankle.

5. Elbow-support-lying, hips raising.

Remark:--This movement executed properly brings the abdominal muscles into bigorous splay. First the patient may need assistance of the attendant to lift the hips, especially in case of feeble patients who are very fleshy. The movement should be executed from 2 to 8 times, when the muscles become stronger, the movement may be repeated 8 to 16 times.

6. Elbow-toe support-lying, hips-raising.

Remark:--This is an exceedingly vigorous movement for developing the abdominal muscles. It must be executed carefully at first and with assistance.

7. Head backward raising. (a) With hands grasping support (b) tips of fingers resting upon top of head, (c) fingers touching back of neck.

8. Head backward raising in combination with the different movements. Head backward raising should be practiced in alternation with the various leg movements, from the beginning as the patient acquires strength.

GOOD HEALTH

10 pt. single

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# SWIMMING AS AN EXERCISE

By

William J. Cromie.

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8 pt. ital

Swimming is one of the oldest sports known to man, and is also one of the best forms of physical education. As an exercise it is valuable, in the first~~ly~~ place, because it is a pleasant mode of recreation; in the second~~ly,~~ because it develops the body symmetrically and thoroughly; in the third~~ly,~~ because it is hygienic; fourth~~ly,~~ because it is a curative and health-giving agency; and lastly, because it very often means the protecting and saving of life.

stet

## Recreation.

8 pt bold

As a form of recreation, a swim in the pool, mill-dam, pond, river, lake or ocean is unsurpassed. How quickly a boy responds to the call of the "gang" to go swimming----it may be to a mud hole in a quarry, or in a pond near the brick yard, but, once indulged in, it is ~~awakens memories~~ never ~~to be~~ forgotten. The exhilarating pleasures of a swim, whether in the open air in summer, or the natatorium in winter, can be appreciated to the full only by those who are good swimmers. The novice, after a few spasmodic strokes, chokingly exclaims that he has had enough water to last him a lifetime, and very often gives up the attempt in disgust. How envious he must feel of his proficient companion, who glides easily and swiftly like a nymph through the water!

After a day of hard toil,— in fact, after any kind of muscular or mental endeavor, ~~it~~ one is soothed and refreshed ~~one to indulge in~~ by a short swim, ~~and also serves to~~ the ~~phys~~ mind is diverted ~~the mind~~ from business cares, the thoughts being concentrated for the time being on the sport. There is no diversion that appeals more to the writer than to see half a hundred or more boys in a swimming pool playing "follow the leader", and performing their various "stunts", or chasing each other in a game of tag as earnestly as we older ones play the game of life. Again, how fascinating it is for one to observe two college teams battle for the supremacy in a hotly contested game of water polo! Surely, swimming has a recreative value for both the individual and the crowd.

## Symmetry and Development. Bold

The captivating art of swimming brings more muscles into harmonious action than most systems of exercise. It does not develop one set of muscles at the expense of another, as is the case in many forms of gymnastics and athletics. Take the rower, for instance, who develops from the waist up. Xenophon, the Athenian historian and general, complained about the ill proportions of the Greek runner, saying that the runners' limbs were wonderful, but that their shoulders were poor. The same holds true of the runner of to-day. Base ball, America's national sport, develops the side of the player that is most used. Bicycling develops the legs at the expense of the arms and chest. Fencing and tennis exercise but one side of the body. Heavy gymnastics upon our modern apparatus develop the upper half of the body, but at the expense of the lower.

Swimming, in conjunction with the above exercises, will tend to correct this one-sidedness, and help secure a symmetrical development. Swimming improves the wind and strengthens the muscles without hardening them. The absence of knotty, bulging muscles is immediately observed in the physique of the man who spends much time in the water. The swimmer's long, smooth, pliant, supple muscle is a pleasing sight when contrasted with the knotty, binding muscle of the weight lifter. The man with the long, smooth muscle usually has more strength, agility and endurance than he of the coarse, knotty, bulging muscle. It is sometimes said that the swimmer has no muscles, but this statement is erroneous. The writer has wrestled with swimmers and found them to be anything but weak. If one ever has the misfort~~une to be embraced by Mr. George Kesler, swimming instructor in the University of Pennsylvania, he will speedily change his mind about the swimmer's absence of muscle.~~ Let one observe C. M. Daniels, the world's champion swimmer, as he plows swiftly and easily through the water, and he will quickly be convinced that there is wonderful strength behind those well-trained strokes. Swimming is an excellent mode of development.

Hygiene. 8 bold

Cleanliness is one of the fundamental principles in both personal and community hygiene, while uncleanliness and filth is the primary cause of sickness and disease. If daily bathing is neglected, the pores of the skin become clogged, the expulsion of effete, waste and morbid matter is retarded, the substance already expelled is re-absorbed, and is a fruitful cause of disease. F. M. Nichols, M. D., ~~F. A. S.~~ in his book ~~on~~ "Esoteric Anthropology," says, "As all the functions of life are carried on by the nervous energy, a loss of that is not only a direct cause of functional debility, but, by diminished vigor of excretion, it prevents the waste matter being carried out of the system, and this matter, thus retained, acts as a poison, and is a cause of almost every kind of disease. This reacts again; exhaustion causes impurity, and impurity produces exhaustion."

Napoleon was a great believer in hygiene. He once said to Antonomarchis, the Italian physician, "Life is a fortress which neither you nor I know very much about. Why throw obstacles in the way of its defence? Its own means are superior to all the apparatus of your laboratories. Water, air and cleanliness are the chief articles in my pharmacopoeia."

Exercises that are largely recreative and that are hygienic in character appeal more to the average college student than do all others. The factor of pleasureableness is largely responsible for this preference for the hygienic instead of the educational forms of physical training. Ask a student who can swim which he prefers --- a swim or a drill in Swedish educational gymnastics-- ~~and~~ one can bank on the swim being given the preference. Propose a lesson in intricate coordinative movements in contrast to a game of basket ball to the student, and see which will be accepted. Students prefer hygienic exercises, and, while it may not be best to invariably give them what they desire, yet a food that is relished is better digested and better assimilated than one which is unpalatable, though each may contain the same amount of sugars, fats, starch and proteids.

Health should be the fundamental and predominant factor in all systems of physical education for college students. If more pleasure is derived from hygienic and recreative exercises than from those which are likely to further tax an overburdened mind, and the same result, health, can be obtained by either kind, why not use the former, more rational method? Of course, hygienic and educational training should be used in conjunction with each other, but the hygienic should be given the preference.

## Curative Agency. & bold

Swimming is a curative or health-giving agency on account of the water coming in contact with one's person. Water is a great agent of purification, both internally and externally. As it enters largely into the composition of all organic beings, it may therefore be termed a universal solvent. It is the great agent of digestion, nutrition and excretion. The matter which is carried out of the system is first dissolved in the watery portion of the blood. It passes from the lungs dissolved in vapor, and from the skin in the form of perspiration. Millions of sluice-ways pour it into the kidneys and into the intestinal canal, and it is then expelled from the system. The copious drinking of pure water is needed to dissolve the impure matter in the system and carry it off.

Water, when applied externally, purifies, cools and invigorates every part of the body with which it comes in contact. It cleanses by its power of dissolving substances; it cools by its coming in contact with so many points of surface, and its power of conducting heat, and often by evaporation. It reduces inflammation by lowering the temperature, equalizing the circulation, and cooling and contracting the capillaries. This condition of the capillaries is also connected with an infusion of nervous power and quickened circulation of the blood. Therefore, water invigorates by the toning up of the nervous system, by equalisation of the circulation, and by the harmonious action of the entire system. It also develops vital heat, which means vital energy.

If one is given a cold bath, or if he indulges in a cold swim, he may be a long time in getting a good reaction, or in getting warm. If the time in the water is shortened, the reaction comes more readily; but, like other powers, it gains strength by exercise. Every day, the person reacts more readily; the strength or vital energy increases with this power of reacting against cold, until one becomes strong and vigorous. This is the process of invigoration; it is a form of vital gymnastics, or education of the organic powers.

It would make a book to go into detail about the various systems of "water cure" now in vogue in various countries, but it is a subject that one should ~~be~~ stud~~ied~~y in order ~~that one may~~ to realize the wonders that these institutions are performing through the medicinal properties of water. Sea swimming is especially beneficial on account of the stimulating effects of the salt water upon the system. It is easier to swim in the sea, as the buoyancy of the salt water is greater than that of fresh water. Of course, it is quite difficult to swim in a heavy surf where the water is constantly breaking, and one should therefore go beyond the breakers if he desires to indulge in the most delightful kind of swimming. He should not, however, venture too far out, unless he is an accomplished swimmer, and even then life boats should be near at hand to insure safety. The witty Irishman said, "Even with life-boats, it is dangerous to be safe."

There are five great curative agencies in the materia medica of Nature that should be studied, viz., air, sunlight, diet, water and exercise. All of these are more or less taken care of in the indulgence of a good swim. In open air swimming, one comes in contact with the tonic properties of air and sunlight, is invigorated by the water and exercise, the appetite and digestion are improved, and, consequently, the problem of dietetics is in the main solved.

## Protects and Saves Life.

8 bold

If ten men on the street are asked if they can swim, about five will answer that they cannot, while not more than one in ten women can swim. To learn to swim is a duty which one owes to himself-- in fact, which one owes to all. Those who live in large cities are so much on and near the water that to be unable to swim is almost criminal negligence. In this country there are thousands who drown through the capsizing of boats at the various bathing resorts, every summer, as well as from other kinds of accidents in the water, who might have been saved had they acquired the art of swimming. Many never think of the value of swimming until, by some unforeseen accident, they are precipitated into the water. They are then instantly and unpleasantly convinced of the value of this very important branch of physical education.

Many a boy has shown himself to be possessed of more courage than skill by boldly venturing beyond his depth, only to find to his dismay that his ability to sustain himself in deep water has been sadly overrated. Many a promising lad has lost his life through his temerity in experimenting with this great force of nature. When he discovers that he is no longer in shallow water ---when he fails to get support from the firm earth for his feet ---when his uneducated limbs do not give him the requisite assistance, he then sinks, takes in water, chokes, and "loses his head." It is then that his more timid companions see him throw up his arms wildly in the air in a frantic and useless endeavor to climb up, thereby throwing away his sole chance of self help, and, unless he is speedily assisted by his frightened comrades, must soon perish. Usually, by the time his stupefied playmates recover from their terror, he is beyond hope. This is a sad pen picture, but numerous instances of this occurrence are almost daily depicted in our newspapers, and can be readily recalled. The lesson is obvious---teach the boys to swim under the tutelage of a proficient instructor.

A--EXERCISE AND SYMMETRY.

1--Development of the chest. Every time one breathe the ribs and the cartilages by which they are attached are moved.--Some depend entirely upon the movement of the diaphram.--Result.-- correct method.

2--EFFECT OF EXERCISE UPON THE JOINTS OF THE SPINE.

Result of not bending the spine in every possible direction often. Results to the muscles which support the spine. "What is the harm if a man can not touch the floor with out bending the knees?"

3--Exerise corrects the deforming influence of occupation and bad position.

4--The purpose of exercise is to develope every group of muscles in the body.

5--Another way in which exercise promotes symmetry is by the proper distribution of fatty tissue.

Why the matter of symmetry is a very important one. A flat chest means compression of the lungs; a protruding abdomen means a compression of the stomach, liver, kidneys, etc.

REGARD FOR SYMMETRY IN GYMNASIUM WORK.

613.7

## EXERCISE AND TEMPERATURE ELEVATION.

IT has long been known that violent exercisex produces a very marked effect upon heat production as well as hat elimination, influencing heat production to a greater degree, however, and to such an extent as to raise the bodily temperature to several degrees above normal.

In children this tendency to temprature rise is much greater than in grown persons, for the temperature regulatingapparatus is much less vigorous in the young of all animals than in adults. In febrile conditions the ability to regulate the heating functions of the body is very largely lost. This is one of the chief causes of the elevation of the bodily temperature in cases of fever. This condition continues for considerable length of time, even to the beginning of convalescence in febrile cases. It is present in markmix chronic febrile conditions, such as tuberculosis for example, as well as in cases of acute fever.

The facts just stated account for the effect of exercuse, either mental or physical, in producing elevation of the temperature in fever patients in convalescence. Not infrequently a fever patient whose temperature is normal suffers a relapse as the result of sitting up in bed or visiting wih friends. Persons su fering with pulmonary tuberculosis often suffer serious relapse as the result of o er-exercise.

Dup

## Value of Physical Exercises in the After-Treatment of Internal Diseases

Quincke emphasizes the great value of graduated physical exercises in the after-treatment not only of diseases affecting the joints and muscles but also in pleuritis, enteroptosis, chronic constipation, and in practically all internal diseases. Only a few patients need special exercises adapted to their peculiar condition, but all convalescents will make more rapid and surer progress toward health if they are required regularly to go through such setting-up drills as are in use in the army and in the gymnasiums. Of course, the amount and the character of the exercise will depend on the condition of the convalescent. The first exercises after recovery and after rising from a sick bed should be taken alone, but after convalescents have partially recovered their strength there is added value in exercises carried out in groups or classes. Such exercises not only restore a normal blood circulation, but they are needed to give control of bodily movements, for long confinement to the bed will often have impaired the motor apparatus.

6/3.7

# The Joy of Activity.

The most radical difference between an animal and a vegetable is that the latter remains quiet while the former moves about. The polyp, it is true, makes an exception of itself by sticking fast to some slimy rock or bit of wreckage, and certain vegetable forms move about with great celerity; but the general law remains, that in a natural state, animals live active lives.

It is interesting to note the incessant activity of forest animals. How hard and constantly they toil, the squirrels, the chipmunks, the beavers, minks and muskrats, as well as the various tribes of birds! Never a day off to rest, never any loafing nor shirking, the old ones always at work and the young ones always at play. Instinctively, these humble creatures keep their muscles actively at work, and systematically bring every part into action by means of work or play.

EXERCISE IN SPINAL CURVATURE.

Toepel, before the Medical Association of Georgia, April 17, 1907, said that the orthopedic surgeon needs exercise and massage in his corrective work. An up-to-date physician is no longer satisfied to treat a case of curvature of the spine by braces alone. Modern treatment of the condition calls for the intelligent use of gymnastics, either alone or in conjunction with other measures.

Memo

MEMO.

# CHATS ABOUT EXERCISE FOR INVALIDS.

Interviews with the following classes of persons:--

A lean dyspeptic

A fat dyspeptic

Hyperpepsia

Hypopepsia

Bilious headaches

Enteroptosis

~~Bright's disease~~

Nervous dyspeptic - J. J. Mulheron Phys. Cult. Pamphlet p. 135

Fat diabetic

Bright's disease

Lean diabetic

Young diabetic

Obese Zander Institute - Pamph. p 11

Rheumatic

Consumptive

Neurasthenic

Sedentary man Article XLII Maine Med. Asso. 613:7 - P. 2 - 4 - International Health Pamph. P. 7.

Ataxia

Asthma

Pleurisy

Adhesions

Weak lungs

Heart disease

Normal man

Lazy man - Terse sayings about work - Art. XLII Maine Med. Asso p. 8.

Complexion Screwer - Health Pamphlet 613:7 p. 13

Healthy persons

Gy. Mulheron. Phys. Cult. Pamph. p. 136

Boy )
)
Girl) School - Report-Washington 96-97-p. 8. Pamphlet.
Phys. Ed. & Proc. Hygiene-pamphlet-p. 9.
Prov. of Phys. Ed. pg. 2. Pamphlet.

Young man-- sports — Adv. of Phys. Ed. Pamphlet p. 3.

Young woman-- swimming

Adult man

Adult woman

Old man

Old woman

Babies

Bed ridden

Convalescents

Apoplectic

Flat chested

Weak waisted

Posterior curvatures

Lateral curvatures

Weak legs

Weak arms

Swaying gait

Flat footed

Toeing in

Self-resistive

Swedish movements

Medical Swedish

Delsarte

Heavy Dumb-bells Proceedings of Amer. Asso. 1893. Pamphlet p. 17

Light dumb-bells

Club swining

Free hand movements

Home gymnasium

Mc Fadden's

Whiteley exercise — Pamphlet

Dr. Kellogg's weight & spring

Rubber bands

Domestic work

Sawing and chopping

Spading & hoeing

Walking International Health Pamph. p. 12.

Running

Swimming – Irving C Rosse Pamphlet. p 6.

Horseback riding

Rowing

Bicycle

Singing

Horn playing

Mountain climbing

Games

Skating

Eating for strength

Bathing

Cold bath-- when

Warm bath-- when

Hot bath-- when

Drinking) Cold<br>) Hot<br>) Alcoholic<br>) Fruit juices

Overeating

Fatigue fever

Sleep

Rest

~~[illegible]~~

Over-exercise

Secondary fatigue

Sprains

Clothing

Massage (brief description)- In India 613.7 T11 p40

Correct breathing

Feminine respiration

Breathing exercises

Should create thirst for --- Air

Second wind

Breathing muscles must be set to strengthen the otherwise little worth, unless exercise very vigorous, causing forced breathing.

Series of exercises-- days orders for different classes of cases, illustrating each exercise by small figures showing the movement, putting the figures in the if the prescription figures opposite figures 1/2 long.

CUTS.

Undeveloped boy

Well developed boy

Undeveloped man

Well developed man

Pigeon breasted boy

Sedentary young woman

Well developed young woman

Typical old man

Typical old woman

Different types of walking

Different types of sitting, right and wrong

Evil effects of dress

Pneymographic tracings

Swedish gymnastics (typical positions)

Medical Swedish movements Zander Institute Pamphlet.

Series of self resistive movements

613-- 7-- Exercise

613-- 71-- Gymnast.

616-- 33-- The Stom.

See r. s. s.

## CHARTS

Normal man & woman

Weak

Table of coefficients

Table of measurements

Table of symmetry in man or woman

Explanations of charts, man or woman.

Coefficients, etc.

Summary of physiological effects of exercise. "Morale" §13.7, III, p. 122.

Relation of ex. to grown

Proper rate of growth

Development in boys and girls

Table of exercises to strengthen different groups of muscles

Table of muscular groups

Anatomical cuts showing different groups of muscles

Rest for acute disease

Exercise for chronic disease.

Exercises for Home.

## EXERCISES WITHOUT APPARATUS.

### Of the Arm and Hand.

1. Fingers abduction and adduction.
2. Fingers ~~extension~~ flexion and extension.
3. Wrist flexion and extension.
4. Combine the above, beginning with abduction.

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5. Forearm rotation.
6. Forearm flexion and extension.
7. Forearm pronation, flexion, and extension.
8. Forearm flexion and extension, with fingers abduction, adduction, flexion, and extension, and wrist flexion and extension.

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9. Arms flexion across chest, with extension outward and backward.
10. Arms upward raising, arms sidewise raising, upward reaching, sinking, downward reaching.
11. Arms rotating.
12. Arms rotation, shoulder joint.
13. Circumduction.

..................................

### Leg Exercises.

Note A. Finger and wrist exercises may be repeated, with arms in the following positions.

Note B. In taking the following exercises the movement should be voluntarily controlled; that is, in using the flexor muscles, resistance should be made by the extensors, and vice versa. By this means each se of muscles may be able to do as much work as is required for its healthy development, and a perfect balance will be maintained between the antagonizing muscles, and so symmetrical development will be secured. It should be remembered, however, that in order to ~~xxxx~~ secure results from this method of exercise, it is necessary that the acting muscles shall be thoroughly energized,-- that is, the highest possible degree of tension should be maintained during the muscular movement, and the movement should be executed very slowly.

The movements should begin with the joints most removed from the trunk, and each group of muscles should be exercised in succession, until the trunk is reached. Care must be taken to bring the will to bear upon individual groups of muscles. The effect of this is not only to develop the muscle~~s~~, but to bring it under perfect control of the will.

(1.) Downward reaching.

(2.) Elbows at sides, forearm half flexed, extending outward.

(3.) Forearm half flexed, extending forward.

(4.) Arms forward reach.

(5) Arms outward reach.

(6.) Arms upward reach.

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Exercises Feet and Legs.

1. Abduction and adduction of toes.
2. Extension of ankle, with flexion of toes.
3. Flexion of ankle, with extension of toes.
4. Flexion and extension of leg from the thigh.

---

5. Abduction and adduction of leg.
6. Flexion and extension of thigh from the trunk.
7. Rotation of leg at the hip joint.
8. Circumduction of leg at the joint.

## Exercises for the Head.

1. Flexion and extension forward and backward.
2. Flexion and extension right and left.
3. Rotation to right and left.
4. Rotation right and left, with marked flexion.

..............................................

## Exercises for the Trunk.

1. Arms upward reach, standing, backward and forward bending.
2. Wing standing, to right and left bending.
3. Think standing, right and left twisting.
4. Rest standing, to right and left twisting, with side bending.

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5. Lying on back, head forward raising.
6. Back lying, legs raising, singly, in alternation, and with head.
7. On face lying, head backward raising.
8. Legs backward raising, singly, and with head.

..............................................

## Breathing Exercises.

1. On back lying, breathe deeply, expanding sides and abdomen.

2. Deep breathing, expanding the chest and trunk fully and breathing out. Hold chest in position for complete expansion, ~~xxxxxxx~~ drawing the abdominal muscles as vigorously as possible.

3. Empty the lungs, close the throat, and execute the movement of inspiration or breathing in with the chest, raising chest as high as possible. The effect of this is to draw the stomach and other abdominal organs upward.

4. Fill the lungs full as possible, lightly percuss the chest at the sides, breathe out with firm pressure of sides, so as to completely empty the chest. The purpose of this movement is to overcome rigidity, by increasing the elasticity of the cartilages.

6137.

Memo. for work on Exercise.

To determine the amount of work done by a person in walking--

1. On a level surface: Multiply the distance walked at the rate of three miles per hour by the weight of the person and divide by 20.

2. On an ascending incline: Multiply the distance actually travelled in feet by the weight of the person and divide by 20 as before, then add the weight of the person multiplied by the height through which the body has been lifted.

Prepare a table which will show the strength individuals of different heights should have in proportion to their height, based upon the strength of the average man or average woman and determined by the law that the strength increases with the square of the height.

(This principle seems to be wrongp-height does not always mean strength, as the strength of a muscle is not in proportion to its length but to its thickness. Try the principle as applied to breadth measured at the shoulder or hips, or an average of the two; or the girth reduced to a square, taking girth of chest, waist, or hips, or the averageof the three.)

Add to other things, the thighs, calves, taking the average of the two, upper arm and forearm.

Take the average of the thigh and calf girth, the average of the upper arm and forearm.

Then take the average of the depth of chest and breadth of chest, the average of the depth of abdomen and breadth of waist.

First obtain the averages for the above, and in addition the girth of the hips, waist, chest, each independent, and the average of the three

Breadth of shoulders, chest, waist, hips and bi-iliac, and the average of the five.

After getting the different quantities for each one, make the average for the whole 13 of this lot and and get the square of that average.

Another method for comparison: Multiply the height by the average of the breadth.

Memo.

| | |
|---|---|
| In comparing the square of height, | 5349 |
| Square of the average of chest, waist and hips, | 5330 |
| Breadth of shoulders, | 4314 |

Height of short men being taken as basis.

Actual strength of tall man was 4940

613.7 38



Neglects of early childhood will never be retrieved.

Most deformities acquired by incorrect attitude or deficient development in childhood.

Children do not take exercise enough--pale, languid, feeble.

Bones of children soft, vascular; are easily bruised, become inflammed from violent exercise, and a prey to germs, white swellings, hip-joint disease, etc.

Children injured by too long sitting in unnatural attitudes.

Adults not so much injured--bones being more solid.

Deformities result from exercises in strained attitudes and unsymmetrical exercise.

Too much exercise of some muscles and too little of others.

Children should not become too much fatigued.

Exercises should not be too prolonged or too fatiguing.

A good deal of activity at frequent intervals of rest, and no severe exercises, best adapted to children.

Children injured by too much by coddling--must not go to excess.

Hardening stunts growth.

Exercise taken out of doors as much as possible.

A substitute for young children--exercise in doors with scanty clothing so as to expose the body to the air as much as possible.

Clothing always to be free, unrestricted.

Give the muscles free play and a chance to grow.

Divided skirts for girls.

## Physiologic Effects of Exercise.

Exercise quickens every vital process.

The following is a brief recipe of the influence of exercise upon the chief functions and structures of the body as shown by carefully conducted scientific experiments; among the most important and exact of which are those of Juntz of Berlin.

Effects of exercise on breathing, rate and volume.
" " " " blood pressure.
" " " " temperature.
" " " " perspiration.
" " " " kidney action.
" " " " digestion.
" " " " bowel action.
" " " " mental activity.
" " " " fatigue.
" " " " development of bones and muscles.

## How to Estimate the Amount of Work Done.

The body is a machine. In muscular activity energy is expended as in a locomotive or an automobile.

The source of muscular energy.

Food is fuel.

The special muscle food is sugar.

Fats also burn in the body and are good muscle food.

Protein - poor source of muscular energy; only two-thirds of the amount eaten is utilized; the other third is burned, but the heat produced serves no useful purpose.

Protein by stimulating the cells causes the expenditure of more energy than it supplies.

Energy spent in muscle work may be estimated in foot-pounds or calories.

Mans' power is also estimated by a horse power testing machine invented by Laughlin.

The amount of work an ordinary laborer does in a day.

The number of foot-pounds represented in hard labor.

The amount of work done in walking at different rates of speed; in climbing, lifting one's self vertically.

The amount of work done is fifteen times as much as walking on a level.

The amount of work done walking a mile at a moderate rate of speed is the same as lifting one's self 400 feet vertically.

The number of calories of energy consumed walking at different rates of speed.

The energy expended in going down hill at different grades.

" " " in riding a bicycle at a moderate speed.

A man may travel twice the distance with the same expenditure of enrgy as walking at a moderate rate of speed. At higher rates of speed the economy is greater.

On a bicycle one may travel three times as fast with the same expenditure of energy as walking rapidly. As a matter of fact a bicycle rider can, without fatigue ride three or four times as far as he can walk.

## Exercises that Cure.

Man is by nature an active animal. Few wild creatures thrive in captivity. Inactivity kills them.

Idleness, a sedentary life, breeds disease as surely as do poison habits and disease germs.

An unused muscle wastes away. An unused joint becomes the seat of rheumatism.

The mountain stream sparkles and gurgles with purity and life. The stagnant pool reeks with miasms and teem with slimy creatures and croaking frogs. The sedentary man is like the scum covered pond. His breath is foul his perspiration rank, his tongue is coated, his skin is sallow, his bowels constipated, his heart weak, his breath short, his mind clouded, every function deranged, every structure degenerating. His efficiency far below par. His body is an easy mark for germs which produce pneumonia, Bright's disease arterio sclerosis, rheumatism and other acute and chronic ills which torture and abbreviate the lives of "the idle rich" and the indolent poor.

"Honest sweat," the result of muscle work is nature's great eliminator. The exercise which makes the sweat, burns up the body poisons, purifies the blood, strengthens, expands the lungs, clears the brain, creates appetie, aids assimilation builds up resistance to disease, fortifies against old age, combats "the blues." An hour's daily exercise is a better investment than a "life policy." (Both are better still.)

Exercise is a potent remedy for disease. It cures by removing the cause.

Fantastic and intricate procedures are absolutely unnecessary. The really efficient exercises may be taken without a trainer but they must be taken systematically to secure the maximum benefit.

While exercise is of greater value as a means of general health building, certain exercises are of special service as curative means in several very common maladies, especially constipation neurasthenia, obesity, arteriosclerosis (high blood pressure), prolapse of abdominal and pelvic organs, chronic rheumatism, insomnia, weak lungs, weak heart, feeble digestion, anemia, general debility. Even in Bright's disease and advanced heart disease, exercises are of very special value when rightly applied.

In connection with the "rest cure" or milk "regimen", following surgical operations and in convalesence from severe acute illnesses, appropriate exercises are invaluable.

The exercises described in this little manual have been selected in the light of forty years experience in treatment of chronic invalids.

# Correct Posture.

Correct posture - sitting.

"      "      - standing.

"      "      - lying.

Incorrect chairs - illustrate several.

Rocking chairs and ordinary chairs. The correct chair.

Health chair. Show a number of new chairs.

Methods of acquiring correct sitting and standing posture.

Lying back support.

Lying on face.

Lying over pillow.

Total strength.

Strength chart.

Table showing normal strength of muscles.

Table giving measurements.

Show strength graphics for both men and women.

A description of bed exercises.

Chair exercises.

Standing exercises.

Wall exercises.

Stretching exercises.

Incline table exercises.

Occupation exercises.

Weak lungs.

Weak heart.

Weak chest.

Weak abdominal muscles.

Prolapsed stomach.

" colon.

" womb.

Exercises for special diseases.

Automatic exercises.

Mechanical exercises.

Running, swimming, horse back riding, work, games, golf tennis etc.

Swimming, surf bath.

Different forms of surf bath.

Breasting the waves.

Dive under.

Pull for shore.

Walking.

Walking routes about the Sanitarium.

Diseases may be corrected by exercise.

Constipation, rheumatism, arterio sclerosis, insomnia, depression "the blues."

Prolapsed colon.

Prolapsed stomach.

" pelvic organs.

Convalescent surgical cases.

Pelvic colon adherent.

Manual Sweedish movement.

Out door living.

Air bath.

Daily athletic exercise.

The graduated formulas for exercises for general health building.

A list of exercises - numbered.

Cuts showing out door gymnasium.

Walking parties.

Weston the pedestrian.

slowly and should be retained five or ten minutes before making an attempt to evacuate it.

Of course it is of the highest importance to encourage bowel action by every possible means. The enema should not be wholly depended upon but used only as an aid to other measures. However, an enema taken at night does not interfere with bowel movements the next day, but rather assists in securing natural stools.

The thing of first and greatest importance to promote bowel action is roughage, the amount of which must sometimes be very considerable. Some years ago when spending a time at the Von Noorden clinic in Vienna, I inquired about the method of dealing with cases of obstinate constipation. The reply was "Stick brodt"(a very coarse pumpernickel consisting chiefly of the very coarsest bran, with just enough rye flour to hold it together.)

"How much must the patient take ?"

"Half a kilogram (one pound)".

"Suppose his bowels still do not move, then what?"

"More stick brodt."

Failure to get relief from roughage is unusually due to the use of too small quantities. Patients and even some doctors are afraid of causing irritation by the use of bran. There is no reason for apprehension. Bran does not irritate; it merely titillates. Having observed closely for many years, I have never seen a case of harmful irritation resulting from the use of bran. Roughage must be used at every meal without exception. The quantity must be increased until the desired effect is obtained. At least two heaping tablespoonfuls of coarse bran are usually required for each meal or an equal quantity of agar. Fruits and coarse vegetables reason why the residue should not be evacuated within 12 to 14 hours from the time the meal is eaten. No advantage whatever is gained by longer retention. A normal colon rejects its residues after each meal. This is none too frequent. The big anthropoids move their bowels four to six times a day, and three or four bowel movements is the rule among primitive and semireason why the residue should not be evacuated within I2 to I4 hours from the time the meal is eaten. No advantage whatever is gained by longer retention. A normal colon rejects its residues after each meal. This is none too frequent. The big anthropoids move their bowels four to six times a day, and three or four bowel movements is the rule among primitive and semi-

## EXERCISE. GENERAL PRINCIPLES.

Young children can grow into almost any shape, and can, by habits of proper exercise and positions of the body, obtain healthy forms
How to Live 2: 43.

The living machinery God Designs, should be in daily activity, and in this activity or motion of the machinery is its preserving power.

Health Reformer, p: 45.

If work is performed without the heart being in it, it is simply drudgery, and the benefit which would result from the exercise , is not gained.

Health Reformer, p:45.

## BENEFIT FROM EXERCISE.

There will be increased vitality, which isso necessary to health.

Vol. 2, p. 529.

Exercise will aid the work of digestion x x x x x x x .Judicious exercise would induce the blood to the surface, and thus relieve the internal organs. Brisk, yet not violent exercise, in the open air, with cheerfulness of spirits, will promote the circulation, giving a healthful glow to the skin, and sending the blood vitalized by the pure air to the extremities.

Vol. 2, p. 530.

The limbs will strengthen with use. Moderate exercise every day will impart strength to the muscles, which, without exercise become flabby and feeble. By active exercise in the open air every day the liver, kidneys , and lungs ~~xx~~ also will be strengthened to perform their work.

Vol. 2, p. 533.

Not only will the organs of the body be strengthened by exercise, but the mind also will acquire strength and knowledge through the action of these organs. x x x x Each faculty of the mind and each muscle has its distinctive office, and all require to be exercised in order to become xxx properly developed, and retain health vigor. Each organ and muscle has its work to do in the living organism. Every wheel in the machinery must be a living, active, working wheel.
Vol. 3, p. 77.

It is not good policy to give up the use of certain muscles because pain is felt from their exercise. The pain is frequently caused by the effort of nature to give life and vigor to those parts that have become partially lifeless through inaction. The motion of these long disused muscles will cause pain, because nature has awakened them to life.

Vol. 3, p. 78.

By judicious exercise you may expand the chest.

Christian Ed. p. 132.

If they worked intelligently, giving both mind and body a due share of exercise, ministers would not so readily succomb to disease.

Gospel Wkr. 173.

I wish to encourage my invalid friends to exercise, for that is necessary for the recovery of their health.

H.R. 184.

KIND OF EXERCISE.

Commence moderately at first to have ~~xxx~~ more air and exercise.

Vol. 2: 535.

Exercise to be of decided advantage to you, should be systematized, and brought to bear upon the debilitated organs that they may become strengthened by use.

Vol. 3, p. 76.

The exercise of one muscle, while others are left with nothing to do, will not strengthen the inactive ones any more than continual exercise of one of the organs of the mind, will develope and strenghten the organs not brought into use.

Vol. 3: 77.

If one muscle of the body is exercised more than another, the one used will become much the larger and will destroy the harmony and beauty of the system. A variety of exercise will call into use all the muscles of the body.

Vol. 3: 78.

A large class of women are content to hover over the stove breathing impure air for one half or three fourths of the time, until the brain is heated and half benumbed. They should go out and exercise every day, even though some things in doors have to be neglected. They need the cool air to quiet their distracted brains. They need not go to their neighbor's to gossip, but should make it their object to do some good, working to the end to benefit others.

Vol. 2: 531.

Where useful labor is combined with ~~xxxxxxxx~~ study there is no need of gymnastic exercises, and much more benefit is derived from work performed in the open air than in door exercise. x x x x The farmer finds in his ~~x~~ labor all the movements that were every practiced in the gymnasium. And his movement room is in the open fields; the canopy of heaven is its roof, and the solid earth is its floor.

Signs , 86, #33.

Let them take regular exercise that will cause them to breathe deep and full, and they will soon feel they have a new hold on life.

Signs 86, 33.

Gymnasium exercise may in some instances be of advantage. They were brought in to supply the want of useful physical training, and have become popular with educational institutions; but they are not without drawbacks. Unless carefully regulated, they are productive of more harm than good. Some have suffered life-long physical injury through these gymnasium sports. The manual training connected with our schools, if rightly conducted, will largely take the place of gymnastics.

C.C . 212.

RESULT OF LACK OF EXERCISE.

Neglecting to exercise the entire body, of a portion of it, will bring on morbid conditions.

Vol. 3: 76.

Disease fastens upon them because they are robbed of physical exercise.

Vol. 3: 138.

The blood is not enabled to expel the impurities as it would if active circulation was induced by exercise.

Vol. 2: 529.

Inaction of any of the organs of the body will be followed by a decrease in size and strength of the muscles, and will cause the blood to flow sluggishly through the blood-vessels.

Vol. 3: 76.

The more we exercise, the better will be the circulation of the blood.

Vol. 2: 525.

The studied habit of shunning air and avoiding exercise closes the pores,--the little mouths through which the body breathes, --making it impossible to throw off impurities through that channel. The burden of labor is thrown upon the liver, lungs, kidneys, etc. and these internal organs are compelled to do the work of the skin.

Vol. 2: 524.

WHEN TO TAKE EXERCISE.

Morning exercise, in walking in the free, invigorating air of heaven or cultivating flowers, small fruits, and vegetables, is necessary to a healthful circulation of the blood.

Health Reformer 200.

To walk out after a meal, hold the head erect, put back the shoulders, and exercise moderately, will be a great benefit. The mind will be diverted from self to the beauties of nature. The less the attention is called to the stomach after a meal the better.

Vol.2: 530.

Neither study nor violent exercise should be engaged in immediately after a full meal, this would be a violation of the laws of the system.

Vol. 2: 413.

Art. for Mod. Med.

THE TRAINING OF THE ABDOMINAL MUSCLES.

J. H. Kellogg, M.D.

The importance of the abdominal muscles in relation to the general health is quite too generally overlooked. The rectus abdominis, the transversalis, the internal oblique and the external oblique form the muscular part of the anterior wall of the lower abdomen. The tone of these muscles regulaters intra-abdominal pressure. The tension within the abdominal cavity directly influences in a most remarkable way the circulation of blood in the abdominal viscera and the digestive functions of the alimentary canal,and indirectly affects almost every other organ and function of the entire body.

The veins of the abdomen are very large and are capable of very great distension. Experiments have shown, in fact, that the abdominal veins are capable of holding all the blood in the body. The size of the abdominal veins as to a large extent regulated by the intra-abdominal pressure. When the intra-abdominal tension is low, the veins naturally become distended, as their external support is diminished. When the intra-abdominal pressure is high, the size of the veins is lessened and the amount of blood which they contain proportionately diminished.

It is evident that the smaller the amount of blood in the mesenteric vessels, the greater that contained in the restof the body; and vice versa. Digestion excites the mesenteric circulation and fills the portal system with blood, thus withdrawing blood from other parts. This accounts for the drowsiness which many dyspeptics experience soon after eating, the result of an anaemic state of the brain, produced by the accumulation of blood in the portal vessels. Many dyspeptics suffer from cold extremities during the early stages of the digestive process. This may be due to the same cause, though excitation of the vasomotor centers and spasm of the vessels of the limbs is probably the most common cause.

As before remarked, intra-abdominal pressure is chiefly regulated by the tone of the abdominal muscles. The diaphragm and the abdominal muscles act in opposition. Consequently the strength of the diaphragm is in proportion to that of the abdominal muscles. Weakness of the abdominal muscles necessarily implies a weak diaphragm, for the strength of the diaphragm depends upon the amount of work required of it. The tension of the abdominal muscles is the result of a storm of nervous impulses constantly pouring into them from the central ganglia. A certain definite tone is possessed by every muscle and every group of muscles . A series of rythmical contractions is ~~xxx~~ constantly taking place in all voluntary as well as involuntary muscles whereby this tone is maintained. The low musical note heard when the fingers are pressed firmly into the ears is produced by the contraction of the arm muscles.

The tension of the abdominal muscles may be increased or diminished in disease. In a strong healthy personx, the muscular tension is sufficient to firmly compress the abdominal contents and support each organ in its proper place. This muscular tension or involuntary contraction is in fact the chief means of support to the abdominal viscera. The so-called ligaments by which the stomach, liver, pancreas, intestines, and other organs are attached to the upper and posterior walls of the abdominal cavity, act as mooring ropes, coming into play as a means of support only when the abdominal walls are relaxed.

When there is a general loss of muscular tone, the muscles of the abdomen are relaxed with the rest of the muscular system. The abdominal walls lose their natural firmness, becoming soft like the folds of a sack, but become taut when the individual sits of stands erect, indicating the descent of the bowels and other viscera, a condition known as enteroptosis, which has been so well described by Glenard. The prolapsed stomach or other viscus is no longer supported by the abdominal wall, but is hanging upon the membranous bands or ligaments by which it is attached. Both the blood-vessels and the nerves of the organ pass to it through these ligamentous supports. As the weight of the organ gradually stretches its supports, the blood-vessels and the nerves are necessarily also stretched. This process naturally results in pain and various other disturbances. The caliber of the stretched vessels is, of course, lessened, thus diminishing the amount of blood which can flow through them. This is very well illustrated by the stretching of an ordinary rubber tube. The caliber diminishes just in proportion as the length is increased. Thus the arterial blood-supply of a prolapsed organ is very notably diminished.

At the same time the organ necessarily becomes congested since the stretching of the veins narrows their caliber and this prevents the free movement of blood toward the heart. The condition of an organ in which the arterial blood-supply is diminished while the volume of venous blood is increased must be sone of disease. All the functions of the organ must be disturbed, and in time its structurex likewise becomes impaired. When the tissues are continually bathed in venous blood, they are constantly in a state of partial asphyxia through the contact with $CO_2$. The concentration of other excrementitious substances in the tissues likewise lessens their activity and lowers their vital tone, lessening vital resistance. It is thus that the prolapsed stomach becomes a hypopeptis stomach. The loss of the normal germicide activity of healthy gastric juice leads to infection of the stomach. Bacteria colonize upon its walls, and penetrate the mucous follicles. The result is gastric catarrh. Intestinal catarrh follows in time, and ofteh catarrh of the billiary ducts.

The strain brought upon the nerves by the constant tension resulting from the loss of the natural support of the abdominal walls sets up a variety of mischievous reflexes which manifest themselves in many ways. One of the most common of these is backache, experienced when the patient remains long in the upright position. In such cases the patient is very soon relieved after lying down. Headache, especially pain at the back of the neck and at the top of the head, sensation of weight around the lower part of the body, sideache, palpitation of the heart, nervous asthma, general nervous depression, nervous irritability, general sensation of languor or exhaustion after slight effort, are other common symptoms which result from enteroptosis following a relaxed condition of the abdominal muscles. Strange perversions of sight and hearing, such as roaring in the ears, flashes of light, and various color impressions, are also frequently observed. Vertigo, confusion of thought, inability to concentrate the mind, indecision, and various mental, and even moral disturbances, are also not uncommon results of nervous disturbances set up by the reflex influence of a prolapsed and pendant condition of the large organs of the abdomen. Coldness of the hands and feet is also frequently due to this cause. In such cases the patient finds the feet are not warmed by exercise, but often become colder. The skin of the feet and legs will be found to be either very pale or of a bluish tinge due to extreme contraction of the small arteries. This is not the result of weakness of the heart, or a poor circulation, to which causes this condition is commonly attributed, but an irritation of the vasomotor centers of the spine, resulting from the strain upon the sympathetic nerves of the abdomen.

Still other mischiefs arise from loss of tone of the abdominal muscles. The walls of the hollow organs of the abdomen, especially the stomach and the colon, being deprived of their normal external support, are overstretched by their expanding contents, and the result is dilatation. Dilatation of the stomach may result from the weight of ingested fluids or solids, of from the expanding gases resulting from fermentation. Dilatation of the colon may be the result of gaseous distension from fermentation and putrefaction, or the excessive accumulation of fecal matters. These dilatations occur all the mose easily becagse of the loss of tone which the intestinal muscles suffer in common with the muscles of the rest of the body in conditions which give rise to atony of the abdominal walls; that is, when the abdominal walls are in a weak state in consequence of general muscular atony, the walls of the stomach are in a similar condition. The food taken into the stomach is not promptly discharged, the whole or a part remaining until after the hydrochloric acid has been absorbed to such a degree that fermentations may take place. Bouchard has shown that this occurs whenever ~~the~~ food is retained in the stomach for more than five hours. The too long retention of food in the stomach exhausts the muscular walls of the organ, while the formation of gases by fermentation overstretches them.

Here then are five factors which tend to produce gastric dilatation and increasing atony:

1. Atony of the abdominal muscles, removing the normal

support of the gastric walls.

2. Loss of tone of the abdominal walls.

3. Long retention of food, exhausting the gastric muscles.

4. Fermentation of the retained food, forming gases whereby the stomach is distended.

5. Venous congestion of the stomach whereby its muscular structures are weakened and all its functions disturbed.

Nearly all the same factors are operative in producing dilatation of the colon. Ordinary peristalsis is only sufficient to secure the movement of the food along the alimentary canal so long as they remain in a fluid or semifluid state. When the absorption of water in the colon has proceeded until the alimentary mass is reduced to a semi-solid state, an increased intra-abdominal tension by strong contraction of the abdominal muscles, resulting in compression of the colon, is necessary for the emptying of the lower bowel. When the tension of the abdominal muscles is diminished, the bowel is not completely emptied; a portion of the fecal matters remain behind, and in consequence of too long retention in contact with the intestinal mucous membrane, they become abnormally dry and hardened through the absorption of too large an amount of their fluid contents, and the result is chronic constipation with impaction, from which result dilatation of the colon, which may lead to paresis or even permanent paralysis of its walls, hemorrhoids, catarrh of the rectum, the sigmoid flexure, or the entire colon, and appendicitis.

Gastric dilatation gives rise to the numerous conditions commonly described as biliousness, to nervous headache, in some cases to hypersecretion, and even gastric ulcer. These cases furnish just the conditions requisite for the development of gastric cancer, a condition which is increasing with alarming rapidity. Dana, Bouchard, and many others have shown the relation which exists between the putrefactive processes in the alimentary canal and the various local and general disorders which at first sight might appear to be wholly distinch from any possible gastric disturbance.

The ptomains and various toxic substances developed in the stomack and the colon in cases of hypopepsia, dilatation of the stomach and intestines, catarrh of the stomach or intestines, produce wide-spread mischief in the body. All forms of metabolic activity suffer more or less disturbance. The processes of tissue building are perverted. To these changes are due various forms of paralysis resulting from changes in the brain and spinal cord; degenerations of the liver, spleen, and other organs, resulting in abdominal dropsy and Bright's disease; degenerations of the heart and blood-vessels--dilatation of the heart, arteriosclerosis and aneurism; changes in the blood--diminished alkalinity, from which come diabetes, furunculosis, rickets, rheumatism, neurasthenia, neuralgia; other blood changes--especially ~~xxxxx~~ anemia and pernicious anemia, the result of interference with the normal blood-making processes.

The respiratory function suffers materially as the result of reduced abdominal tension. In order that the lungs shall be filled with fresh pure air, containing the necessary supply of oxygen, they must first be emptied of the impure air with which the air cells and tubes are quickly filled through the escape of $CO_2$ and other toxic matters from the blood. The lungs are, of course, never completely emptied during life. At each act of ordinary expiration about one-fifth of the total volume of air contained in the lungs is exhaled, an equal quantity of pure air being taken in by the succeeding inspiratory effort. The fresh air taken into the lungs mingles with the air in the air-passages, and by diffusion lessens the impurity.

One of the most important factors in the emptying of the lungs is the ascent of the diaphragm. This is not an active but a passive movement. The diaphragm is active only in the contraction which accompanies inhalation, during which it is lowered, forcing the stomach and other abdominal organs downward and pressing them against the abdominal wall. The tension of the abdominal wall is the opposing force which the diaphragm must overcome. The tense abdominal muscles act like a spring in which the energy expended by the diaphragm in contraction is stored up. When the contraction of the diaphragm ceases, the stretched abdominal muscles recoil, forcing the abdominal contents upward, thus compressing the diaphragm against the lungs which by the compression are emptied of a portion of their air.

When the abdominal muscles are weakened or when their tension is diminished, they offer little resistance to the downward movement of the diaphragm and afford correspondingly little resistance to its upward movement. The prolapse of the heavy abdominal muscles which are attached to the diaphragm drags this important muscle downward so that its latitude of movement is greatly diminished. Thus the amount of air which passes in and out with respiration is lessened perhaps to one-half or even one-third the normal amount. The necessary result is a diminished supply of oxygen to the body. The blood is never fully charged with oxygen. Every tissue suffers. Cerebral ackt ivity is interfered with. There is drowsiness, confusion of thought, depression. The liver is hindered in its work as a destroyer of the poisons normally generated in the body and those taken in with the food. It is unable to destroy uric acid and similar compounds which, being left to accumulate in the body, give rise to rheumatism, neuralgia, neurasthenia, and a whole host of ailments. The digestive process is impaired. The heart is weakened. Vital resistance is lowered. The way is prepared for the development of almost any acute or chronic infectious malady and for degenerations of various sorts.

Lacking the stimulus of normal abdominal tension against which to work in its movements, the diaphragm becomes weak. The powerful assistance which it normally gives to the function of                          is lost. Blood accumulates in the veins in all parts of the body, especially in the large vascular organs of the abdomen. Congestion of the brain, congestion of the kidneys, congestion of the liver, stomach, and other viscera result and in time disorder of both function and structure follows. ¶ In man bladder and prostatic diseases result from the disturbance of the portal circulation, chronic constipation and other morbid factors which have been pointed out. In women diseases of the bladder, also retroversion and various other forms of displacement of the pelvic viscera, with congestions, neuralgias, catarrhs, and inflammations, follow as natural consequences of the prolapse of overlying organs, and the resulting circulatory and nervous disturbances.

The above enumeration of morbid conditions growing out of diminished intra-abdominal tension and the loss of tone of the abdominal muscles is but a partial and very inadequate presentation of the morbid phenomena which are the natural outgrowth of this very common but generally overlooked condition. Weakness of the abdominal muscles is found in nearly all civilized women who have reached the age of twenty years, and in a very large proportion of girls who are fourteen years of age or older. In man the condition is much less common. In man this condition is generally the result of the stooped position assumed by students and many business and professional men when engaged in work at their desks. In women the mischievous results of a sedentary life are aggravated by incorrect modes of dress, especially tight bands, heavy skirts, and the rigid supports of corsets and stays which prevent normal muscular movement.

There are comparatively few cases of chronic disease in which a weakness of the abdominal muscles does not play an important part as an etiological factor, andin the great majority of chronic cases in both men and women, it is necessary that special means shall be employed for the development of the abdominal muscles in order that a cure shall be effected. The neglect to attend to this important matter is a very common cause of failure in dealing with these cases, which generally drift about from one practitioner to another until they either die of their chronic disorder or some intercurrent acute malady, or get well by taking to bicycle riding, swimming, gymnastics, or outdoor life, thousands recovering without exactly knowing how or why. Muscular exercise, of course, acts favorably upon the body in a variety of ways, but it is through [the development of] the abdominal muscles and the important aid these render to respiration, circulation, digestion and other functions, a large part, perhaps we may say the chief part, of the benefit derived from muscular activity is secured to the body.

There are various methods by which the abdominal muscles may be strengthened and their tone increased. A difference must be recognized between muscular power and muscular tone. Muscular strength is determined by the actual amount of energy which may be manifested by the muscle when stimulated by the will. By muscular tone is meant the state of tension in which the muscle is found in a condition of rest, and which is independent of the action of the will.

Very weak and undeveloped abdominal muscles are often found in a state of retraction, being contracted so firmly as to be almost in contact with the posterior wall of the abdomen, giving the appearance that the abdominal cavity has been largely emptied of its contents. When the abdomen has been opened in such a case, he intestines are found entirely empty of gas. The colon and stomach are found contracted and generally pale in color unless inflammation is present. This extreme tension of the abdominal muscles is found in peritonities, in appendicitis, and in very acute affections of the abdominal viscera when accompanied by pain. It is also not infrequently found in cases in which the abdominal sympathetic ganglia are rendered abnormally sensitive in consequence of prolapse of the stomach of ~~xxx~~ other viscera.

On the other hand, stong abdominal muscles are frequently found relaxed as the result of sitting in a relaxed or stooped sitting position, or because of a flabby relaxed condition of the muscular system in general, lack of exercise, loss of nervous tone arising from excesses of any sort. The chop-fallen facial expression of the habitual drinker is evidence of this condition of lowered muscular tone, which through the existing relation of abdominal tension to the bodily functions may become a source of much mischief.

The abdominal muscles are voluntary muscles, like those of the arms and legs and their tension is quite independent of the will, being controlled by automatic centers over which the will has no influence. In cases of diminished intra-abdominal tension, it is necessary to give attention both to the increase of tension and to the increase of muscular power. The tension may be increased by cold applications to the spine, the abdomen, the feet or the rectum.

Cold is the most effective of all means of increasing muscular tone. How this is accomplished we do not know any more than we know how the actinic ray of the sun produces solar erythema or how certain flavors excite the appetite while others produce an opposite effect.

Cold applications may be made to the abdomen by means of a cold towel spread out on the abdomen and rubbed for two or three minutes, or by means of a stream of cold water applied by the aid of a dipper, or regular douche apparatus. A convenient method of applying cold water to the abdomen is by means of the affusion. The attendant pours cold water from a dipper upon the umbilicus while the patient is lying undressed in a bath tub. If the patient is easily chilled, a little warm water (95° to 102°) may be run into the tub before the patient lies down in it. This will prevent any tendency to chill. The temperature of the water employed for the affusion should be about 60° to 70°. Colder water may be used by strong patients, or by feeble patients when they are properly trained. The dipper should at first be held not more than one foot above the patient. The hight should be gradually increased from day to day until the dipper at as great a height as arrangements will permit. The regular douche apparatus is, of course, better for an application of this sort. The broken douche, the fan douche, or a gentle spray should be employed rather than the jet. A strong horizontal jet or percussion douche may be applied to the spine at a temperature of 50° to 60° or the dipper douche may here again be employed, the patient sitting over the bath-tub for the purpose, while cold water is poured from a dipper held as high as possible. The duration of these cold applications should not be more than one or two minutes. To chill or benumb the parts will produce an effect the very opposite of that desired.

Placing the feet in very cold water in a basin reflexly increases the tone of the abdominal muscles. Priessnitz and more recently Kneipp made his patients walk barefooted in the grass wet with dew, and sometimes even encouraged them to run about barefooted in the snow for a short time. Such procedures are exceedingly effective means of increasing the tone of the abdominal muscles, through the strong reflex stimulation set up.

The running foot bath is a more effective procedure and easily taken. This may be administered in an ordinary bath-tub as follows. The patient with the feet bare steps into the empty bath-tub, partially closing the outlet. The cold water faucet is now opened and the water allowed to run in at a rate such that there will be all the time about an inch of water in the tub. The patient stands on one foot and rubs the back of one foot with the sole of the other foot, changing feet every ten or fifteen seconds, so as to secure a continuous effect. This procedure excites the tension of the abdominal muscles in a very remarkable degree. Cold water may also be applied to the feet by means of the dipper pour, the spray, or the percussion douche.

Perhaps the most powerful of all procedures by which the tension of the abdominal muscles may be increased is the application of cold water to the rectum. A rectal irrigator is best for the purpose, but an ordinary enema apparatus may be employed. When the latter is used, half a pint of cold water ($50^\circ$to $60^\circ$) is quite rapidly introduced into the rectum. Within a few seconds, the abdominal muscles will be involuntarily contracted, often with a strong repulsive movement. When the irrigator is employed, the cold water is allowed to run in and out for five to ten minutes. When the sensation of cold becomes painful, as is generally the case after a few seconds, the flow of water should be stopped until the tenesmus disappears. It is then allowed to flow again. This is repeated for five to ten minutes. This application may be applied twice a day. It willbe found extremely useful in cases of chronic constipation due to weak abdominal muscles, or diminished abdominal tension, conditions found in the great majority of cases of chronic constipation.

The effect of the cold application to the rectum may be intensified by alternation with heat.By a suitable arrangement water as hot as can be borne and cold water ($50^\circ$ to $60^\circ$) is

Star page 17.

Another hydriatic procedure of great value is the wet girdle, or the umschlag of the Germans. Care must be taken, however, in the application of the girdle. Mackintosh or other impervious coverings must be omitted, and the flannel covering must be just thick enough to prevent chilling but thin enough to allow the towel to dry out every two or three hours. The towel should be renewed by wringing out of cold water just before it becomes dry. A single towel is sufficient, and should be wrung just dry enough so it will not drip. It should be long enough to reach around the body. With feeble patients, a half towel may be used or a thin compress large enough to cover the front of the abdomen. The flannel bandage should be long enough to reach once or twice around the body. It should be pinned close.

Prolonged fomentations to the abdomen, and prolonged hot baths should be avoided as much as possible in cases of this sort. If hot applications are necessary for the relief of pain, they should always be followed by a cold application for the purpose of restoring the muscle and nerve tone as well as the tone of the vessels.

made to pass thalternately through the organ. The change should be made every ten seconds. The duraction of the applications may be five to ten minutes.

Applications of electricity, especially the sinusoidal x and the faradic currents, also increase the tension of the abdominal muscles. The sinusoidal current is particularly useful for this, as it does its work without exciting disagreeable sensations.

Massage, especially light stroking and pinching movements, applied about the umbilical region, and kneading of the abdominal muscles, are useful means of increasing muscle tone. The superficial movements excite muscle tone reflexly, while massage improves the nutrition of the muscle.

The strength of the abdominal muscles may be increased by exercise and by applications of electricity. The sinusoidal electric current is the most useful of all forms of electrical application. This current may be applied by means of a special apparatus, so regulated as regards speed and the quantity of current as to produce a muscular contraction with free (?) circulation. Muscular contractions produced in this way are quite painless. Well-moistened electrodes af reasonable size are employed and the current is regulated so as to be just strong enough to produce a vigorous contraction of the muscle. Special electrical apparatus may be employed for this purpose, or equally good results may be obtained from an ordinary telephone generator, which may be purchased at a cost of three to five dollars. The best results are obtained by means of a generator ruh by water or electricity and furnished with a          of the speed. The applications should be made daily for ten or fifteen minutes in such a manner as to secure vigorous contraction of all the abdominal muscles.

Voluntary exercisex is perhaps the most important of all means of strengthening the abdominal muscles. The muscles of the abdomen may be best brought into vigorous action by exercises in which the trunk or the legs are elevated. The following exercises are especially useful:

1. Lying on the back with the limbs extended, both legs are raised together as high as possible, then lowered. The movements should be made slowly in both directions. It is well for the patient to count while raising the legs, repeating the same while lowering the legs. A breath should be taken before each count. This will be four short breaths while raising the legs and the same number while lowering them. Breathing brings the diaphragm into play, the effect of which is highly beneficial. The breathing and the counting are beneficial by bringing the lungs as well as the abdominal muscles into full activity.

2. Lying upon the back with the legs extended, raise the head as far as possible, taking care not to assist with the arms. Count four while raising the head, and repeat while lowering the head.

3. Still more vigorous action of the muscles may be secured by raising both the legs and he head at the same time.

4. Toe-elbow lying, in which the trunk is supported in a horizontal position by the toes and the elbows, brings all the principal muscles of he trunk into active play.

5. Sitting erect in a chair, with chest well raised, lift the feet from the floor and extend the legs, counting as before while raising and lowering the legs. The vigor of this exercise may be increased by placing the hands at the back of the neck, as shown in the cut, or by raising the arms above the head.

6. Sitting on the front edge of a chair, place the hands upon the hips, raising the chest well forward, drawing the chin in. Now render the whole body rigid, and,keeping the legs flexed at a right angle, sway the trunk back and forth. With each ~~xxxxxxxx~~ backward movement, the feet will be lifted from the floor and at the same moment the abdominal muscles will be powerfully contracted. The vigor of the movement may be increased by stretching the feet so that the heels will touch the floor.

It is well to combine this exercise with breathing movements, the lungs being filled as the trunk moves backward and emptied with the forward movement. This is a most excellent exercise and can be practiced by any patient able to sit erect. It may be graduated to suit the strength of the patient by increasing or diminishing the latitude of the swaying movement and by drawing the feet nearer the chair or pushing them farther away. A very feeble patient may begin by raising the heels only with the backward movement, allowing the toes to rest upon the floor. In this exercise the strong tension of the abdominal muscles during inspiration aids in strengthening the diaphragm. The strong compression of the viscera between the diaphragm and the tense abdominal muscles during inspiration relieves congestion of the liver and stomach, hastens the movement of blood through the portal circulation, aids the absorption of food and promotes gastric and intestinal activity. The expiratory effort is also rendered as complete as possible, the ascent of the diaphragm being aided by the tense condition of the abdominal muscles.

7. Stand with the back against a smooth wall. The heels, the hips, the shoulders, the back of the head, and the little fingers must touch the wall, the thumbs being turned outward as the arms are stretched downward and sidewise. Now take thirty or forty deep breaths, breathing slowly in and out. Repeat this exercise two or three times daily, and endeavor to hold the chest high all the time when sitting or walking, drawing the chin well in, and carrying the hips well back while the chest is held forward. The correct position in standing, walking and sitting is highly important as ~~xxxxxxxxxof~~ and aid to development of the abdominal muscles and proper breathing.

Various arm exercises, especially arm-raising, either with or without dumb-bells, may be practiced in connection with the swaying movements.

Other special exercises may be employed for strengthening the diaphragm. The following are particularly useful:

1. Sitting erect with the knees separated, the hands are clasped across the lower part of the abdomen. Firm pressure is made inward and upward so as to lift the abdominal contents. Now breath deeply, filling the lungs as fully as possible, and emptying them as completely as possible. The effect of the pressure of the hands willbe to increase the work of the diaphragm during inhalation and to assist the emptying of the lungs by forcing the contenst of the abdomen up against the diaphragm, thus raising as high as possible. This exercise also tends to increase the expansion of the upper part of the chest which is especially useful for persons who are in the habit of sitting in a stooped position. The stooped position not only renders the upper part of the lungs idle but causes collapse of the air cells since the expansion of the lower part of the chest draws air out of these portions of the lungs. which are not expanded by the raising of the overlying chest wall. The portions of the lungs thus rendered idle and air-starved are an easy prey to the tubercle bacillus, which generally begins its work in the apices of the lungs.

A feeble patient may take this exercise while lying in bed. If very feeble, the pressure upon the abdomen may be made by an assistant, as shown in Figure ..... Moderate pressure should be made as the patient inhales, the resistance being increased from day to day as the diaphragm gains in strength. Stronger pressure should be made during the expiratory effort so that the diaphragm may be pushed up by crowding the abdomincal viscera up against it.

2. An excellent mechanical means of exercising the diaphragm is the shot compress. This consists of a quilted sack filled with shot. The sack should be made of such size and shape as to cover the abdomen from an inch above the umbilicus to the pubis. The weight may be ten to fifteen pounds, according to the strength of the patient. With the compress laid upon the abdomen, the patient should breathe as deep as possible taking show deep breaths, being careful to avoid breathing out suddenly. The time of the movement should be regulated by counting,four for inspiration and the same for expiration, or a metronome may be used for the purpose.

3. Another excellent method of strengthening the diaphragm is the following: The patient lies upon his face with a large inflated rubber ball placed between the umbilicus and the pubis. An ordinary water bag filled with air will answer the purpose fairly well. In the absence of anything better, a large, dry bath-towel may be used, or eben a mass of cotton batting,or woal, After taking the position, the patient should take slow, deep breaths. In inhalation the diaphragm is compelled to lift the weight of the trunk and to overcome the resistance of the inflated rubber sack.

4. An abdominal supporter, so constructed as to produce elastic pressure upon the lower abdomen, affords an excellent means of training the diaphragm. With each downward movement of the diaphragm, the supporter is forced downward and forward, while with each upward movement of the diaphragm during

expiration the supporter lifts the intestines upward. The diaphragm is thus strengthened by the resistance afforded by this organ and the emptying of the lungs is aided. The abdominal supporter has the advantage that it may be worn constantly during the daytime, and thus acts continusously in training the diaphragm to increased efficiency.

~~Ths~~ A large share of the movements of the Swedish system aid in the development of the abdominal muscles. In the opinion of the writer, the Swedish system owes its value chiefly to this fact.

It may seem somewhat troublesome to employ these measures but anyone who will take the pains to note the effect of the systematic application of the simple means here suggested for improving the condition of the abdominal muscles, will soon be repaid by seeing the rapid improvement of patients whom he has previously labored ~~fm~~ in vain to relieve.

THE PHYSICAL EDUCATION OF GIRLS AND WOMEN.

Throughout the whole animal kingdom the young are prompted by an instinctive impulse to almost constant exercise.

From exercise and the free use of pure air no child should be debarred.

The bodily exercises of the two sexes ought, in fact, to be the same.

Girls should not be confined to sedentary life within the precincts of the nursery.

The first occupation of the day for children should be out of doors

As much of the day should be passed in the open air as the weather will permit.

Walking up-stairs.

The Physical Training of Women.

The physical training of woman is, in certain respects, more important than that of man.

Gymnastics is usually brought to a close at too early a period in a girl's life.

Hysteria, of which we hear so much nowadays, is a degeneration of the nervous system.

PHYSICAL EDUCATION.

ROUND-SHOULDERED GIRLS.

"What shall we do with our round-shouldered girls?"

Conditions which affect vital organs.

The depressed and sunken chest and the protuberant abdomen, both indication of a lessening of activity of vital organs as well as a displacement of the same.

Stooping posture at their studies or in school.

The average woman has no comprehension of what a tight dress is.

PHYSICAL CULTURE NECESSARY FOR BRAIN WORKERS.

Curvature of the spine.

"Too much work and no play."

The sturdy boy who keeps at or near the foot of the class, and the [redacted], hollow-chested girl, the pride and boast of her teachers.

An [illegible] of one or more groups of muscles, or of one or more organs.

Physical culture should begin at the same time as the cultivation of the mind.

The exercises should be systematically arranged.

On entering the gymnasium, business and other cares should be left on the outside.

The costume worn by women during exercise sh ould be so made as to allow of the freest possible movement of the body and extremities.

RESPIRATION IN MEN AND WOMEN.

## EXERCISE AND HEALTH.

Activity is essential for health. Stagnant water becomes foul, while the running stream remains pure and clear. The tissues of a person who neglects muscular exercise become filled with waste matter in consequence. Exercise stimulates the activity and vigor of every organ of the body. The energy of the heart and the activity of the lungs are increased four or five fold by exercise. Through the increased activity of the heart the movement of blood through the body is accelerated, and through the increased activity of the ~~kidneys~~ lungs the quantity of oxygen is increased to purify the blood and vitalize the tissues. Thus the tide of life rises higher. The activity of the liver, kidneys, skin, and all other eliminative organs is greatly increased, thus securing purity of blood and tissues.

As a direct result of deficient exercise, the body is predisposed to numerous diseases, especially rheumatism, indigestion, diabetes, obesity, neuralgia, insomnia, constipation, and premature old age.

Exercise may be classed as gentle, moderate, and violent. Gentle exercise is that which does not produce either fatigue or breathlessness. Moderate exercise produces fatigue when continued sufficiently long, but not breathlessness. Violent exercise produces breathlessness, which is one form of fatigue; and if continued for any length of time produces exhaustion.

Gentle exercise is adapted to invalids and very feeble persons. Violent exercise is permissable only to young persons and to adults who have been accustomed to vigorous exercise all their lives. Moderate exercise is the sort which is especially indicated for health in all classes. It must not be considered, however, that exercises are harmful that cause a person to breathe deep. Deep breathing is one of the most beneficial results of exercise.

A good set of muscles is one of the most excellent qualifications which a person can possess. There is no position in life for which they unfit him, and there is none which they will not able to to fill to better advantage than he could otherwise do. There are a thousand and one emergencies in life in which strong, vigorous, and well-trained muscles are of enormous service, and in which their use may be of incalculable value. Proper physical culture gives, not only increased physical strength, but greater dexterity, suppleness, and grace of movement. The man who walks with a shuffling, swaying, and awkward gait does so, not on account of any original defect in his physical make-up, but through the weakness of certain mualces which, by disuse, have become unable to do their part in the act of walking, and so render him unable to perform it in an easy and graceful manner. The trained gymnast exhibits a lightness and elasticity of movement impossible to an individual who has not had the benefit of physical training.

Proper training of the muscles also prevents or corrects various bodily deformities, such as round shoulders, flat and narrow chests, and crooked backs, and gives to the body an erect and graceful carriage. Many of these deformities are directly or indirectly productive of interference of the body in general, through interference with the proper working of the various vital organs, particularly the lungs; and hence physical culture does more than simply add to the comeliness of the body and grace of movement; it really increases the vital capability of the body, thus lengthening life, as well as rendering it more joyous.

For example, Dr. Wm. G. Anderson, director of the Yale gymnasium, made a study of the longevity of "Y" men. The data which he has collected cover the lives of 907 athletes who had obtained preeminence in rowing, football, track athletics, and baseball. The average number of years of life was found to be smallest among football men. Compared with the select mortality tables of the Actuarial Society, Yale athletes were found to be ahead in longevity. The percentage of dead among the general graduates of Yale was found to be 12.9, while of the athletes the percentage of dead was 7.2,--a mortality a little more than half that of the general graduate. Of the fifty-eight deaths, nine were by violence; twenty-four of lung disease or heart failure. These facts seem to indicate that vigorous physical exercise, even when carried somewhat to an excess, as is generally the case with college athletics,, is conducive to longevity, or at least is more favorable to longevity than are the habits of the average college student.

Muscular exercise not only improves the health and strengthens, but directly or indirectly affects in a favorable manner nearly every organ of the body. The muscles aid in supporting the various bones which compose the skeleton in their proper positions. When the muscles become weak they relax, and allow various portions of the body to drop into uncouth and unhealthful positions.

It is thus that the shoulders become rounded, being allowed to drop forwadd through weakness of the muscles which are intended to hold them back in position. The ribs, which form the framework of the chest, not being properly pulled forward and out ward through contraction of the muscles attached to them, gradually fall inward, thus flattening the chest, and compressing those important breathing organs, the lungs. By proper exercise these physical defects may be prevented, and entirely remedied in most persons who have not yet attained middle age. Even in advanced years much can be done to correct these physical deformities.

Still more remarkable is the effect of exercise upon the activities of various internal organs. The effect of muscular exercise in increasing the action of the heart and lungs is well known. A brisk run will often double the activity of the heart, and much more than double the activity of the lungs, both as to number and depth of inspiration. The amount of air taken in at each breath is also greatly increased, more than doubling, in fact, the work of the lungs.

The heart is a pump which distributes to the tissues the vital fluid by which it is to be replenished. When the heart works more rapidly and vigorously a larger amount of blood is refurnished to every organ of the body, and the tissues are consequently more liberally supplied with nutriment, and more thoroughly renovated.

Not only is a larger amount of new material carried to the tissues, but the old, worn-out waste products are removed much more thoroughly, being carried to the organs whose business it is to remove them from the body--the kidneys, skin, etc. The lungs, by their increased activity, introduce into the blood and veins of the whole system a larger quantity of oxygen, the great purifier which vivifies the tissues, and cleanses every nook and corner of the vital domain. Every activity is quickened. The whole system is infused with a higher grade of vitality. The bodily machinery runs at a higher speed, and with greater effectiveness for work. The brain, freer from the products of waste, and supplied with more highly vitalized blood, is able to do better thinking. The liver, having a larger amount of oxygen and a better blood supply, can do more bile making. The stomach secretes a better quality of gastric juice, and more of it, and hence is able to digest a larger amount of food, and more perfectly elaborate it and prepare it for entrance into the blood. The demand for a larger quantity of food creates a better appetite, and a keener relish for food.

Physical exercise gives better command of the whole body; and when properly conducted trains both sides of the body alike, and so doubles the efficiency of the muscles. A man who has been untrained really uses his left side but very little. Even the right limb usually has enough more training to make it a little larger than the left. The extra amount of work done by the right side of the body results in increasing the strength of the muscles of this side, and in deformity of the spine, which is made to curve toward the left side, causing the shoulder to drop a little. There is probably not more than one person in four who does not have this deformity.

With proper physical training, both sides of the body will be equally developed, and should be equally useful.

Thus, every part of the body seems to take on new life and activity; and to a person who has previously been in a state of inaction, with his system torpid and clogged by the products of waste products which have not been eliminated, the change is almost equivalent to a new birth. After having once tasted of the delights of living on a higher plane, with all sensibilities quickened, and his ability for enjoyment and appreciation of the pleasures and blessings of life so greatly increased, one could hardly be induced at any price to return to the old sluggish and inane existence.

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## EXERCISE AS COMPENSATION MEANS IN DISTURBANCES OF COORDINATION

Disturbances of coordination in tabes dorsalis have ~~its~~ their cause, as we think, in a lowering of the normal sensibility where the decrease of the sense of motion in the joints and the sense of contraction in the muscles is the main point. The most rational therapy consists therefore in the restoration of the normal sensibility of these organs. This can be done successfully only as far as it is possible to improve or remove the anatomical lesion. It is to be thought that this may occur in the same way as in other pathological processes but nothing definite is known about it as yet. So we try a different method and attempt to make use of the remaining quantity of sensibility in the manner that sufficient signals are transmitted to the central organs about the position of the limbs. The method to this is exercise, that is the frequently repeated motions done under constant attention, respectively the ~~the~~ attempt of a well imagined ~~ed~~ motion. Through the exercise the conception of fine sensible impressions is facilitated and through the same the conception of finest differences of irritation are made possible. This is a well ~~k~~ known fact. The capability of the blind to read the so-called Braille which is gained by exercise belongs to that group. Through the exercise the central organ becomes capable to perceive and use small irritations for coordination, also through the exercise the sensitiveness of the organs is increased so that a small often repeated irritation will have the same value as an intense but rarely occurring stimulation. From this it is shown that in the theory the change from an ataxic to a normal motion is ~~done~~ accomplished according to the same laws as the practice of complicated motion in the healthy where the finest differences of stimulation have to be perceived. Evidently this method presupposes a certain minimum of sensible impressions. Total anesthesia excludes the use of the exercise therapy but it never occurs in Tabes Dorsalis. The treatment will take a much longer time if the disturbances of sensibility have been of a marked degree. It was said at first that this method was of use only when there was no disturbance of the deep sensibility and of the joint and muscle sense. HIRSCHBERG proved that very brillant results have been obtained by the exercise therapy even in those cases. BECHTEREW and OSTANKOF observed and reported improvements in the sensibility of the skin under the influence of the exercises. This occurs at times but is comparatively rare. The sense of position is always improved. The sensibility to pressure usually returns. Attempts to hasten the improvement of coordination by impressions thru hearing and vision are of no value. It is most important to find for each limb the most suitable kinds of exercises to establish compensation for the lack of sensibility. At times even when only a very small portion of sensibility is left a cure may be almost complete. These kind of patients have to use their entire attention to watch their body and the limbs that are moved. As soon as they close their eyes they will fall. A man with a very marked ataxia, that could not leave his chair was cured after a treatment of eight months completely, he even could walk down the steps backward without a cane, but all his motions were done under the control of his eyes, as soon as he closed them he fell. . If the disturbances of sensibility have not been excessive the patient will learn to stand and walk with closed eyes, even if he cannot do it quite as well as under the control of his eyes. The minimum amount of the sensibility that is necessary to get fesults is hard to estimate , but there have to be some vague ideas about the position of the limbs even if they are not correct. If the patient has a good will power and is able to concentrate his mind upon the motions one can give a good prognosis. Cases where active muscle contractions give rise to a slight impression are the most favorable ones. The motions may be perfectly normal the only difference in the appearance of the person may be due to the hypotonia of the joints.

In normal persons the motions are without insecurity. In ataxic persons, every motion has to be watched closely by them. Their success depends mostly upon the willpower of the patient. If they keep up their exercises for months, the motions may become quite secure. But we often saw much-improved cases that soon returned to their old ataxic state because they had not enough patience and will power to keep up the exercises. Weak, easily worn-out patients, should stay for months in an institution even after the real cure is over. The security of the motions increases the longer the patients keep up the exercises. If the muscle sensibility is altered very much there will always be a certain insecurity.

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Mechanics of body motions:

It will be our task to find the laws that are active in the equilibrium of the body in the upright position, no matter whether concerning the entire body as in walking, running, jumping or only parts of the body as in sitting and getting up, bending forward or bending in the knees.

On two cylindrical-shaped supports the body is resting when the person is standing up and it is well understood that the upper part of the body, trunk, head and arms are balanced only by the lower limbs. The legs alone without the body would not be able to stand up but they are able to maintain their equilibrium with the parts of the body resting upon them.

The problem to keep a relatively heavy weight on two ~~relatively~~ long cylindrical supports is ~~underxxxxxx~~ solved by the human body in the ability in every movement to arrange and group differently the muscle masses and to prevent the threatening loss of balance. The change in the place of the parts of the body is accomplished by the muscles, which during their contraction can group their masses to a different centre of gravity, especially the parts to which they are attached --- as the skeleton with the organs attached to it. The axes where the change in position takes place is in the joint. There is one faculty that gives the value to this mechanism that is the capability to balance the parts with extreme rapidity in the movement of necessity and upon this fact depends the security of the ~~pxx~~ position of the body and the locomotion. Correcting and counteracting is the device of the antagonistic muscles and the arrangement of the ligaments of the bones and joints. From this we understand that the upright position of the body is the result of muscular activity as one could never make a dead body stand on its legs.

The dividing up of the body into segments which are capable of moving in different directions is necessary for the great variety of motions.

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The ankle joint would allow a marked bending forward of the body without raising the heels but it is the centre of gravity that prevents this motion. A bending backward motion is very limited as it would transfer the point of gravity behind the heels; it can be done only as far as knee and hip joints can compensate for it, as the spine has only a very slight motion backward.

THE KNEE JOINT

The knee joint is in a moderate degree of hypertension and slight flexion when the person is standing up. This is caused by the posterior muscle of the leg. This muscle mass is on account of its tone shorter than the bone. The stronger the tension the greater the ~~tendxxxxx~~ tendency to flex the knee, which occurs in every dorsal flexion. Bending of the knees has a great value for the organism that has not been appreciated. In the animal the movable scapula and the hip joint has no mechanism to moderate the sudden concussion of shock. If the thigh was placed upon the tibia in a perpendicular line the shock to the body on each step would be considerable. The bent knee acts as a spring causing the elastic gait. In jumping, the knees are always bent when the feet reach the ground. People that are obliged to stand a great deal will usually stand on partially bent knees. The working man or farmer can be recognized by the position of their knees which position is ugly when of a marked degree. The excursions of the joints depend upon their anatomical arrangement and the tonus of the muscle masses.

THE HIP JOINT.

Normally the unlimited bending of the thigh against the abdomen is only possible when the knee is bent at the same time. Lateral motion is limited by the tone of the adducters. Motion backward is limited and can be done only with extended knees.

CHANGES IN POSITION WITHOUT LOCOMOTION

Standing on one leg the entire weight is resting upon one foot, the body is bent to the side and the foot shows slight oscillations. A slight insecurity of the solidity of the base will cause an increased lateral bending of the body. Of diagnostic importance is the slight bending of the thigh and leg of the free limb, so that the foot is in line with the other knee. This occurs very early in TABES before any signs of coordination are noticed. (See picture on page 120 of original) The position of the trunk is there changed relatively little so that with the progress of the disease a constant increasing tendency to fix the trunk is noticed.

Bending the knees taught in school is accomplished by raising the heels and moderately abducting the knees. If the trunk is kept at a perpendicular line the heels have to be raised. If the entire sole of the foot is to rest upon the ground the trunk will have to bend forward. This is a characteristic position in TABES when bending of the knees is attempted.

Walking

We shall divide a pace into its different phases: Flexion of the knee, the body resting on the other leg, bending of the trunk toward the leg supporting its weight. The swinging leg is unable to reach a point anterior to its previous one because as a radius it can touch only a perpendicular line. If the center of this circle moves forward the foot could reach the ground. Thus the trunk and the pelvis move forward. At the same time the leg that supported the weight so far becomes free and can move forward, lifting the heel from the ground first in flexing the foot at the ankle joint.

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During the second phase the ~~right~~ limb completes the ~~lateral~~ motion and touches the ground. The third phase consists in the even deviding up of the weight of the body on the two limbs. In the normal person the foot is touching the ground first with the ~~toes~~ heel due to a plantar flexion. The leg is thus lengthened and provisional support rendered the ~~the~~ trunk before its entire weight is transmitted to it.

Getting up and sitting down.

Getting up from a chair is made impossible as long as the legs are extended anteriorly. They have to be pulled back in order to have the center of gravity not behind the heels. The normal person will bring the feet so far back that the heels are slightly raised, thus standing on their toes or rather ball of the foot. The trunk is bent forward.

This advantage soon changes into a disadvantage when a pathological disturbance begins to alter a normal display of muscular activity, When for some reason the contractions become insecure and slower so that the organism in an intended change of place cannot depend upon its equilibrium. The quick motions become dangerous in locomotion. The more movable the part the more stable the equilibrium and for that reason a doll can stand but not a dead body. In these cases the organism reduces the motions of the segments by contracting the antagonistic muscles. Upon this fact depends the stiff walk and position of the body even as long as no spastic muscle affections are present. We shall now consider the condition of single movable segments and the influence of their position in different ways of motion.

## THE FOOT

With the body standing with the feet parallel to each other the line of the centre of gravity is in the region of the heels or a little anterior to them. Upon the heel is resting ~~the~~ most of the weight, the epidermis here being the strongest of any in the body.

The length of the foot makes it possible to transmit the centre of gravity to the ball of the foot when bending forward. In extreme bending forward the toes are the centre of gravity and the heels are raised. Only the great toe is important in maintaining the equilibrium. An amputation of all the other toes would cause hardly any change. In bending forward the body attempts to keep the more secure centre of gravity in the heels resulting in a maximal bending of the legs and thigh backwards, which however is very limited for anatomical reasons, the center of gravity being finally transmitted to the ball of the foot.

In small steps the heel is not raised from the ground they are used only in very careful walking when the ground is not safe or the equilibrium interfered with. (Tabes)

In the medium sized steps while one foot is swinging the foot of the other leg raises the heel from the ground. The swinging leg reaches the ground first with the heel. At that moment the feet are both on the ground. The anterior foot stands on the ground with the entire sole while the other one raises the heel. The swinging foot is slightly flexed at the knee and hip joint.

MECHANICS OF STEPS IN TABES.

Changes in the gait are caused by the altered equilibrium and the hypotonia of the muscles. There is a lack of sensibility for the motions of the spine and the hip joint. In the extreme grades one can notice the peculiarity of carriage of the trunk. The spine is kept straight and stiff the paces are very small , the toes are slightly raised and the heels push against the ground. The trunk will always rest upon the posterior foot that is carrying the weight, while in the normal walk the motion of the trunk is the main factor in producing a step. Here the trunk is pulled over after the step is completed. Lateral steps are more simple because the trunk does not need to move back and forward, it is used in these cases to practice the foundation rules . In the beginning the weight of the body is divided up evenly for the two lower limbs. If the step is to be taken to the right side the weight of the body is transferred to the left leg so as to make the right limb free for locomotion.(See illustrations on pages 131-136 of original)

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In case of danger of falling the patient should be supported in the axilla close to the body, the arm and hand should never be grasped as it will not prevent the fall and may cause a fracture. Only after the patient is supported in the axilla may he grasp the hand or arm of the attendant. The patient's clothes should not touch those of the attendants during the exercises. The arm of the attendant next to the patient is bent at right angles; the other one is carried passively. The attendant has to watch the lower extremities closely, especially when the patient has to look up during the exercises. The bending of the ankle joint occurs frequently and should be supported by high tied fitting shoes or gaiters that have a few lateral stays of steel. The sole of the ~~foot~~ shoe should be a little wider than the foot, rubber soles are quite safe on a dry ground. The cane should be strong and have a big handle.

A large number of accidents occur due to carelessness. Fractures, tearing of tendons and dislocations may be the result and are often not noticed until after a long time.

Clothing should be light and not restraining any of the motions in the exercises.

## EXERCISE ROOMS AND DEVICES.

As paradigm we mention the rooms where several patients will take their exercises at the same time. The most important point is to let the patients rest while one of them is practicing. In treating single cases there is danger of prolonging the exercises too much and to decrease the pauses. A new exercise should not be taken up until the pulse is entirely normal in rate as the patient do not have the normal feeling of fatigue.

CONDITIONS NECESSARY FOR TREATMENT.

Spinal irritation: Our treatment should be tried in every case of tabetic ataxia as it gives the best results in these cases but one should not begin the treatment while any symptoms of meningeal irritations of the spine are present. The spinal irritation may occur in the beginning of the disease or at any other stage. It is noticed by dull, painful paraesthesias with varying but not very great intensity, contiuously in type affecting the muscles of the back and at times the extremities. In the majority of cases these symptoms disappear within a few weeks. These attacks are usually combined with an increase of the paralysis or an increase in the loss of sensibility. One should always wait until the acute symptoms of spinal irritation have disappeared. The treatment is not contraindicated in lancinating pains, which last only a few days.

Blindness: Vision is the most important factor in the systematic exercises. It is noticed that blind tabetic persons do not develop marked symptoms of tabes and that even blindness occuring during the disease will improve the ataxia. Marked ataxia, and disturbances of sensibility and blindness together will give a hopeless prognosis.

Hypotonia: A moderate degree of hypotonia will have no influence upon the treatments, if the condition is very much pronounced and the knee joints are altered very much this may have to be corrected first by orthopedic interferences.

Cardiac lesions do not exclude the treatment but the pulse should be constantly watched and the treatments under no conditions continued until the normal frequency of the pulse is present, as the patient has no sense of fatigue.

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Protective measures during treatment. The danger of falling is the greatest as it may occur suddenly and without any ~~wa-~~ warning. It has happened that a man being ~~by a~~ accompanied by a servant on each side fell down as quick as a flash, even pulling the servant down that attempted to get hold of him. The fall is due to a sudden bending of the knee, the patient not being aware of the fact suddenly will fall down as he lost the equilibrium. The patient has no sensations of the fall, but finds himself to his greatest surprise lying on the ground. These patients that even the most simple motions have to watch closely, especially during exercises will thru excessive muscular contraction and attention try to protect themselves and will soon be worn out, there should be devices to protect the patient from falling so that he can absolutely depend upon it. In cases of lack of will power and taught by experience that he canot depend upon his own limbs nor upon his companion, these patients will give up to attempt any motions. The inactivity of the muscles will favour the disturbances of coordination. Thus the most important necessity is to avoid every no matter how slight an injury. For that reason we have the severe and medium cases watched from both sides, the lighter cases only from one side and only in the very slight cases and after we found according to our own experience that the patient is able to practice alone we let him do so.

It requires a high degree of intelligence to watch the patient and to give him the faith of an impossibility of a fall without touching him. The watching also is extremely tiresome as every motion has to be followed with the utmost attention and the patient should not be supported unless there is real danger of his falling.

Besides that it is important that the paients see the rules of the motions demonstrated on the other patients. Finally there are certain motions necessary in society that cannot be practiced alone. Exercises in bed are done simply because the relatively less hard exercises and the security during the rest in bed will allow the patient to concentrate his mind upon the subject more. Walking exercises should be done in groups of 3-6 patients. For single treatment in private practice a long ~~narrow~~ wide hall should be choosen. The hall should be well lighted. Halls that are so small that the patient can support himself on the walls are not suitable as they will give the wrong impression to the physician and patient. The room for practice should be about 20 meters long. At all places of the hall there should be a chance to rest, so that the patient does not have to walk back to his chair after getting thru with the exercise. The chairs should have a good support for the back and also lateral supports. A good light attached to the ceiling is very essential.

Drawings on the floor of the practicing hall.

A black stripe along the enire lenght of the hall 21 cm wide, corresponding with the width of two feet in the paralell direction.

A second black stripe of 11 cm width.

A black stripe 21 cm in width with transverse lines 1.5 cm in width at a distance of 63 cm. This is called an entire or long step. Each one of these divisions is subdivided once more this constitutes a small step.

A black stripe with the same divisions but of a width of 11 cm.

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Zick-zack stripe. Width 21 cm for both feet, length of ~~an~~ each side 63 cm constituting the large step. One should not change the size of the angles from the drawing given in the book on page 154 sta to have the line running paralell to the walls of the practicing hall.

Drawing of the foot-prints about ~~three~~ SIX pair in succession one of these running in one and another one running in the opposite direction.

Drawing on the ground to teach the turning around on one place. Scheme on page 155 of original shows one drawing to turn to the right and one to turn to the left.

~~VIII.~~ The dark places indicate the beginning position of the feet.

~~IX~~ Apparatus with the same drawing as the previous one on the floor drawn on boards, transportable and with a railing.

Besides the general exercises it is recommended to have exercises specially indicated in the single cases.

Exercises of the lower extremities

1/In the lying down position.

2/Sitting position.

3/Standing and balancing upper part of the body.

4/For locomotion of the entire body in a room.

The following motions should be done in a maximal degree unless indicated differently.

The heel should rest on the bed and slip up on it during motion.

The eyes are wide open, and follow the exercises.

The head is placed high enough so that motions can be well watched.

Explanations of signs:

Leg: B. (Bein)
Flex: (bend) : b.( at knee and hip joint)
And: #
Extend: auss. (ausstrecken)
Abducted: abd.
Adducted: add.
Flex limb only half of its normal extend: b/2
Stop at a certain stage voluntarily: Halt willkürlich.
Stop according to doctors command: Halt comm.
Both legs moved at same time: B. B.
Move limb free in the air: frei.
Patella: P
Limb on top of other: oberh. (oberhalb)
Region midway betw en patella and ankle: Um. (Unterschenkel-Mitte)
Ankle joint: Fg. (Fussgelenk)
Toes: Z. (Zehen)
Limb gliding on bed: gl. (gleiten)

( See original on page 159)

EXERCISES

Flex leg at knee and hip joint and extend: B. b # auss.

Flex leg , while flexed abduct, adduct and then extend:

B. b # b. abd. # b add. # auss.

Flex one leg only half of its normal extend: B b/2 # auss.---------.

B. b/2 # b/2 abd. # b/2 add. # auss.

Flex leg, during flexion stop at any stage: B. b ( halt willkürlich #

Like previous exercise stop according to doctors command:

B b ( halt ~~willkurlich)~~ Comm. ) # auss.

Patient stops voluntarily during extension: B b # auss. ( halt willk.)

Patient stops in extension according to doctor's command:

B/ b # auss. ( Halt Comm)

Same exercises with the other leg and then with both legs.

Patients have a tendency to do the exercises too fast, the motions should be regular and very slow. The same exercise should not be repeated more than 2-4 times as they will get tiresome.

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If the disturbance of coordination is more marked on one side that side should exercise a little more than the other. Shaking of the limb and lateral motions should be avoided as much as possible during the exercises. If the toes have a tendency to drop the hypotonia should be overcome and the toes should always be partially bent up. The extend of motions should be permitted to be only of t the normal range. In exercises with both legs the knees should not touch each other but should be at the same level.

Sheets of the bed have to be kept tied

The given signs are of value on account of the frequent repitations. They are to be used by the patients also, who have to take notes of the exercises done.

EXERCISES:

Flex and extend leg so that heel does not touch the bed (Frei)

B/ b # auss. Frei.

One leg touches with the heel the patella of the other leg, then leg is extended(: B. oberh. P. # auss.

Leg touches patella and is left there for an optional length of time.

B. oberh. P Halt willkurlich. # auss.

Same exercise , length of pause indicated by command of doctor.

B. oberh. P Halt Comm. # auss.

Same exercises as the last two but heel touches the region midway between patella and ankle joint B. oberh. Um. # auss

B oberh. UM. halt willk. # auss.

B. oberh. Um. Halt comm. # auss.

Same exercises but heel touches ankle joint of other foot.

B. oberh. Fg. # auss. B. oberh Fg. halt willk. # auss.

B/ oberh. Fg. Halt Comm. # auss.

Same exercises but heel to toes( Toes: Z)

Heel to patella, down to middle between patella and ankle joint( not gliding) to the ankle , to the toes. B.P. # Um. # Fg. # Z # auss.

Begin with the heel to the toes going up to the patella.

B. oberh. Z. # Fg. # Um. P. # auss.

Leg flexed so that heel is lateral to knee of other leg then heel lifted up to patella, extension of leg.

B. b # P. # auss.

B. b/2 # Um. # auss.

B b/4 # Fg. # auss.

B. Z. # auss.

Heel on patella , then heel put down on the bed lateral to knee, leg extended. B. oberh. P# Bett # auss.

B/ oberh. Um. # Bett # auss.

B. oberh. Fg. # Bett # auss.

B. oberh. Z. # Bett # auss.

In these exercises the limb is free in the air , the weight and the excursion motions are combined.

Keeping the limb for a shorter or longer time in the same position requires special attention.

EXERCISES.

Heel on knee of oppsite ~~foot~~ leg, heel gliding down on the border of tibia to the ankle joint, and is then extended.

B. oberh. P. # Gl. bis Fg. # auss.

Same exercise but after reaching the ankle joint the heel is gliding up to patella again.: B. P. # Gl. bis Fg. # Gl. bis P # auss.

Heel to patella gliding down on tibia to the toes stopping midway ~~be~~ between patella and ankle joint, at t e ankle joint and at the toes

B. P. # Gl. bis Um. # Gl. bis Fg. # gl. bis Z aus

Same exercises repeated the patient stopping at different points voluntarily

Same exercises patient stops according to doctors command.

The value of these exercises consists in the balancing of the foot while gliding down on the border of the tibia. The musculature of the thigh, leg and foot is activated in this exercise.

It is an interesting study to watch the details of disturbances of coordination in the different ways the patients try to do the exercises.

The heel can not touch the toes of the opposite foot unless the foot is flexed there.

The value of each exercise for our purpose is estimated according to the relation of coordination exercise to muscular work. The greater the amount of coordination in the exercise and the less the necessary muscular contraction the greater the value of the exercise.

<u>" Maximum amount of coordination and minimum of muscular work."</u>

<u>EXERCISES</u>

Leg lifted up so that it forms a right angle with the thigh and the thigh forming a right angle with the trunk. : <u>B. b # U. L # auss</u>

Leg in the extended position is lifted up and then put down, slowly.

Leg lifted up in the extended position, leg flexed so it forms a right angle with thigh, and then slowly put back in position.

Leg flexed so that it forms a right angle with thigh, extended free in the air and then slowly put down on the bed.

These exercises require much muscular work and should be done very seldom, the leg should not be kept in the air for a long time.

Care should be taken not to stretch the flexors of the thigh too much

EXERCISES

Both legs are flexed so the the ankle joints and knees are kept in contact and then extended. : B. B. b (fest) # auss. ( fest)

Both legs flexed half of their normal range of mobolity. : B.B. b/2 (fest) # auss. ( fest)

These two exercises are repeated with voluntary pauses and then with pauses according to the direction of the doctor.

Both legs flexed, one remaining in that posotion, the other one being extended and then again flexed, then the first leg is ~~flexed~~ ~~and~~ extended and flexed, while the second one remains in the flexed position, finally both legs are extended:

B.B. b # $B_1$ halt $B_2$ auss # $B_2$ b # $B_2$ halt $B_1$ auss # $B_1$ b # B. B. auss.

The same exercise but during extension the heel must not touch the bed.

Same exercise but during flexion the heel must not touch the bed.

Same exercise but during extension and flexion the heels should be free in the air.

Same exercise where both legs are moved together the heels and ankles should touch each other closely.

Both legs flexed and extended above the bed free in the air.

One leg flexed while extending it the other one is flexed at the same time and then extended.: $B_1$ b # $B_1$ auss $B_2$ b # $B_2$ auss.

The first leg is flexed and then abducted at the same time the second leg is flexed, ~~abducted and adducted and~~ the first leg is adducted, at the same time the second leg is extended, then the ~~second~~ first leg is extended.

$B_1$ b # $B_1$ abd. $B_2$ b # $B_1$ add. $B_2$ auss # $B_1$ # auss.

One leg flexed the other one in the extended position is placed laterall, then both legs put back in position.

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One leg flexed and then extended at the same time the other one placed laterally and then adducted. $B_1$ b # $B_1$ auss $B_2$ seitwarts # $B_2$ heran ~~B . auss.~~

Same exercise during extension the heel should be free in the air.
$B_1$ b # $B_1$ abd. $B_2$ b # $B_1$ add. $B_2$ auss. (frei) # $B_1$ auss (frei).
$B_1$ b # $B_1$ auss. (frei) $B_2$ seitwarts # $B_2$ heran.
$B_1$ b # $B_2$ seitwarts # $B_2$ heran $B_1$ auss. frei.
Same exercises during flexion the heel is free in the air.
These exercises largely depend upon the sensibility of the skin.
Tha patient should try to move both legs and watch the contact pressure ~~wr~~. All the exercises have to be followed with the eyes.

EXERCISES

Heels upon knee, heel is gliding along the tibia free in the air to the ankle joint and then back up to the knee.

B oberh. P # Gl. frei bis Fg. halt # Gl. bis P frei halt # auss.

Same exercise the heel is gliding down to the toes of the other foot.
Heel upon knee, lifted up and put at the upper third of the leg, lifted up again and put at the lower third of the leg, lifted up and then touching the ankle joint, after that the heel goes up in the same way to the patella .
The doctor puts his finger on a spot of the leg, the patient tries to touch the finger with his heel.
Same exercise but here the doctor moves his finger to a different point befor the patient had a ch ance to touch it so that he has to follow it with his heel to the other point
The doctor holds his hand in different positions, the patient trying to touch it with his heel.
Heel upon the patella of the opposite extended leg, this flexes and then extends. $B_1$ P. # $B_2$ b # $B_2$ auss. # $B_1$ auss.

Same exercise but heel put midway between patella and ankle.

$B_1$ Um # $B_2$ b # U. $B_2$ auss. # $B_1$ auss.

Heel of the first foot upon the opposite patella, while this second leg flexes and extends the first one abducts and adducts.

$B_1$ P # $B_1$ abd. $B_2$ b # $B_1$ add. $B_2$ auss. # $B_1$ auss.

Both legs flex one gliding on the bed the other one free in the air.

$B_1$ $B_2$ b # $B_1$ auss $B_2$ auss. frei.

$B_1$ b frei $B_2$ b # $B_2$ auss. frei. $B_1$ auss.

Heel upon patella gliding down at the same time the second leg extends, while the first one is gliding back, the second leg extends.

$B_1$ P # $B_1$ Gl. bis Fg. $B_2$ b # $B_1$ Gl. bis knee $B_2$ auss. # $B_1$ auss.

In these exercises the doctor should see that both legs really move at the same time , not that one remains still until the other one has done the work.

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EXERCISES FOR THE SEVERE CASES OF ATAXIA ( THE PARALYTICAL STAGE.)

These cases of paralysis should not be grouped with the common cases of paralysis as ~~there~~ here is only an unability to perform voluntary motions. The regular coordination exercises have no value as the patient is paralysed and the coordination exercises may be done after the limbs start to show some incoordinate motion. We divide the exercises in those of the toes: flexion, extension, adduction, abduction, of one toe, several or all toes.

Foot: Plantar-flexion, dorsal flexion, lifting of the inner and then the outer margin, rotation of the foot.

Leg: In the sitting position the leg hanging down: extension and flexion of the leg.

Thigh; Rotation inward, rotation outward, abduction gliding on the bed, adduction.

Putting one leg on top of the other on.

EXERCISES IN THE DORSAL POSITION WITH SPECIAL DEVICES.

A garter with a disc 5 cm in diameter fastened to it is put around the leg near the knee joint. Later on the garter is moved to diffrent places on the leg.

A transverse wooden pole fastend to an iron holder, so that it can be raised or lowered or arranged to be closer or farther from the body. The leg is put on the pole and then back on the bed. 1. Heigth of pole 40 cm, proximal distance from foot 10 cm One leg is flexed put over the pole rested there for a while and put back on bed.

The heigth is increased gradually as well as the proximal distance from the foot. Later both legs are put on the pole in succession or at ~~once~~ the same time.

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Heigth of pole 40 cm. Proximal distance from foot 10 cm. One leg is lifted up, while in the flexed position, foot put on pole allowed to rest there and then put back in position on the bed.

Heigth 55 cm proximal distance 10 cm.

Heigth of pole 40 cm, distance 20 cm.

Heigth of pole 40 cm at the region of knees, same exercise.

Heigth 55 cm, proximal distance 25 cm so that pole over middle of legs, one leg is put on pole, while this is put back, the other one is put up, ~~at the same time~~

Both legs put on pole at the same time.

A wooden plate 32 cm wide and 65 cm in length with two rows of eliptical depressions of about 10 cm in diameter may be used and put in the bed so that its position can be changed in the manner shown on page 181 of the original. The heels are then put into the different depressions.

To the sides of a lawn chair is fastened an iron pole consisting of three parts, which can be fixed by ball joints and screws into different positions. On the distal part the rings can be attached. The wire rings are of different sizes, the smallest one being about 26 cm the largest one about 50 cm in diameter. The patient lying on the lawn chair attempts to run his toes around the margin of the ring. The rings can be arranged differently as to distance and thus the exercises are modified. This exercise is difficult and beginners should not attempt them.

The wooden rings of 20 cm diameter with handles are used in the next form of exercises. These rings are held by the physician in different positions so that the patient is able to put his foot thru the ring. In the beginning the patient will not be ~~ab~~ able to avoid touching the ring.

This treatment can be modified in putting one leg thru two rings or both legs thru one ring. The change in position of the rings will cause variations in the exercise.

In treating the upper extremities it is absolutely necessary to use devices to improve the very fine coordination movements, while the exercises of the lower extremities may be done with or without apparatus. The exercises for the lower extremities are mostly done in the lying down position, as the legs do not have to support the weight of the body. Exercises on the apparatus should be no more difficult as the free exercises. We cannot help repeating the same rule again and again considering the fact that so much harm has been done in overworking the patient or allowing a too great abnormal range of motion so that tissues were torn.

In an institution where the exercises are done under the constant supervision of the physician the free exercises are preferred. If the patient has to go home and desires to continue the exercises he may do so on the apparatus previously described, but one should let him know that he will not very much improve his condition. The apparatus should not belong to the patient but to the doctor, who has the right to ask for its return at any time.

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In the exercises with an apparatus there is at times too much and at other times too little work put upon the limb. If the opening in one of the devices where the patient has to put his leg thru is not large enough the leg has to be swinging free in the air until it reaches the definite point, and has not only to maitain its equilibrium but also to carry the entire weight of the limb. The weight of the limb will disturb the coordination. . The free exercises will diminish ~~exclude~~ the lifting of the weight of the limb and develop the fine motions of coordination. The patient left to himself will not be able to do exercises with the apparatus correctly. The author advocating the use of his apparatus stated that the patient was able to put his feet thru the openings in the apparatus within a few weeks. He did not say in what condition the patient was when he began and I consider it an enormously long time for learning just one kind of motion. I like to ask whether the patients using Jacobs screen apparatus have learned to walk and whether their method has begun with plain and simple exercises gradually getting more complicated according to the progress the patient made?

## EXERCISES WITH CLOSED EYES.

In the lighter disturbances of sensibility where the muscle sensibility is able to compensate for the lack of joint sensibility the exercises done with open eyes will have a somewhat jerky character , these motions are found in the preataxic stage. In the second stage of the disease the motions will be done faster with closed eyes. In the more severe cases the patient will not be able to hold a limb in the same position after his eyes are closed or at least it will swing back and forth.

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It is our ideal that the patient should learn to do all the exercises with closed eyes as well as a healthy person would do , but only as much as that. The exercises with an apparatus would even by a healthy person not be done as long as the eyes are closed. The degree of improvement possible depends upon the amount of the sensibility present in the gegimning, the degree of the improvement obtained depends upon the duration of the exercises. In very severe cases there is a marked difference to be noticed at the end of a years treatment and a continuous improvement takes place. In the dark the patients motions are much less xxx secure but by far better as if they had not had any treatments at all.

To the exercises without the control of the eyes ~~is~~ belongs the flexion of the leg while the patient is in a ventral ~~dorsal~~ position. Even in the very mild cases there is an unability noticed that ~~the~~ to extend his leg slowly after flexion, it will suddenly drop down. This test is used to determine a difference in the disturbances of coordination in both legs . This exercise is very tiresome and should not be too often repeated.

The patient should try the exercises with closed eyes in the beginning so as to enable one to estimate the extend of the disturbance of coordination. The exercises should not be taken up regularly untill the patient has learned to move his limbs with a moderate speed and security. The exercises do not need to be done with patients eyes closed right in the beginnig, but instead of watching closely all the movements his mind may be diverted so that he will look to the ceiling or wall. Later on he should attempt to do the exercises with closed eyes.

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Among the exercises without the control of the eyes we have one ~~gr~~ group which we may call the exercises of sensibility. By that we mean the attempt to perform motions as they are remembered by the patient when they have been done with open eyes. For this the patient should be in the dorsal position.

The leg is flexed passively to a certain angle and left there, the patient following the process closely with his eyes. The patient now closes the eyes and tries to put his second leg in the same position where the first one is. When he thinks to have accomplished it he opens the eyes and corrects his mistakes.

In the second exercise the leg is not moved passively but according to the doctors command put in a certain position by the patient and then the eyes are closed and the same aatempt is made as in the previous exercise.

Positions obtained by passive motiones are not as well recognized and imitated by the patient as the activ ones.

These exercises should not be done for too long a time as they cause fatigue easily.

The results of each exercise should always be written down to keep tract of the progress of the condition.

EXERCISES IN THE SITTING POSITION.

Authors advising the exercises with the use of apparatus have a large number of motions to be done in the sitting position. I fail to see the advantage of that as there are only a few motions in common life that have to be done in the sitting down position. In the lying down position the limbs have more freedom of motion. In severe disturbances of coordination in patients that since years have not felt the contact of the feet with the ground and that will flex the leg when they intend extending it we have them go thru exercises with his clothes on and shoes and stockings in the sitting position. Of course only very simple motions are done as lifting up of the flexed leg and ~~putting it down~~ stamping it on the ground. One should take care that the ankle is not sprained and that the foot touches the ground evenly. The same exercise may be repeated ~~fo~~ four times with the same foot and then the other foot may be tried. It is not necessary to attempt the exercises with both feet as this motion does not occur in ordinary life.

If one watches a tabetic person in the advanced stage one will observe the characteristic position of the legs while sitting. There is a marked abduction of the flexed legs , the knees are far separated from each other, so the ~~the~~ foot rests on the ground with the outer margin. This is due to lack of tone of th adductor muscles. Also in the dorsal position the foot is as a rule turned out , the patient should do exercises that will improve the position of the legs in the sitting as well as in the lying down position.

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Getting up and sitting down:

The normal process of getting up and sitting down has been described in one of the previous chapters. If we watch a tabetic person attempting to get up we find that he moves his trunk and feet back and forth without putting them in the right position. He has forgotten one of the most important motions necessary for the maintainance of the equilibrium that to pull back the legs back so that the center of gravity is near the ankle joint. He also has forgotten to move his trunk forward in order to get up. After he is reminded of the necessity of the motion he will be able to do so, and learn to get up and sit down within a few minutes' training.

sitting down.

Exercise: The knees are at first put in a slightly flexed position so that the angle formed is equal at the knee and at the hip joint. This will be somewhat difficult for the patient on account of the hypertension ( lack of tone of the posterior muscles of the leg) and because the tone rarely is the same in both legs, so that the patient has to watch both legs at once. As soon as this has been done the body has to be bent forward. Now the real sitting down motion takes place the knees are to be bent more and the trunk is to be bent more forward. In that way the buttocks cannot force the trunk backward and the patient is able to sit down slowly. The trunk should be bent forward until the patient really is sitting. The ankle joints are to be watched and protected from bending over and the body should be watched as to its tendency to fall over forward.

Getting up: Both feet are to be put back as far as to the margin of the chair, then the trunk is to be bent forward. He remains in that position until the knees have made a slight extension motion.

While the extension of the knees is completed the trunk should gradually become straight. A healthy person will pull the feet far under the chair in getting up and support the weight of the body with the ball of the foot, so that the trunk does not have to bent forward as far to maintain the equilibrium of the body. For the tabetic person the ball of the foot is not a very secure support, he has to use the heel or the entire sole of the foot, and thus he has to bend his trunk forward . Befor the patient attempts to get up, one has to see that he does not sitt too far back in the chair.

WALKING EXERCISES.

In walking the rate , the direction and the distance between the two feet will cause variations. The arms will make rythmic motions according to the gait. It should be our ideal in treating the patients not only to restore their normal ability of locomotion , but also enable him to ~~to~~ maintain his equlibrium under the different variations that are apt to occur. The physiology of walking has been described in the one of the previous chapters and we shall now describe the system of walking. The drawings on the floor that have been described will be used for the following exercises.

WALKING IN THE UPRIGHT POSITION.

The first few exercise hours are to be used to note the ability of the patients and their peculiarity in walking.

Exercises: Walk slowly forward for a distance of about 20 meters and watch closely every motion.

Besides the slowness of the walk the patient should watch and correct the extreme outward rotation of the feet which should form an angle of 45 degrees with the direction the patient is walking in.

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Slow walk, the outward rotation of the feet is to be corrected . The distance between the two feet is to be decreased to about 20 cm between the two heels.

Slow walking, the feet are to be kept almost paralell, the toes are slightly turned out. Heels are to touch each other after each step. The basis for the walk is about 21 cm.

Slow walk. The length of the step has to be watched now. It should be a medium step ( About 30 cm)

Slow walk. The step should be about 15 cm long: a small step.

Slow walking the step should be about 60 cm. : large step. Each patient has to do these exercises singly and all the details necessary are repeated to him again and again. Each patient is carefully watched according to the principles men~~tio~~-tioned befor. A skirt is not to be worn and trousers should be narrow. Women should wear gymnasium suits. The shoes should be fairly tight on the feet to support the ankle joint, which will be best done by shoes that are laced. The heels should be broad and low.

In the beginnig walks of short distances about ~~of~~ 3-5 meters are sufficient.

The tendency of the patients to walk fast is almost constant and should be ~~watched~~ corrected.

After each exercise the pulse is to be counted , which ~~usu~~ usually in the begining of the treatment may rise to 120-150. The duration of the exercises depends upon the frequency of the pulse. Befor beginning a new treatment one should wait until the pulse has returned to its normal rate.

Easily transportable chairs are to put everywhere in the

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hall to give the patient a chance to rest whereever he may be.

Befor the patient gets up he is to be instructed about the rules in walking: leaning the weight of the body on the posterior foot and to bend the trunk forward. At first the length of the step is not watched but in the following exercises the length is to be observed and modified. Canes are not to be used. The eyes of the patient are to be fixed upon the legs and every motion is to be followed with the greatest attention.

Exercises: Small steps forward, after each step the feet are placed side by side.

Small steps forward, like normal gait.

3/4 step, feet paralell to each other after each step.

3/4 steps normal gait.

1/4 steps, feet paralell to each other after each step.

1/4 steps, normal.

Forward one step ( small) and then one 1/4 step, feet paralell to each other after each step. Repeat 5- 10 times.

Forward 3/4 step and then 1/4 step (feet paralell after each step.) 5-6 times.

Forward 1/2 step with leg A 1/2 step with leg B, 3/4 step with leg A 1/2 step with leg B Repeat 3-4 times. Feet paralell after each step.

Forward 1/4 step foot A, 1/4 step foot B, 1/4 step foot B 1/4 step foot A.

B.A 1/4 step. B A 1/4 Step. B A 1/2 step. B.B 1/4 Step B.B 1/4 step, B A 1/2 step.

WALKING SIDEWISE.

Lateral steps to left side about 10-15 m meter than back to the right.

Repeat with slight variations, in the size and number of steps. Walking sidewise is less difficult for the patient than walking forward. In the more severe cases these steps have to be practised first. In the medium cases the steps forward can alternate with the sideways steps. The sidewise steps should be practiced befor the long forward steps . ( See pictures of original)

The sidewise steps in the tabetic cannot be very large as he has to put his entire sole of the foot on the ground befor he can trust it to support the body weight. A healthy person will put only the toes on the ground first to increase the length of the side step. For the sidewise steps we use the drawings on the ground . During the first exercises one should not hold the patient to the length marked on the ground.

WALKING BACKWARD.

Walking backward requires also the bending forward of the trunk but the trunk has to be pulled back during the step. The small steps should be done only , .

Exercises: Backward: 1/4 smallest steps, feet paralell to each other after each step.

1/8 Steps, feet paralell to each other after each step.

1/8 steps backward normal step.

Backward Leg A 1/8 step, leg A 1/8 of a step, leg B 1/8 of a step leg B 1 /8 of a step.

Backward 1/4 step normal.

Backward 1/2 step. Feet paralell after each step.

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## CONTROL OF MOTIONS BY THE EYES.

In the lying down position the importance of the control of the motions by the eyes has been mentioned. This is still more important in the upright position.

After the patients are thru with the exercises so far we beginn in having them not watch his lower limbs very closely any more but have them look about 1-2 meters ahead on the ground. We then beginn again with the most simple exercises and we will notice that the old mistakes reappear. The patient will reassume his tendency to walk fast, to rotate his legs outward and to put the feet on the ground too violently. He cannot observe the length of the steps as marked on the ground, but may be able to keep on the wide black stripe. Later on steps are altered in distance and direction the patient walking for,+ back and sidewise.

The patient now starts with the exercises the eyes fixed upon the opposite wall of the hall. This modification will make walking much more difficult, the coordination is disturbed and the patient will be completely unable to walk straight. The same exercises ~~from~~ beginning with the simplest kind are done.

The eyes are now fixed to the place of the junction of the ceiling with the wall.

The patient fixes his eyes upon the ceiling somewhat in front of the head.

Eyes are closed and exercises done in the same manner. The attendant does not have to watch the eyes of the patient but his feet. The exercises are much harder on the patient as the muscles are tenser to compensate for the missing control of the eyes. ~~Besides~~

Besides that the feeling of insecurity will cause a marked psychic e excitement. The exercises should be moderate and the pulse should be strictly watched. The exercises with closed eyes should not be done until the patient is thru with all the other exercises, especially in the simple exercises of the sidewise walking.

Instead of fixing the eyes on other objects one can hide the legs by means of aprons or ~~aprons~~ skirts. Women can wear their skirts.

THE TEMPO.

To combat the tendency of walking too fast is of the greatest importance in the beginning. The habit of walking slower is to be considered a symptom of improvement as slow walking and coordination go hand in hand. But later on the patient should be taught to change the rapidity of the gait. The patient left to himself is apt to increase the pauses between each step but to hurry thru the actual motion of the step. It is this tendency that should be combatted. To shorten the intervalls between the steps the commando of the physician is to be followed.

THE COMMANDO.

For this purpose we use the words march or turn or halt or better we clapp in the hands.

After the other condition necessary for the step are determined the signal for the step to beginn is given.
Walking according to the doctors command is a very important as the patient should learn to maintain his equilibrium ~~in all~~ under all circumstances.

## THE TURNING AROUND.

The tabetic always has difficulties in turning around or going out of the way. The tabetic person will always make a much greater detour than a normal person in going out of the way.

The exercises for the learning of turning around are as follows: The patient stands in the anatomical position, the heels should touch each other, while the toes are slightly separated from each other. One foot now starts to turn using the heel as the axis, the other foot is lifted up from the ground and put next to the first one. At first the patient will not be able to make a great detour and it should be left to him until he gets more perfect in the exercises, then the distance should be marked with lines on the ground. Finally the patient has to turn all around..

## THE ZICK-ZACK WALK.

The knowledge of changing the direction in walking is made use of in the zick-zack gait, which is marked on the ground and has been previously described.

## STANDING AND WALKING WITH PARTIALLY FLEXED KNEES

Practically all of our patients have lost the ability to stand or walk with flexed knees on account of the hypotonia of the muscles and the habit to extend the knees as far as possible to prevent a falling down. Patients left to themselves should not attempt to do this exercise, but it is very useful if done carefully and under the proper supervision. The object of this exercise is the forming of a habit to use the flexor and extensor muscles of the leg for the maintainance of the equilibrium instead of using only the bones. The flexed knee relieves the cartilages of the knee and may increase the tonus of the muscles used. Walking and standing with partially flexed knees is extremely hard on the patient for reasons that are easily understood. The muscle sense is rarely intact even in the very mild cases so that a flexion of the knee even for one minute will be impossible to the patient, his knees will either flex so that the patient falls down or they will suddenly extend. The tabetic person will flex the knee joints more than a normal person to maintain his equlibrium and the trunk will have to be bent forward also. It is most difficult for the patient to keep both legs flexed of the same degree , as a rule one will be extended and the other one flexed. This is due to the unequal intensity of the disturbance of sensibility and the lack ~~of capability~~ of innervation at the same time in muscle groups not closely related anatomical.

WALKING ON A NARROW LINE.

By that we understand the dark stripe on the ground with a width of 10 cm. One foot has to be put in front of the other one in walking.

Exercises: Foot a on the stripe, foot b lateral to the stripe. Foot b steps forward right in front of foot a on the stripe. Foot a now is put next to foot b lateral to the stripe. Then foot a is put in front of foot b on the stripe. . The same exercise is then repeated.

A certain length of the step is now to be used. Otherwise the same exercises are done.

Feet are put only on the small stripe one in front of each other, the regular walking on the small stripe.

A certain length of the steps are now to be used, otherwise the same exercise.

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WALKING EXERCISES IN THE SEVERE STAGES OF ATAXIA( THE PARALYTIC STAGE)

All the walking exercises mentioned so far presuppose the ability of the keeping up of the upright position , the legs are able to support the weight of the body. That class of cases that is forced to remain in the roll-chair or in the bed has to have different kinds of exercises or different provisions made for the exercises. Even these cases will show a marked improvement after a course of exercises.

After the simple exercises in the dorsal position in bed have been done one should attempt to put the patient in the upright position, so that the foot soles will get used to contact with the ground. The knees will become flexed the feet will turn and the trunk will be unable to find its right position. Evidently the patient has forgotten how to use the muscles that are necessary for the upright position of the body, while in the dorsal position he is able to do many kinds of motions.

In this stage it is dangerous for the attendants to get hold of the patients in the axilla for that reason a broad belt is used with four handles , one on each side and two in the back. On these handles the attendants hold the patient up.

The width of the belt , the manner in which it is closed by wide straps, the kind of the handles enable the attendant to lift the patient up on them without causing any discomfort to the patient on account of the pressure of the belt. Besides that the patient is sure that he will not fall and the attendants have a way of holding the patient up without causing any injury.

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If dealing with a case that is completely unable to stand up for any length of time at all the belt should be put on while he is sitting down. The legs do not have to support the wight of the body as the patient is lifted up on the handles of the belt. The patient now has to learn the position of the foot on the ankle joint, the sole getting used to the contact with the ground, the extension of the knee joint also has to be practised. After the patient is able to put his feet securely to the ground, which often has to be practised for weeks, one can beginn to allow the weight of the body to rest on the legs.

Walking will have to be practised at first on the same place the leg is lifted up from the ground in flexing the knee and the hip joint. The putting down of the sole on the ground should be done in the form of stamping so that the sole will get use to the sensatio n. After that has been learned the patient attempts to put one foot in front of the other one. This simple exercise will be very difficult to the patient although he has not to think about maintaining his equilibrium. It is so difficult because the patient has had no chance to use the muscles as long as in the roll-chair. As soon as the patient has learned to put a limb in the desired direction he does not belong any more to the pseudo-paralytic stage but to the ataxic. The walking exercises on the belt are still to be continued, the belt being used only in the case of necessity. This exercise will tire the patient out exceedingly and it is of advantage to use ~~acres~~ belt for a ceratin length of time.

Less severe cases that are very afraid of falling may use the belt for some time but the exercises should be done as soon as possible without it.

PRECISION IN LOCOMOTION.

It has been proven that even in the healthy the steps are uneven and there is no reason why the patients should be bothered with the exact execution of the commands. It is the physiological task of the legs to keep the body in the upright position and to enable the person to walk. An apparatus where the steps have to be of a ceratin length and the position of the feet has to be exactly the same as indicated is of little or no value for the patient. The schemes drawn on the floors according to our plans will agree with the demands of physiological motions, because the step can be done even if the size is not exactly as it might be.

APPARATUS FOR WALKING EXERCISES.

See pictures on pages 232- 236. The patient is standing on the board with both feet, then one foot is put forward, backward or sidewise to touch the different lines on the board. This is done voluntarily at first, later on according to the doctors command. Rails are on the sides of some parts of the board so as to give support to the patient when needed. The correct execution of these motions demand a fairly well develloped balance of the body. It is an excellent exercise where only the precision is lacking.

Exercises: .Left leg forward to 2, back to I. Right leg to three, 2 ( on right side) back to 1.

B a to 3, back to 1. With both legs in succession, til 4-5.

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B a to 2, to 3 to 4 to 5 , back to 1. B b in the same way
B a to 2 , to 4 back to 1.

B a to 5 , to 4 , to 3 , to 2, to 1. Same in both exercises with leg b.

The same exercises for the lateral and backward steps. The single contours are about 15,5 cm apart from each other. The longest distance from the beginning position is about 62 cm, the same length as that of a common step. The step backward should be tried only until 2. The commando during the exercises should be: left forward , or right sidewise and so on.

Length of the steps and the position of the feet are marked on the board.

The steps: Going up or downstairs is a common ~~me~~ occuring motion , and will have to be learned even if other motions as difficult as that, have to be avoided. The difficulty consists in the balancing the weight of the body on one leg, while the other one is flexed and raised up and then brought forward. Then the entire weight of the body rests upon the leg stepping up and has to lift ~~up~~ the entire body. Much muscle force is necessary for that exercise and a precise coordination. The entire attention of the doctor and attendants are required. The more severe cases should not do them without holding on to the railing and using one cane. The muscular work should be reduced by leaning on the cane. The pulse should be normal befor each exercise . In cases of marked hypotonia one should be especially careful. These exercises are best taken outside of the regular exercise hours so that the patient will have the right amount of vigor and strength.

The steps that are used for the patient's exercises are shown in picture 63 of the original. The width of the steps are about 70 cm the railings are high and comfortable. Each step is low and deep so that the entire foot can be placed upon it.

CARRYING OBJECTS WHILE WALKING.

The patient has to carry objects of different sizes and weights in one or both hands and on the head.

THE APPARATUS ADVOCATED BY V. LEYDEN+JACOB FOR WALKING EXERCISES are of no use as the patient does not learn motions as they are necessary in common life.

EXERCISES DONE BY SEVERAL PATIENTS AT THE SAME TIME.

In the method of having several patients do the exercises we see a way in teaching a number of important motions that are necessary in common life while with other people.

At least three persons can do the exercises: Walking forward ,half a step without a commando.
Walking forward half a step with commando.
The patients are standing behind each other behind the transverse lines in distances of half a step. All start with the same leg walking with half step distances.
Same exercises.everybody is walking with full length steps. All start with the same foot, no commando.
Same exercise with commando.
Same exercises as the previous ones with arms lifted up.
~~Walking side by~~ side. ~~side~~

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WALKING SIDEWISE.

Primary position: the patients at least three in number are standing side by side leaving a distance of the length of one step beween each other, so that one of the transverse stripes of the drawings on the ground ~~is~~ between their feet. The step shoud be the length ~~that~~ of a full step. ( See pictures of original figures 104, 105, 106) Everybody takes ~~one~~ big steps to the right side: Phase 1:The first man puts his right foot over the next transverse stripe. Phase 2: The first man pulls his left foot over to the right one , at the same time the second man puts his right foot over the next transverse stripe. Phase 3: The first man starts with the next step, putting his right foot over the next transverse stripe, the second man pulls his left foot over to the right, and the third man begins in putting his right foot over the next transverse stripe. Phase 4: The third man pulls his left foot over to the right, the second man puts his right foot over the next transverse stripe while the third man pulls his left foot over to the right.

Same exercises with the commando of the physician.

Same exercises but in the primary position the patients should stand at a distance of half a step from each other.

Same exercises under commando.

During these exercises all the patients have to perform the motions according to the first man. For that reason the first man should be one of the least severe cases , or even a normal person. If the first person is a normal person it may be up to him to change the rate of the exercises and have the rest adapt themselves to the change. The combination of the exercises in walking with raised up arms ~~or~~ will make the exercises much more difficult.

A special group of exercises done by several patients are the kind of motions that are necessary in society and are called by us as scenes. Among the large number of various exercises we shall describe a few. Two persons walk toward each other from different sides of the room as soon as they meet one of them has to go out of the way according to a previous agreement, but afterwards he has to continue his walk in the direction he started in.

The same exercise with the modification that the patient has to go out of the way whose name is called by the doctor when the patients meet.

A number of chairs are put in the hall in a straight line at distances of one meter from each other. Two patients walking in the opposite directions have to walk beween the chairs in the figure of eight walk.

The same exercise but two patients are walking behind each other, so that four patients are practising at the same time.

Each one of the four patients walks in the opposite direction in the figure of eight between the chairs.

The distance between the chairs is decreased, so that the patients are somewhat crowded.

These exercises may be modified in combining them with common occurrences in daily life as waving at each other, taking off the hat turning of the trunk lateral with and without words of greeting.

Same exercise the coat has to be taken off and put on while walking.

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We are now at the end of the exercises. The arms may be moved strongly during walking, or the trunk should be turned to different sides. As an examination one may try the exercises in having two patients trying to push each other out of the way. This may be done under careful supervision and not lasting longer than 1/2- 1 minutes. The patients are standing opposite each other with heels and toes in apposition ~~and at other times~~ or keeping the feet at a slight distance from each other. At times one foot may be put in front of the other. They take hold of each others right hands, while the other hand is put on the back or in the side or used to maintain the equlibrium according to the FLORET fighters. The hands pressed against each other attempt to push the opposite party out of his position. This is done to examine the equlibrium and is as exercise a very hard work.

## ATAXIA OF THE UPPER EXTREMITIES.

The sensibility of the skin: Anomalies in walking and standing as found in tabetics are not always disturbances of coordination. The hypotonic conditions of the muscles with changes in the joints are often very prominent. Disturbances of function of the upper extremities in tabetics may not be due to lack of coordinattion altogether but also in the disturbed sensibility if the fingers and hand, which will greatly impair the functions of the hands.

A person with great disturbances of sensibility may be able to hold a cane but cannot hold a pen, get a match out of the box or button a coat. The treatment of lack of sensibility if possible at all does not belong to this exercise therapy , only disturbances of function as far as ataxia is concerned will be treated . We know that the degree of disturbance of sensibility does not go hand in hand with the degree of ataxia in tabes, one of these defects may be much pronounced while the other ones are hardly noticed at all. Marked atxia and slight disturbances of sensibility have a much better prognosis than marked degrees of interference with sensibility. The course motions of the hand will return in a case of ataxia, a comon laborer will be able to make his living again, while a violine player probably will have to give up his profession.

EXAMINATION FOR ATAXIA.

The shoulder joint may be examined in having the patient extend the arm on the forarm ~~on than~~ Horizontal or vertical motions are to be attempted without touching bars that are put up for that purpose. This may be graphically represented by an apparatus similar to a perimeter, where tha patient has to draw lines on paper stripes pasted on to the concave surface of the apparatus.

The ellbow joint being capable only of extension and flexion is easily examined, the motions in a tabetic are usually jearky. The motion of the ellbow joint is accomplished in a different ~~rent~~ way when the arm is in the vertical instead in a horizontal position. The examinations therefore should be done in different positions of the arm. The same is true in the pronation and supination of the hand.

In examining the fingers one must not forget that the disturbance of function cannot be estimated by the degree of ataxia , but that the lack of sensibility is the important factor. Normally the joints of the hand are slighly flexed, ready for any motion, the tabetic hand does not show the slight rounding of the fingers , the two distal joints are extended and during function only one metacarpal joint is flexed. This condition is analogous to the extension of the knee and ankle joint. To hold an object the thumb is used to press the object against the second and third phalanx of the fingers. The finger tips which have the highest degree of sensibility are not used. . In the same manner are other things done like writing or buttoning.

Touching the finger tips with the thumb so that the inner space is that of a circle is done by the patient with difficulty . This motion is done to estimate the degree of the disturbance and for a good exercise to reestablish coordination.

PRINCIPLES IN THE TREATMENT OF THE UPPER EXTREMETIES.

The upper extremities work with a great number of motion of very slight excursion and small differences in the angles. An extremely fine precision of the motions ~~are~~ is absolutely necessary The allowable limit of mistakes in the motions of the fingers amount to not more than one or very few millimeters.

The sum of exercises for the upper extremities can be divided up in ~~two~~ three groups: Simple contraction of muscles

Exercises on special apparatus.

Commom functions of the hands as writing.

Exercises mentioned are arranged so that all or most of the joints are activated. Befor we describe the different exercises we like to draw the readers attention to the position of the upper limbs in the normal and tabetic person: The normal person will hold the upper arm slighly abducted , the forarm is flexed on the arm and the hand extended. The tabatic person is more apt to hold the arm close to the body, the hand being somewhat flexed and the fingers in the position previously described, this is due to the lack of muscular sensibility and analogous to the position of the legs the plantar flexion and the outward rotation of the thigh.

APPARATUS FOR THE TREATMENT OF THE UPPER EXTREMITIES.

A triangular enlongated block, about 40 cm in length, the width of each side being about 5 cm . One of the borders is dull, the other one sharp and the third one is grouved. The grouved border is put up and the patient asked to run a pencil along the grouve. At first the patient will not be able to do so but after some exercises he will succede in drawing a fairly straight line. The arm in this exercise has to make small but very exact excursions at the ellbow joint. Every anomaly of innervation, every defect of coordination is shown on the paper visible to the patient and the doctor. The position of the block can be changed so that its axis varies with that of the body. Not only the quality of motion but also the time can be changed. Slow even motions are harder for the tabetic

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than rapid jearky motions. Lately the old apparatus has been improved in putting it upon a movable stage , so that it can be put into different positions. The other hand does not have to hold the block as it is immovable as soon as once fixed.

Board with depressions width about 25 cm and 30 cm in length. In regular intervalls depressions are made . The depressions are made around the margin of the board , one depression in the middle The board is put befor the patient who with his arm raised is waiting for the doctors command. Th e doctor mentiones the numbers of one of the depressions and the patient has to put his finger tip as fast as possible into that depression. At first the same number is selected again and again, later on different numbers are called for. A difficult and important complication of this exercise is that the patient has to hold his hand behind his head until the commando is heard, so that he is not able to see it until it is moved.

A new modification of this device has been done in deviding the board in two parts , which can be separated from each other and put up in any position . This device makes many variations possible , both hands can be used at the same time.

Board with projections is used very much in the same way as that with depressions. If is of advantage here to have the patient touch one projection with one finger, keeping it there, while the other fingers touches different projections. Many variations can be easily found for the treatment , which are very nessessary and useful.

The plug board will enable the patient to attempt many useful but complicated exercises. (See figure 119) On a board are found openings running in the horizontal and diagonal direction. The plugs are found beside the board lying on the table. The patient is to pick up one of the plugs from the table and put them in one of the openings. The rate of this motion can be modified as well as position of the upper part of the plug. Afterwards the patient has to take the plugs out of the holes and put them into other openings.

The ball apparatus: ( See figures 120- 122 on pages 261 - 263 of original) Exercises with this apparatus require precision and security of motions. One of the balls swinging in the air on a string has to be grasped by a patient. At first the pateint can take as much time to this as he cares to, but after a while he will have to learn to get the ball at any stage of the swinging. The patient will in the beginning wait for the most suitable moment keeping the muscles ready to act. After a while the patient has to get hold of the ball according to commando. The larger the ball the easier the exrcise. Two or more balls can be swinting at the same ~~ti~~ time the physician indicates the ball that has to be grasped in naming the ~~diffeent~~ color of it. The exercises can be modified in having the patient grasping some more balls ~~after he~~ while he is holding the first one in his hand. One should see that the patient does not grasp the balls with their whole hand but only with the finger tips. This aparatus can be raised or lowered.

Round disks: of different sizes , from that of a quarter to a dollar and different colors are put up in a column and the patient asked to put them up according to different sizes or colors. One should see that the patient flexes his fingers slighly while taking hold of the disks as is done by normal persons, so that the fingers form practically a circle.

Schemes to draw as seen on page 265 of the original. These patterns are put on paper and on a stiff cover , a pencil is used. To run the pencil along the angles and circles will be found to be especially difficult.

Finally we see attempts in writing , after a treatment of six weeks one can notice a maked change in the handwriting of the patient as is shown on page 267.

ATAXIA OF THE TRUNK.

The main joint for motions of the trunk is the hip joint. This ~~condition~~ affection is rather rare , especially an affaction of the spine itself. Usually the spine is carried stiff, the only motion being at the hip joint. The exercises previously described as walking and movements of the lower limb in the dorsal position will also improve the condition of the trunk as well as that of the lower extremities. Hessing recommended wearing of a corset for incoordination of the trunk. We have not seen any advantages of this device as it will interfere with walking and will prevent the muscles of the spine to become activated. Their is only one kind of cases where it may be used and that is in the rare occurrences of extreme laxity of the ligaments of the hip joint with a gait similar to that of a double sided subluxation of the hip joint.

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DOSAGE OF EXERCISES.

Not the duration of the exercise but the concentration of the mind will garantie a progress in the improvement of the condition. Without close attention all the exercises are without value. The necessity of close attention , the bodily exertion , the disgust of the patient when the limbs do not want to move the way he attempted to have them move, the fear of falling or an injury are the factors that cause fatigue relatively soon. According to our experience the duration of a single exercise during which time the patient's mind is closely occupied should not exeed four minutes. Exercises in the dorsal position are not as prone to exhaust the ~~pat-~~ patient as there is less fear of an injury and less actual muscular work. A whole series of exercises should not last longer than half an hour, including the pauses of rest after each exercise. Under normal conditions the disappearance of the feeling of fatigue would indicate that a new exercise can be started, in the tabetic the sense of fatigue is very much impaired , the action of the pulse is here always to be taken into consideration. With the progress of the exercises the pulse will not be influenced as much as in the beginning. Patients that show a marked rise in the pulse rate even after a long time of treatments are to be considered to be suspecious of belonging to the group of tabetic cachexia patients with the characteristic anemic appearance and the muscular weakness for which our therapy is valuable but has to be done with the greatest carefullness, or one might think that the kind of exercises have not been the right ones for that case. Two series daily of exercises are the average number of treatments for each patient.

The exercises in the morning are usually those in the dorsal position while in the afternoon the patient attempts the exercises in the upright position, if the patient is taking three short treatments daily the third one may consist in walking exercises.. The patient may walk for 10-15 minutes if the pulse remains normal and he ~~the patie~~ does not complain of fatigue or an increase in pain or an unfavorable influence upon the appetite or sleep. The patient should feel freer and refreshed after the exercises, he ~~they~~ should soon recover from the exertion and notice an increase in their productive power.

## TREATMENT OF HYPOTONIA.

The decrease of the normal muscle tonus with its consequences for the joints can influence greatly the manner and the result of the exercises. The danger of a bending of the ankle joint and its prophylaxis has already been mentioned. The causal treatment of the hypotonia is connected with the causal treatment of tabes and therefor does not belong to our field of treatment. As long as the hypotonia is not pronounced enough to change the function of the joint entirely a correctur of the abnormal condition is not neccessary. Under certain circumstances the consequence of a moderate hypotonia may even be beneficial for the maintainance of the equlibrium. Normally the knee joint is kept in a condition of slight flexion by the extensor and flexor muscles of the leg. If thru the hypotonia of the muscles the patient is able to to put the femur in a perpendicular way upon the tibia he will gain a relative security of the joint. In excessive hypotonia of the knee joint an orthopaedic apparatus to prevent the hyperextension of the knee may be used. Theoretically the use of such an apparatus is simple but practically it is found to be very difficult to use.

The secure fixation of the knee joint is almost impossible unless there are supports from the thigh to the ankle joints, with a support for the ankle joint. At the region of the knee joint there is a special device to prevent the bending back of the knee joint. Another difficulty is found in the danger of the sudden bending of the knee. Devices to prevent this will prevent sitting down of the patient. In cases where such a devise is neccessary it may be connected with a device to interupt this action while sitting down by means of a spring, which can be hidden under the clothes.

This kind of apparatus is of considerable weight, there have been recommended stockings made of the hide of dogs with stays at the knee joint. .

The problem of treatment of tabetic hypotonia has not been solved as yet.

RESULTS FROM OUR EXERCISE THERAPY.

The longer the exercises are continued the more complete and lasting is the result and the more secure are the motions. The patient may not be able to do everything as a normal person as far as time and security is concerned but his condition will be improved so that he will be able to get along without any help. The patient will have to use the control of his eyes for many of his motions, and he will appear to be somwhat stiff as can be easily understood. The patient will be able to earn his living and to get along fairly well as far as locomotion is concerned. It has been in the charity clinics that the complete cure of marked degrees of incoordination have been curedm where the patient did not have to consider the time and the expense and become disgusted and suspecious that the treatment was intentionally prolonged .

EXERCISE THERAPY IN THE PREATAXIC STAGE.

A lack of coordination may not be very evident in this stage but as we have previously seen it may be found in certain motions. If that is the case these motions should be practized. We mentioned befor that tabetics that have been used to prompt discipline befor they became tabetic as soldures for instance will not develop such a marked degree of coordination, and the result of the exercise therapy will be especially good. Disturbances of coordination develop so gradually that they are not noticed by the patient until one day he finds himself unable to do a certain motion like walking downstairs or moving around in the dark. In one of our patient the first sign of any trouble was noticed in the unability to see the painting on the ceiling in the Sixtinic chapel.

TREATMENT OF THE MUSCLES OF THE EYE.

The paresis of the muscles of the eye with the changing intensity and contraction , which is practically pathognomonic can be treated by attempts to fix the eyes upon subjects. Disks that can be arranged differently on a perimeter are very suitable for that purpose. This treatment is very important as in tabes the antagonistic muscles usually retract because the other muscle has been stretched too much. It is not known how much this retraction has to do with the permanent paralysis of the muscles of the eye.

LARYNGEAL PARESIS

We advise exercises in breathing, singing and speaking. A more precise exercise has not been found on account of the uncertainty as to the cause of the disturbance.

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PARALYSIS OF THE BLADDER.

The constant occurrence of paralysis of the bladder even in uncomplicated tabes or in the beginning stage where it constitutes the only motor anomaly is cause enough to separate these lesions from those that show anatomically a lesion of the motor tracts. This condition is due to an anaesthesia preventing the patient to realize when the bladder is filled and secondly by a motor paralysis, so that the contraction of the bladder does not depend upon a voluntary impulse. . The influence of the sensory disturbance is so much more evident as it can not be aided by the tactile sense nor by the control of the eyes. The condition shows changes in intensity and often disappears during the course of the disease. Thus these cases are in our estimation not cases of pure motor paralysis. In the beginning stage the patient should train his bladder in emptying at a certain time and at regular intervalls, this is very successful in the beginning stage. In advanced stages one uses aseptic injections of luke warm solutions of boric acid about 200-500 Gm and in this manner cause the bladder to contract when filled. Thus the mucous membrane and the muscular coat are stimulated. At times even that is not sufficient to stimulate the contractions of the bladder. In those cases an electric current may be sent thru the well filled bladder, we are just in the beginning of these treaments and cannot give a definite result at this time.

THE EFFECT OF EXERCISE UPON THE MUSCLES.

The changes which occur in the muscles during exercise.

Prof. Lombard's experiment.

Not only muscles but tendons become stronger by exercise.

Excessive exercise of muscles already well developed has an opposite result.

Astonishing extent to which muscles may be developed.

Dr. Winship and Louis St. Cyr.

An ordinary man can carry twice his own weight on his shoulder

Interesting figures relating to comparative strength of different muscles.

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# The Effect of Exercise upon the Muscles.

Let us notice the changes which occur in the muscle during exercise. As the result of receiving more blood, the nutrition is improved, and thus the growth of the muscles is promoted. The wastes of the muscles are removed more completely during exercise, and these wastes,— the wastes which occur as the result of the activity of the muscles,— after the exercise has been completed, provided it was moderate in character, are more than made good. By this, nature prepares for an extra expenditure of strength on a subsequent occasion; that is, if a person exercises his muscles to a moderate degree, so that they become moderately fatigued, during the rest which occurs afterward the wastes will not only be completely repaired, but the repair will go beyond the previous waste, and the muscles will be increased in size and strength, and be prepared for an increased amount of work. It is in this way that the muscles become larger, stronger, and more elastic as the result of exercise.

Prof. Lombard, a few ~~months~~ years ago, made some very interesting experiments relating to this subject. He attached a weight to his hand by the middle finger, and lifted this weight with his finger as many times as possible; he was only able to lift it thirty times the first day; the next day the strength of the muscles seemed to be diminished, so that he could not lift as much as on the previous day; on the next day he lifted less yet, and on the next day still less, and so on for a whole week. So that during the first week the muscles of the forearm which op-

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erate the middle finger, gradually weakened ; but after the first week, there was an exceedingly rapid gain of strength, and this strength increased each day, until at the end of twenty days there was such an enormous increase of strength that he was enabled to lift the weight 778 times.

This is a good practical illustration of the way in which the muscles may be made to grow as the result of exercise. Of course, in this case, it was only one small muscle that was exercised, so that the whole nutritive force of the body could be used to strengthen that muscle. It would have required an enormous amount of vital force to strengthen all the muscles in this manner ; but this force being directed, not to the whole body, but to this single muscle, its strength was increased twenty-five times.

It is found that, as the result of exercise, the muscles become, not only larger and stronger, but the tendons by which these muscles are attached to the bones become stronger ; and not only the muscles and tendons, but even the bones themselves, become larger and stronger. Why ? — Because the increased work of the muscle attached to the bone, brings to that bone a larger supply of blood ; so that by the increased supply of blood as the result of exercise, the ligaments, tendons, and bones, as well as the muscles, are supplied with an extra amount of nourishment.

An excessive use of a muscle already well developed results in an opposite manner. When a muscle is overstrained or overworked, there is rapid deteri-

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oration, so that in a few days the muscle which was hard and strong will become soft, relaxed, and flabby, and may be permanently injured. This fact is perhaps connected with another curious fact, that a muscle, when unduly stimulated and overweighted, elongates instead of contracting, indicating that its natural tension has been destroyed.

The extent to which the muscle may be developed is something astonishing. You have heard of Dr. Winship, who lifted some 2800 pounds. Louis St. Cyr, of Canada, is said to have outlifted the doctor by more than a thousand pounds. It seems that there must be a natural or hereditary physical tendency in this direction, if a person becomes so remarkably strong; and yet in the case of Dr. Winship, there does not seem to have been anything of this kind, because, when young, he is said to have been physically frail. The development of Dr. Winship's remarkable strength seems to have been due to the fact that when in college, he was very much affronted by one of his fellow-students, and he felt greatly distressed because he was not strong enough to give the fellow a good thrashing. He therefore set himself to work at private gymnastics, and practiced until he was able to give his enemy as good a thrashing as he deserved. Finding himself so much benefited and improved in health by his exercises, he continued them for many years, giving special attention to the one exercise of lifting, until by the aid of a harness so adjusted to his body as to enable him to lift with his whole physical force, he could lift nearly one and a half tons.

Unfortunately, there has not been a very careful study of this subject by gymnasts in general, probably because of the lack of proper apparatus. But we have at the Sanitarium an apparatus for testing the strength of each group of muscles, and I have finally constructed a chart, I think for the first time in the study of this subject, upon which we can represent the strength of the entire body, that is, the strength of each individual group of muscles — the muscles which close the hand, open the hand; flex the arm, extend the arm; turn the arm over, turn it back; and so of all the different groups of muscles in the body. I have isolated and studied each group of muscles, with the most interesting results. The grasp of the hand, as determined by Landois, is about seven tenths of the weight of the body; while the combined strength of the muscles of the arm is eight times the weight of the body. Of course one could not lift with his arm eight times the weight of his body, because when he undertakes to lift, his lifting is chiefly with two or three of the muscles of

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the arm. The total strength of the muscles of the legs is about thirteen times the weight of the body.

An ordinary man can carry about twice his own weight upon his shoulders; there are many muscles which are weaker than the muscles of the legs, so that he has only the strength of the weakest muscles to depend upon in sustaining the weight in this way. In the case of the trunk, including the chest, we have the same figures as in the case of the arms, the combined strength of the muscles of the trunk and chest being equivalent to lifting eight times the weight of the body. The total strength of the muscles of the chest,— the muscles of respiration, the muscles of the upper part of the chest and of the lower chest, and also the muscles of expiration,— is 2.3 times the weight of the body; while the total strength of all the muscles connected with the chest — the pectoral muscles and all the muscles acting upon the chest — is a little more than five times the weight of the body. The total lifting capacity of all the muscles of the body put together, is just thirty times the weight of the body.

These figures become really interesting, when one comes to study their relations to each other. I have not yet made as careful a study as I intend to make, of all the relations of the different groups of muscles to each other.

weight

In woman, the grasp of the hand is only equivalent to five tenths of the body, and the lifting capacity of the muscles of the arms is only 4.6 times the weight of the body,— only half the lifting capacity of those muscles in man. The total strength of the leg-muscles in woman is 9.4 times the weight of the body, instead of being thirteen times the weight of the body, as in man. Strength of respiration is 1.1 times the weight of the body, and the lifting capacity, 3 7 times the weight of the body; so that the total strength of the trunk muscles is about 5 times the weight of the body, or a trifle more than the strength of the arms; while the total strength of the entire body is 19 times the weight of the individual.

The figures which I have given represent only a small fraction of the strength that the average man may possess, if only properly trained. The achievements of Dr. Winship may not be equaled by every one, and it is probable that his great strength did not prolong his own life. The average man can lift about 400 pounds. The man who can lift seven or eight hundred pounds is a very strong man; and a man who can lift a thousand pounds is considered a man of extraordinary strength. There are thousands of men who cannot lift 300 pounds, and yet the total

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lifting ability of the body of an average man is about a ton ; almost any man ought to be able to lift [redacted] two tons. Now suppose every man, instead of having his lifting capacity at so low a point as 250, 300, or 400 pounds, were able to lift a thousand pounds ; how much greater would be the capacity of the human race for work ! Every person should have use of the full power of his muscles, and have that power under perfect control of the will. This is something to which early attention should be given ; children should be trained in early childhood to control their muscles, and the muscles should be so educated that as the child grows older, his strength will gradually increase, more vigorous exercises can be taken, and so, at maturity, each man and woman would reach his maximum of strength.

(For "Gymnastics.")

# THE DESCENT OF MAN.

Scientists of the Darwinian school tell us that the human race is descended, or rather ascended, from the megatherium or some other four-handed or four-footed ancestor who once roamed the primeval forests of the earth subsisting upon fruits and nuts and products of the soil. Without committing ourselves to this theory, which is still acknowledged to be an hypothesis, it is painfully evident that, however much man may have ascended intellectually and morally, he has descended physically. Any one who has ever looked upon the mammoth skeleton of the megatherium in the Museum of the Washingtonian Institute at Washington must be impressed with the thought that modern man is a very puny creature as compared with his reputed ancestor.

It has been suggested that this physical decay may be due to his change in diet, since all the big animals, the elephant, the mammoth, the elk and the bison as well as the megatherium are vegetarians, while carnivorous animals are comparatively small, through a wise provision of nature that animals which subsist upon others shall be punished for their cruelty by physical deterioration. If lions were as as big as elephants, and cats and dogs were the sizes of horses and oxen, all animals would soon be exterminated.

~~average young woman has become so perverted that she considers it masculine to be thoroughly healthy and strong, and able to do something.~~

Even during the Middle Ages, however, when Germany was still in a semi-barbarous condition, a small army of these hardy sons of nature made their way over the mountain passes into Italy and ran down the steep slopes on a pillaging expedition, armed with nothing but their long jumping-poles. Encountering an army of soldiers arranged three lines deep, with spears set and coats of mail glistening in the son, they were nothing daunted, but, making a short run, planted their jumping-poles in the ground and leaped into the air, vaulting over the heads of their enemies, left them far behind before they had time to recover from their surprise and consternation. Leonardo da Vinci was a man possessed of such physical activity that he often amused his visitors by suddenly springing up from the floor and touching the ceiling with his head or ringing the bells of the chandelier with his feet. There is probably no living artist who would care to undertake such feats.

the world as a whole

~~IS THE RACE DETERIO~~

It is a common remark that the human race is growing "weaker and wiser." That the race is growing weaker is too apparent to be denied; whether or not ~~it~~ is growing wiser in the best sense of the word, is a question which might be discussed. Knowledge is certainly increasing. This is especially true in regard to knowledge respecting the needs of the physical man, and the relation of physical conditions to mental and moral. If we are wise enough to make a proper use of this knowledge, it is possible that we may succeed in growing stronger as well as wiser. The ancient Greeks believed a sound body necessary for a sound mind, and hence gave great attention to athletics, and to all kinds of physical exercise. Girls and women, as well as boys and men, were required to undergo such exercises, and to engage in such games and sports as would develop the muscles and the whole physical frame. Aristotle, the teacher of Alexander the Great, well understood the necessity of developing the body, and hence took his pupil away from the luxuries and pleasures of the court, and subjected him to the rigorous regimen necessary for developing a vigorous body. The early Romans, as well as the Greeks, gave great attention to the development of the physique. Julius Cæsar was an athlete. All kinds of physical exercises and sports requiring vigorous activity of the body, were encouraged and much in vogue among the Romans.

During the darkness of the Middle Ages, however, the importance of physical education was lost sight of. One of the most pernicious corruptions which at an early period crept into the Christian church, was the idea that the body must be abused and tormented in order that the soul or spirit should be perfected. This idea was carried to such an extreme that one of the early Fathers asserts that the "purest souls are to be found in the dirtiest bodies." In accordance with these ideas, the ~~corrupted~~ church destroyed the magnificent gymnasia and baths erected

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by the Roman emperors, and brought baths and gymnastics into such disrepute by anathemas and bulls that one historian tells us the bath was actually unknown in Europe for a thousand years. It is only in very recent times that cleanliness has come to be considered "next to godliness," and probably even yet the majority of Christian people entertain the notion that there is an intimate relation between hard muscles and hard hearts, while many very excellent persons would as soon allow their children to witness a prize fight as to visit a gymnasium. The result of these erroneous notions has been a distinct and noticeable decline in physical vigor, which may be recognized as having progressed even within the memory of almost any person of adult years.

George Washington, the father of his country, on one occasion threw a silver dollar the distance of six hundred feet, a little less than one eighth of a mile. Chief-Justice Coleridge, while visiting the spot some years ago, asked a United States senator the question, "How did he do it?" Said the senator in reply, "A dollar went farther in those days than now!" Muscles and nerves, as well as the almighty dollar, went farther in those days, and were able to accomplish more than they do now. Frazer, the champion jumper of the world, covers the distance of twenty-three feet. Washington surpassed the champion's best jump by a whole foot. ~~The man does not live in civilized land to-day who could space at a single leap the distance of nearly a rod and a half.~~

A ~~short time~~ ago, the writer had the pleasure of addressing, by invitation, at one of our largest Western ~~schools,~~ an audience of fifteen hundred young men. The question was asked, "How many of you young men are able to lift a heavier weight or do a larger day's work, or are capable of greater physical endurance of any sort, than your fathers?" Only fifteen hands were raised. Taking into consideration the fact that in a question of this sort a young man



few years Colleges

Shortly after. —4—



is pretty certain to give himself the benefit of the doubt, the inference is a fair one that of the fifteen hundred young men present, at least ninety-nine out of each hundred considered themselves inferior to their fathers in physical development and powers of endurance. Probably the proportion of young men who have less physical stamina than their parents is really greater than this; for the audience referred to was almost wholly made up of young men who were country born and bred, and who consequently had had a better opportunity for physical development than city boys.

[redacted], the writer also addressed an audience of eight hundred young women, students at a Western [redacted]. In reply to the question, "How many of you are perfectly well, suffering no inconvenience from headache, backache, nervousness, or other evidences of ill-health?" in that large audience of eight hundred young ladies, only five were found who claimed to be in perfect health, and able to do more than their mothers. The race of strong, vigorous men and healthy, enduring women seems to be almost extinct. What will the next generation be?

school.

Another evidence of the degeneration in physical vigor to which we have referred, is to be found in the fact that young men of the present day, as a rule, are not looking for hard work, but for an easy time. Even young men who are reared on a farm show a disposition to gravitate toward the cities, seeking for such employment as wielding the yard-stick in a dry-goods store or sticking labels on bottles in some drug shop. The average young man of to-day has no taste for such occupation as logging, grubbing, plowing, and subduing the forest, as did the pioneers of half a century ago. If he engages in agricultural operations at all, he no longer swings the cradle or binds the grain into sheaves, but rides upon a patented machine which does the whole work automatically. He even rides on a sulky rake, a sulky plow, a sulky cultivator, and manages to dispense almost altogether with the services of the spade, the hoe, the ax, and other old-fashioned implements of agriculture.

The homely arts of housekeeping are no longer fashionable with young ladies. Embroidery, piano-playing, drawing, painting, sketching, etching, and like accomplishments, are thought to be sufficient to engross the time of the average young woman of the period. Scarcely one can be found who can wash and sweep and weave and milk cows and clean house, as did her mother or her grandmother. It is getting fashionable to be pale and weakly. Indeed, the

as well

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average young woman has become so perverted that she considers it masculine to be thoroughly healthy and strong and able to do something.

It is a good omen for the future that within the last few years there has been a marked increase of interest in physical culture. The educational work done by Drs. Seaver and Anderson at Yale and Chautauqua, Dr. Hartwell in Boston, Dr. Sargent at Harvard, Dr. Posse, Dr. Enebuske, Baron Fosse, and through the physical directors of the Y.M.C.A. teachers and trainers in connection with the various colleges in different parts of the United States, A vast deal of progress has been made in the direction of physical improvement, at least something has been done in staying the tide of physical deterioration and decadance which for many years has been progressing at an alarming rate, the fact having been overlooked that while the average length of human life has been increased the average vigor of the human constitution has been diminished, as shown by the increasing rarity of great longevity. The alarming increase of insanity, tuberculosis and other diseases indicate an increase in constitutional deterioration.

The purpose of the author in the preparation of this work is to contribute something to this progress by the presentation of physiological principles upon which scientific physical culture is based, and pointing out practical methods for securing symmetrical muscular development and correcting the defects which are the natural outgrowth of neglect of muscular exercise.

"Gymnastics"

OUR FIVE HUNDRED MUSCLES.

All movement in the bodies of animals is the result of action of the muscles. The movement of the chest in breathing, the circulation of the blood by the heart, even the changing expressions of the face are examples of muscular action as well as the motion of the arms and legs and other more easily observable movements. The larger movements are the result of the action of the muscles upon the bones which they employ as levers.

The muscles serve other purposes than that of motion. They round out the body and give it symmetry; they support the skeleton and hold its several parts together. The muscles balance the head upon the trunk and hold it erect. Muscles also serve to fill the gaps between the bones, thus completing the walls of the chest and abdomen. The stomach, liver, intestines and other organs of the abdomen and pelvis are held in place, partly by muscular bands and partly by the tension of the muscular walls of the abdomen.

The great function of the muscles, however, is motion. The most simply formed animal, the amoeba, although consisting of a single cell, and having no structure, is capable of movement. Every portion is capable alike of motion and hence it moves without definite direction. Lining the lungs, there are curious cells covered with hairs, each of which is in constant motion, although the cells themselves do not move, furnishing the simpliest example of a simple organ of motion. These cells are sometimes found in movement several hours after death.

In higher animals there are special cells endowed with the power of movement. These are called muscle-cells. Unlike the amoeba these cells cannot move in every direction, but are able to move only in the direction of their length in shortening and elongating.

The muscles are composed of a great number of these cells arranged in fibers; each fiber is composed of a number of cells arranged in a line. Fig. ... shows the structure of a muscular fiber. Figs. ... and ... give a very good idea of the muscular structure of the body. On page ... can be found a list of the principal muscles of the body with a brief description of their action.

SOURCE OF MUSCULAR POWER .— The muscle stores up within itself a peculiar substance called glycogen or animal starch which is the source of muscular energy, the glycogen being first converted into sugar, then burned by a combination of oxygen so that force is produced in a muscle in much the same manner as in a locomotive.

The muscles are the principal source of heat in the body, all muscular movement being accompanied by the development of animal heat as the result of oxidation or burning of the glycogen. The development of both energy and heat in the muscles is under the control of the nervous system. The muscles are made to contract by a voluntary impulse proceeding from the brain by striking the muscle a quick blow by the application of heat and by the application of electricity.

Muscle contraction is not instantaneous, as might be supposed. The movement of contraction travels from one end to the other at the rate of about 50 feet ft. per second. After the muscle is stimulated there is a short pause before contraction begins. This is not observable, however, as this so called latent power is only one one-hundredth part of a second, under ordinary circumstances, and if the muscle has been prepared in advance for the action required of it the latent period is only one fourth as great.

The latent period is greatly increased by cold. The susceptibility of the muscle to contract on the application of electricity, heat, a blow, &c., is the cause of irritability. Cold and fatigue lessen muscular irritability. The movements of a tired man are slow. Cold has the same effect. This is the reason why movements are slow and clumsy when under the influence of fatigue and cold.

The muscles ordinarily contract under a stimulating impulse received from the brain or spinal cord. This impulse results from the throwing off of energy from the nerve centers in the brain or spinal cord in which it has been stored up.

The muscles are continually in a state of partial contraction. It is this fact which gives the body its balance and symmetry. This contraction is the result of a marvelously interesting and useful automatic arrangement by which the nerve centers are constantly sending out a succession of nervous impulses at the rate of 15 to 20 per second. The more vigorous movements of the muscles are the result of stronger impulses sent out with sufficient rapidity to cause ~~x~~ the muscle to maintain its contraction.

When a muscle contracts it changes its shape, shortening in length and increasing in thickness. This may be easily observed in the contraction of the biceps, the muscle of the upper arm.

During the contraction of a muscle, $CO_2$ or carbon-dioxide is produced, the same as in burning wood or coal. This carbon-dioxide is thrown into the blood from the muscle and thence carried into the lungs when it is exhaled. The amount of $CO_2$ thrown off by the lungs may be increased by exercise to five or six times the ordinary amount.

MUSCLE MUSIC.--Every time a nervous impulse reaches a muscle the muscle contracts. When these impulses amount to 20 per second there is not time for relaxation to take place and the muscle remains contracted. By listening to such a muscle, either with the ear or with the stethescope, a low, deep, musical note may be heard like that of the lowest pipes of a big church organ. The real muscle-note is ~~the~~ a lower sound and is not heard; the sound heard is an octave above the real sound or what the musician would call an overtone. By placing the fingers in the ears and contracting the muscles of the arms vigorously the muscular music can be very easily distinguished.

MUSCULAR WORK.--The amount of work the muscle can do depends upon the number of fibers in it, and hence, upon its diameter, or rather the area of its cross-section. The amount of work accomplished is estimated by mutiplying the number of pounds lifted by the number of feet through which the weight is lifted; for example, if 50 lbs. is lifted through a distance of five feet the amount of work accomplished is equal to 250 foot-pounds. The amount which a muscle of a given size can lift differs greatly in different animals; for example, the lifting power of a human muscle is three times that of a frog's muscle of the same size. A muscle possesses the greatest strength at the beginning of its contraction.

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WHEN we consider the muscles as machines, we find them marvelously adapted to the various functions which they perform in the body. They are shaped in a great variety of forms to meet the requirements of symmetry, or movement of the various parts of the body in which they are placed. For example, we find in the upper part of the chest a large fan-shaped muscle, the pectoralis, the fibers of which are gathered into a tendon and attached to the upper part of the arm. In the thigh is found a muscle of a very different shape, the sartorius, or tailor's muscle, by means of which the legs are flexed and crossed as when sitting tailor fashion. This muscle is the longest in the body. A curious little muscle in the neck has three tendons, one at each end and one in the center; the central tendon passes through a loop which serves as a pulley. The muscles employ the bones as levers, by means of which the various movements of the body are produced.

The lever is one of the most important of all the mechanical powers. The principle of the lever is illustrated in the ordinary crowbar, one end of which is placed under the weight to be lifted, while pressure is made at the other end, an intermediate point, usually nearest the weight, resting upon some fixed support called the fulcrum. The two sections of the lever between the power and the fulcrum and the weight and the fulcrum are termed its arms. When the arms of the lever are equal, no advantage is gained by its use; but if one arm is longer than the other, and the power is applied to the long arm, then an advantage is gained which is measured by the proportion existing between the two arms; the greater the length of the long arm in proportion to

Star P. 15.

The muscles are more perfect than machines of human construction, in the fact that they make a more economical use of the fuel supplied them; for example, the best steam engine is able to utilize only ...... of energy of the coal with which it is supplied, ..... appearing as heat, whereas the muscles utilize .... proportion of the energy su plied in food, only ....appearing as heat.

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the short arm, the greater the advantage in lifting a heavy weight. If, however, the purpose is rapidity or extent of movement rather than the lifting of a weight, then an advantage is gained by the application of power to the short arm. In the human body, the power is usually applied to the short arm of the lever; that is, the point of attachment of the muscles to the bones is usually such as to give extent and rapidity of movement, rather than great advantage in lifting heavy weights.

The muscles are far more perfect than mere machinery, for they keep themselves in repair. The point at which the muscle arises, and which is nearest the center of the body, is called its origin, and the point where it is attached is called its insertion. X

There has been very extensive study upon the subject of the mechanical equivalent of the work done by the muscles. It is found that there is a great disproportion between the stimulus applied and the amount of work done; for example, if a weight falls upon the nerve by which a muscle is controlled, the muscle will contract with sufficient force to lift one hundred times the weight which falls upon it. So there is a disproportion between the stimulus applied and the force developed in a muscle, similar to that which exists between the force applied to pull the trigger of a gun, and the force developed in the firing of the gun.

Comparative studies of the force exhibited by man and other animals have been made to determine the proportion between their strength and their weight; it has been found, for example, that a horse can drag three times his own weight, while among insects, the difference between the weight and the force exhibited is much greater. The South American beetle can

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carry forty times its own weight; the ant can carry a mass several times as great as itself. We may note also the force exhibited by insects in the movements of their wings, which often vibrate many thousand times a minute. The dragon-fly, for example, easily keeps up with a railroad train which is going at the rate of a mile a minute; birds also accomplish the same feat. The exhibition of muscular power by these creatures is very great, and proportionately far superior to that of human beings.

Quetelet says that a man by pressing his hands together can exert a force of 120 pounds, and women one third less. Landois states that the force that a man can exert by closing his hand, is about seven tenths of his own weight. A strong man can carry twice his own weight, while the average woman can only carry half as much. I suppose this to be true not because woman is naturally the "weaker vessel," but because she has not had the same chance for development. But I know of no reason why she should not be able to carry as much as a man of the same size, with the same opportunities for development. Lower animals are stronger, proportionately, than human beings. A dog, for example, when he closes his jaws, is capable of exerting force equal to lifting eight times his own weight; a bulldog can close his jaws with so much energy that it requires a tremendous force to pull them apart, and dislodge the dog from his hold. He will sometimes die, even, before he will let go. When a crab uses his pinchers, he exhibits the same degree of force — eight times his own weight. Shell-fish exhibit still greater muscular ability; when a clam, for instance, shuts up his shell, he exerts a force equal to ~~thirty-eight~~ times his own weight. A flea can leap ~~forty~~ times his own length. If an elephant had leaping abilities equal to those of a flea, how far could he jump? Probably about ten times the distance across the Atlantic, or to the moon in eight leaps.

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Some of the lower animals, however, are not so strong as they appear. The stork, for example, stands half a day on one leg; he will stand hours and hours absolutely motionless in this position. One would think he would get tired of standing on one foot, but he does not, because he is really exerting very little force. Nature has furnished the stork with leg bones constructed in such a way that the tibia locks into the femur; he simply locks these joints and then balances himself upon one foot. In a similar way chickens sit upon the roost; they place their feet on the roost and then settle back, and this act closes their toes upon the perch, and thus they retain the position without any effort.

THE MUSCLES.

three hundred and eighty

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Some very interesting calculations have been made in regard to the amount of work which man performs in a day of ten hours. It is found that the amount of work which the ordinary laboring man does in the course of a day, is equal to lifting 300 foot-tons. This seems astonishing, but when we figure it out and see what it means in practical work, we shall find that only an ordinary amount of work is required of the muscles to accomplish the equivalent of lifting this weight in twenty-four hours. An Englishman, Mr. Horton, has made some very interesting calculations as to the amount of work done in walking, and he finds that the work done by a person weighing 150 pounds, walking on a level surface at the rate of about three miles an hour, is equivalent to lifting his own weight perpendicularly, through one twentieth of the distance: hence in walking one hour he lifts $\frac{5,280 \times 150}{20} = 118,800$ foot-pounds, or over fifty-nine foot-tons. If a man walks all day, or a day of ten hours, at three miles an hour, he would walk thirty miles; this would be equivalent to lifting 594 tons a foot high. Now the average man does only about half that amount of work in a day.

Suppose a person walks for an hour at the same rate up an ascent of one mile in three, we have to multiply the whole distance through which he has lifted himself, by one third of his weight, or 792,000 foot-pounds, which is 396 tons. This added to the fifty-nine tons, equals 455 foot-tons for a person climbing a mountain a mile high, walking three miles an hour. To accomplish this would require an ex-

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penditure of energy equal to more than a day's work. The amount of force exhibited by human beings is often very great. For example, a robust rower who is doing his best, does as much work in a given time as seven shovelers who are loading dirt into a cart. We thus see that the ordinary laboring man does not work very hard; but the vigorous rower can maintain his great expenditure of energy only a few minutes, while the laboring man must toil on all day. *

Dr. Smith has made a calculation of the amount of work done, based on the amount of carbon-dioxide thrown off. While a person is asleep, this is four and five tenths grains per minute; the same person awake and walking at the rate of three miles an hour, throws off twenty-five and eight tenths grains, and when he is walking on a treadmill and ascending at the rate of twenty-eight feet per minute, he is throwing off carbon-dioxide at the rate of forty-three and four tenths grains; in other words, when traveling in a treadmill and ascending at the rate of twenty-eight feet per minute, he is doing ten times as much work as when asleep.

The work of the heart in twenty-four hours amounts to from 100 to 150 tons, — sometimes 200 tons; and the work of the lungs in the same time amounts to several tons; and when we add together the work of all the internal organs, we find that it amounts to from 250 to 300 tons per day, besides the ordinary daily labor of the voluntary muscles, which is about 260 to 300 tons; so that the work done each day by the body of the ordinary laboring man is equivalent to from 560 to 600 foot-tons per day.

# Home-Culture

## TRAINING A CHILD NOT TO TEASE.

A CHILD who never "teases" is a rarity; yet no child ought to tease. If a child does tease, the blame of his teasing properly rests on his parents, rather than on himself. The parent who realizes this fact will have an added stimulus to the work of training his child not to tease, and no phase of the work of child-training is simpler, or surer of its result, than this one.

"To tease" is "to pull," "to tug," "to drag," "to vex (or carry) with importunity." A child teases when he wants something from his parents, and fails to get it at the first asking. He pulls and tugs at his parents, in the hope of dragging them to his way of thinking, or to a consent to his having what he wants in spite of their different thinking. He hopes to vex or carry them into the line of his desires by means of his importunities, whatever their view of the case may have been, to begin with. If a child could have what he wanted at his first asking, he would not tease; for there would be no room for his teasing. If a child never secured anything by teasing, he would not come into the habit of teasing; for there would be no inducement to him to tease. When, therefore, a child is accustomed to tease, it is evident that he has been trained by his parents to tease; and they are to bear the responsibility and blame of his teasing.

Many a child does not expect to get what he wants, if it is out of the ordinary line of his daily needs, unless he teases for it; therefore he counts teasing a part of his regular duty in life, as truly as "beating down" the city shop-keeper on his prices is supposed to be the duty of a shopper from the country. If a child asks for a slice of bread or a bit of meat at the family table, or for a glass of water between meals, he expects to get it at the first asking. Teasing for that is not in his mind as a necessity. But if he wants to stay at home from school without any reason for it, or to start off with some of his schoolmates on a long and hazardous tramp, or to sit up an hour later at night, or to have a new sled or velocipede or bicycle, he is not so sure of gaining his request at the first asking. So, when the answer "No" comes back to him in such a case, he meets it with the appeal, "Do let me. Oh, do!" and then he enters upon a nerve struggle for the mastery over his parents at this point, with the idea in his mind that it is a single question of who shall be most persistent in adhering to his side of the conflict.

There are few children who always succeed in carrying their point by teasing; but there are fewer who never succeed by this means. Most parents give way, sooner or later, in some of these conflicts with their children. It may be that they are less determined than their children, and that they are simply tired out by the teasing. It may be that they are moved by their children's earnestness in the matter, and that they yield because of their tenderness toward the little pleaders. It may be that their first answer to the appeal is a thoughtless one, and that their fuller considering of the matter leads them to see it to be right to reverse their impulsive decision. Whatever be the parents' reason for their course in such a case, if they give a negative answer to their children's first request, and an affirmative one in response to more or less teasing on the children's part, they train their children so to believe that teasing is an important factor in a child's progress in life; and of course they are responsible for their children's continuance in the habit of teasing.

It is a misfortune to a child to suppose that teasing is essential to his gaining a point that he ought to gain. A result of such a view in his mind is, that claimed, "How did he do it?" The Senator replied, "A dollar went farther in those days than now," — a very truthful remark indeed. Not only dollars but muscles were possessed of a higher value a century ago than at the present day. The Father of his Country, though not a trained athlete, covered in a long jump the space of 24 feet, whereas Frazer, the world's champion jumper at the present time, has never been able to exceed the distance of 23 feet.

Occasionally, however, a man is found whose strength and development so nearly approach the standard of the olden times, and so far exceed that of the present, that he is considered a curiosity, and he is carried about from city to city to be exhibited in museums, and in special shows, to the astonishment of all beholders. A man of this sort, who might well be called a modern Samson, was exhibited during last summer in New York. A similar exhibition was also made in Chicago. Some of the measurements of this man's strength may be of interest.

Neck, 18½ inches; biceps, 19½ inches; forearm, 17 inches; chest, normal, 52 inches; after exhalation, 46 inches; when fully expanded, 58 inches; waist, 29 inches; thigh, 26¾ inches; calf, 18 inches; height, 5 ft. 8½ inches; weight, 199 pounds. Sandow

The most remarkable of all these figures are the chest measurements. The average man of 5 ft. 8 inches has a chest measurement of only 34 inches. The measurement of the chest in professional athletes rarely exceeds 40 in., a whole foot less than that of this modern Samson. The chest expansion is also phenomenal. Seven inches is the greatest chest expansion ever noted by the writer, while in this man it was a foot.

If physical exercise of the right sort was enforced in all our public schools, scarcely a generation would be required to develop a race of strong men. The total lifting capacity of the entire body, as shown by the researches of the writer, is but little less than ten thousand pounds in a strong man, and is slightly more than five thousand pounds in the man of average strength.

The capacity of the body for muscular work is far greater than is generally supposed. It is only necessary that the muscles should be developed to their full capacity, and that there should be a symmetrical development of the whole muscular system, to enable a well-organized human being to exhibit an amount of muscular energy which to the uninitiated would be truly astonishing.

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WHAT IS CORRECT BREATHING? — There has been much controversy among teachers of vocal music and voice-trainers as to the proper method of breathing. In general, it may be said that the disputants have ranged themselves in two classes, one allowing, if not recommending, the free movement of the upper part of the chest, with little movement of the waist; the other strictly enforcing so-called abdominal respiration. A careful study of this subject, including investigations of the respiratory movements as seen in savage women, in young infants, in healthy men, and in civilized women who have never worn any sort of constriction about the waist, has led us to the conclusion that both the thoracic and the abdominal types are abnormal. This conclusion becomes irresistible when one makes a careful study of the mechanism of respiration. When air is received into the lungs, not only the chest but the whole trunk is expanded. The depression of the floor of the chest cavity, by contraction of the diaphragm, presses the liver and other abdominal organs downward, and so naturally increases the diameter of the abdomen at the same time that the diameter of the chest is increased.

To attempt to breathe by expanding one end of the trunk only, either the upper end or the lower end, is then abnormal. Consid ring the trunk as a single cavity, as we may fairly do, since the diaphragm is a flexible and movable apparatus, it is natural to expect that the point of its greatest expansion would be near its central part, just as would be the case with a flexible rubber bag of similar size and dimensions.

Normal respiration is neither chest respiration nor abdominal respiration, but full respiration, in which the greatest expansion is at the waist, with a slight degree of expansion at the upper chest and the abdomen. Any one who wishes to know how to breathe, has only to take a lesson or two from a young infant lying quietly asleep, to find an object lesson which will give him more information than he could obtain by any amount of study of adults.

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EXERCISE will help a young man to lead a chaste life.

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Body and mind are both gifts, and for the proper use of them our Maker will hold us responsible.

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Exercise gradually increases the physical powers, and gives more strength to resist disease.

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Exercise will do for your body what intellectual training will do for your mind, — educate and strengthen it.

(Star, p.17. Inc. pp.14--17.)

In an exhaustive study of the relative strength of the different groups of muscles in men and women by the aid of a dynamometer especially devised for the purpose the author has developed many interesting facts which are embodied in Table 1. at the close of this volume. By reference to this table it will be noticed that the total strength of the average man is sufficient to lift more than 37 times his body weight; the strength of the average woman is a little less than two thirds as much. Many other interesting facts are shown in the tables which will well repay careful study.

Star 18.

In walking at the rate of 3 miles an hour, Mr. Wharton has determined the energy expended was equivalent to lifting a body through one tenth of the distance travelled.

Double Star 18.

According to some very interesting investigations made by Dr. Edw. Smith, a person walking at the rate of three miles an hour throws off nearly half a dram of carbolic acid gas, or six times as much as when asleep, when walking in a treadmill and ascending at the rate of 28 ft. per minute a man throws off ten times as much $CO_2$ as when asleep. Thus it appears that the amount of vital work done by a person walking at the rate of three miles an hour is six times as great, and when walking in a treadmill, ten times as great.

Star 16.

The dragon fly moves its wings at the rate of 600 strokes per second travelling at the rate of from 5 to 30 feet per second.

THE INFLUENCE OF EXERCISE UPON THE MUSCLES.

One of the effects of exercise is to excite the action of the heart and the blood vessels. The heart beats with greater force and frequency during exercise, pumping an increased quantity of blood into the arteries and the active muscles are dilated, hence an active muscle receives much more blood than an idle muscle, the result is an increased growth in the muscle. Although its tissues are consumed during work the increased amount of blood brought to the muscle stimulates vital activity to such an extent that the wastes are more than completely repaired as the muscle increases in size. This increase in size is accompanied by a great increase in strength. The increase in size and strength are not, however, apparent from the beginning of the exercise; there may be an actual decrease during the first week or two; the increase is very rapid for two or three weeks. In a case observed by Lombard the increase in strength within the time named was more than twenty-fold. This, however, was quite extraordinary. We have sometimes seen persons double the total strength of the body in six weeks. A greater personal gain might doubtless be made if every blood vessel had its own muscle or group of muscles.

It is important to note that a tendon as well as a muscle increases in size and strength as the result of exercise. This is necessary for the reason that the tendon connects the muscle with a bone and must be prepared to sustain the strain to which it would be subjected by the stronger muscle.

Even bone and the ligaments which support the moving joints increase in size and strength, as, being acted upon by the muscles, an increase is acquired in these parts as well as in muscles. The growth of the tendons, bones and ligaments is due to the increased blood supply, as is the case with the muscles.

## THE DANCE OF LIFE.

The growth and repair of a muscle is the result of the constant changes of matter which take place in the body,--in every fiber in the body--and, for a time, outside of the body--a change of substance is taking place. The living particles of muscle are being made and unmade continually. In every microscopical speck of substance there are parts that are alive, parts that are dead, parts which are being made alive, and parts which are dying. If the eye could penetrate the intricate recesses of molecular life it would see a constant march of minute atoms from dead matter up to organized living substances, and a downward march from life to death.

As has been well said, matter is a form through which a stream of matter flows. Matter enters this form, dead, but capable of being made alive. By the mysterious magic of vitality, it is, for a short space, inspired, so to speak, with a principle of vital activity, and after joining for a few hours, days or weeks, as the case may be, in the mysterious dance of life, it loses its divine endowment and falls back to the common level of inert matter, and is swept away to give place to other matter which, in its turn goes through the same marvelous evolutions. Every muscular movement results in the quickening of this march of matter in and out of the charmed circle of life. The more vigorous the movement the greater the expenditure of energy, and the greater extent to which the change of matter is accelerated. During action, the downward rush from life to death is much greater than the upward march of life and activity, hence work always leaves the muscles to some degree depleted and impoverished. A period of of rest, long or short, according to the amount of work done is thus required after every expenditure of muscular energy. Nature is a provident mother, and whenever her resources are thus drawn upon she takes care not only to make good the loss but to lay in a little surplus of supply for future demands, provided the demand has been an unusual one. It is thus that growth of muscle is stimulated by work, but it must be remembered that growth does not occur unless the amount of work done is sufficient to make so great a draft upon the vital capital as to stimulate an unusual degree of reparative work, in other words Nature does not supply greater capacity unless it is made evident that there is to be a demand for it, hence larger and stronger muscles can only be secured by using the muscles to the utmost of their capacity.

OVERWORK AND FATIGUE.

——Quote pages 19 to 26. (except what is crossed out.)

Star Page 19.

Mosso, an Italian physiologist, produced all the phenomena of fatigue in a dog by injecting into its veins the blood of another dog which had been exhausted by muscular work.

Star 28.

Consecutive fatigue is particularly likely to occur in elderly persons and persons suffering from rheumatism, gout, or obesity in persons who have been unaccustomed to exercise, especially invalids.

Recent observations by Abelous show that the poison generated by muscular effort is capable of producing paralysis of both nerves and muscles.

Rest restores the fatigued muscle by allowing it an opportunity to reaccumulate oxygen and glycogen, and to eliminate the poisonous substances generated by work.

Sleep, during rest, greatly facilitates recovery from muscular effort. Lombard has shown that the strength is less when the barometer is low; that it is also influenced by the time of day. Observers differ as to when the strength is greatest; ~~at~~ 10 A.M. and 6 P.M. seem to be the hours of maximum vigor. The strength is greater with the low than with the high temperature, and is diminished by an increase of humidity in the air. Lombard has also shown that tobacco smoking quickly, even in a person accustomed to its use, immediately lessens endurance causing the muscles to become quickly fatigued.

(Quote pages 38-42 and change arrangement of matter.)

RELATION OF EXERCISE TO RESPIRATION.

Quote pages 27-35.

THE MENTAL AND MORAL INFLUENCE OF EXERCISE.

The superior scholarship of college students who give special attention to exercise has long been recognized. Byron, while composing his most celebrated poem, managed to counteract, to a remarkable degree, the baneful influence of his frequent lapses into dissipation by the most vigorous exercise. One of his favorite pas~~t~~times was swimming in the open seas. On one occasion he swam the Bosphorus and prided himself upon the fact that he accomplished the feat in less time than did his ancient rival Leander.

Exercise has for many years been utilized in asylums for feeble minded children as one of the most efficient means of encouraging mental development. Walking a seam in a carpet has been found excellent exercise for securing attention. There is no means by which general vital activity may be so greatly quickened as by muscular exercise.

Bodily exercise does not confer mental powers, but it does increase the capacity for mental activity. The sense of power and self-reliance which vigorous muscular development gives to a young man have a really moral value and aid in the development of manly diginity and self respect . The power of endurance, the manly self reliance, the capacity for resolution and execution, and the hardihood which will be developed by a vigorous physical training are the best antidote for many mental and moral weaknesses, foibles and even vices.

It must be remembered that muscular exercise is not merely training the muscles ; it is a training of the brain, the nerve-centers and the nerves as well as the muscles. This exercise of the nerve-centers must encourage their growth and development as in the case of the muscles. It has been noticed that when a portion of the body has been lost in infancy, as an arm or a leg, that part of the nerve that supplied the lost portion originally, undergoes degeneration and destruction, it disappears, in other words, simply from lack of use. Exercise clears the brain and quiets the nerves by increasing the amount of oxygen received into the body and thus consuming the wastes and purifying the blood . The tissue-wastes, the poisons that paralyze the brain , as is well shown by the experiment of Ferrier, who found that an application of meat extracts of tissue-juices, which represent the poisons of the tissues, when exposed to portions of the brain in the dog or monkey, produced temporary paralysis. Nervousness is often due to the accumulation of these tissue wastes, and hence is readily relieved by exercise; and sleeplessness is often due to the same cause. Exercise accordingly relieves it by purifying the blood, and also by diverting the blood into the muscles and away from the overcharged brain. There is a certain mental educational value also in exercise, which developes the faculty of attention and concentration. More than this, it brings the whole body under discipline and control, provided, of course, that the training is rightly managed. The untrained man or woman has comparatively little control of his muscular system. Only those muscular acts can be well executed which have been commonly, and perhaps one might say, incidentally, performed, such as the most ordinary movements of the upper and lower extremities. The attempt to execute a new movement is clumsy and awkward because of the lack of control of any of the muscles or muscular groups. A child learning to write employs not only his hand, but his whole arm, mouth, eyes, head, trunk and sometimes even the lower extremities; almost every muscle in the body is brought into action. As he acquires proficiency the number of muscular groups associated in the exercise of writing is lessened until only those are employed which are essential to the execution of the movement. Think of the enormous advantage of having the whole body trained in a similar manner. A trained gymnast has command of his entire muscular system. An untrained person has control of only a few muscles, hence he really had under control but a small portion of his physical powers. The movements of children in learning to walk are always awkward; some, through lack of training, never get over the awkwardness and go through life with a shambling, shuffling gait, or with some equally conspicuous defect.

Exercise subdues the emotions and propensities through the healthful influence of fatigue and the expenditure of energy through normal channels. It thus becomes an important aid to purity. The man who wishes to excel in physical exercises of any sort must live a chaste and temperate life.

GENERAL EFFECTS OF EXERCISE.

Exercise promotes general vital activity by stimulating tissue change. It is perhaps for this reason that every living thing exercises in some manner. The swaying of a tree-top in the wind stimulates the growth of its roots and causes them to spread wider and deeper in the soil. Exercise promotes the growth of the body by stimulating the circulation and all the vital activities. Maclaren mentions the case of a young man aged 20 who had ceased to grow for several years, but when under the stimulus of regular and vigorous exercise took a new start and added four inches to his height. The increased vigor of body which is induced by exercise is manifest in the increased elacticity of step and quickness of movement, in the brightness of the eye, and in general cheerfulness of temper which is the natural result of the general sense of wellbeing which accompanies good health.

Exercise promotes symmetry by securing an equable development of all parts of the body. Most savages , at least those who live an active, and what might be considered a natural animal life , are remarkable for symmetry of development. Capt. Cook declared that the natives of the South Sea Islands, ~~whom~~ which he discovered, were so remarkably symmetrical in their development that the women were all Venuses and the men all Apollos.

This volume contains several plates which demonstrate that even at the present time, although this unfortunate people have been, to a great extent, deteriorated through their contact with the white race, are still possessed of remarkably symmetrical and finely developed figures. Several years ago, when spending a short vacation among the primitive Yumas of Arizona, the writer met a gigantic Indian whom the most critical Grecian artist would readily have accepted as a model. When this magnificient son of nature suddenly sprang to view from the bushes and stood before us clad in a pocket handkerchief, we were so lost in admiration that we quite forgot to be startled, although the possibility of being picked up and slung over the giant's shoulder and carried home as a trophy, was not too remote to be unworthy of consideration as we were wholly without protection.

Exercise is necessary to maintain suppleness of the joints and ligaments. An unused joint soon becomes rigid. This is as true of the joints of the spinal column as of any other portion of the body. Rigidity of these joints, especially those of the lumbar region greatly hamper the movements of the body. The expansion of the chest is rendered possible by the flexibility of the cartilaginous portion of the ribs. The stiffness of old age may be held at bay by daily, systematic exercise. Pompey, according to Sallust, even when quite advanced in years, could run and jump and carry weights equal to his most robust soldiers. Hufeland tells us that an Italian danseuse, Galeria Copiola, made her debut at the age of 90 , and a number of years later , danced before the Emperor Augustus.

Star 21.

It is a curious fact that recovery, even from extreme fatigue, or absolute exhaustion, may, under some circumstances, take place in a surprisingly short space of time, for example, a muscle which has been made to contract until ~~it~~ the will can no longer stimulate it to action, after five minutes massage or application of galvanic electricity is found to have recovered its normal activity; indeed a muscle thus treated may be able to manifest a considerably higher degree of energy, after being recovered from complete exhaustion ~~of~~ by massage, than before. In prolonged effort there must be a continual succession of exhaustion followed by quick recovery. In experiments upon this point made by the writer a number of years ago it was found that

(Here describe the results of experiment on the fatigue curve)

The influence of exercise upon the blood is one of the most interesting of the recent facts which have been developed in relation to muscular work. Winternitz, of Vienna, has shown that one of the effects of exercise is to increase the number of blood corpuscles in ~~the~~ circulation in the blood vessels. This increase is very marked, and takes place within a very short time. The increase may amount to as much as 15 or 20 per cent. It is not to be supposed that these corpuscles are manufactured in so short a space of time at the rate with which the increased activity of the circulation brings out these corpuscles from the congested vessels of the internal organs in which they are stagnating and serving no useful purpose. Thus brought into circulation they become active in conveying oxygen from the lungs to the tissues, and carrying back to the lungs the carbolic acid gas which they have absorbed. Since the vital activity of the body and its resistance against disease are largely determined by the number and activity of the blood corpuscles, it is evident that exercise, through its influence upon the blood, is one of the most important of all the means whereby the vigor and the resisting power of the body may be increased. Hippocrates valued exercise, both as a means of health and a curative measure. Two of his favorite aphorisms were, "He who eats without taking exercise cannot be well;" "Perfect health results from a just and constant equilibrium between alimentation and exercise." Aristotle counselled his disciples to diminish the quantity of food which they ate "and increase exercise" holding that "The cause of disease is either an excess of excretions resulting from excessive nourishment, or from want of exercise." Plato recommended the symmetrical development of the body from the earliest infancy as the best means of obtaining physical beauty.

GENERAL HYGIENE OF EXERCISE.

First of all, exercise must be regular and systematic; it should be taken daily. The popular fashion of taking a few weeks vacation annually, spending thus from three to six weeks of active exercise in hunting, boating or physical recreation of some sort, while certainly better than no exercise at all, often leads to injury in taking unaccustomed exercise, and at the best leaves the body the greater part of the year without proper attention to its physical wants. When at college the writer was acquainted with a young man, who, regularly every Sunday, went out upon the back porch of his boarding house and made one great leap. This weekly jump was all the exercise he took. He adopted this plan as a means of economizing time and declared that this one great jump exhausted him more than walking 9 to 10 miles and hence, he argued, must be fully as efficient as a means of exercise. Such exercise is, however, far from beneficial ; we might as well undertake to eat a week's rations at a meal as to do a week's exercise in five minutes or even a greater length of time .

In exercise the muscles of the body should be brought into symmetrical and harmonious action. The great majority of men and women use comparatively few muscles; —those that are customarily employed in walking, standing, sitting or engaging in their ordinary pursuits. Correct walking is an excellent exercise , so long as the muscles of the trunk maintain an energized position; such walking is, in fact, a better means of exercise than haphazard or desultory gymnastic exercises. Moderate exercise is far better than violent exercise either daily or less frequently employed. The effect of severe exercise is to produce hard but not flexible or elastic muscles. What is needed is strong, flexible muscles ; these may be acquired by systematic exercise under proper supervision.

In exercise the muscles must be brought into proper action. As a rule, bring as many muscles as possible into play in the execution of a movement. By this means strain upon a few muscles will be avoided.

Another point of cardinal importance, is, that a correct position of the body should be assumed before the exercise is taken. This point is fully dwelt upon elsewhere. In bending forward the point of flexion should be, not at the waist but at the hips, which constitute the true joints of the body. When the waist is compressed the stomach, chest, liver, bowels and other large internal organs are brought under pressure, and ~~of~~ cerebral congestion may be the result. In travelling in Holland, Germany, and other European countries the writer has often noticed that women at work in the field invariably bend at the hips while working industriously with their hands on the ground and taking care not to bend the knees. Upon asking a Danish woman why she was so careful to maintain this position in bending forward while at work, she stated that her father taught her to work in this way, first, because it was healthier to do so, and second that the appearance was better than crouching upon the ground.

Before exercise is taken, the body should be placed in a proper attitude, otherwise more harm than good may be done. Both sides should be equally developed, but the exercise should be conducted in such a manner as to give each side an opportunity to operate independently of the other, so that the muscles may be, to a certain extent at least, emancipated from the slavery of associated movement. The movements of the fingers, winking and facial movement may be associated with disease. A person who is not accustomed to exercise should begin carefully, avoiding rash experiments. It is especially important to employ moderate exercise at the beginning so as to give the heart and lungs opportunity for development. When possible to do so, a chart showing the strength of each group of muscles ~~which~~ should be obtained, and exercise should be based upon the accurate data thus provided.

It is especially important also, to avoid too great fatigue at the beginning of exercise, particularly consecutive or secondary fatigue, or what has been termed exercise fever. Soreness of the muscles after exercise may be overlooked, but a rise of temperature after exercise, even if very slight in degree demands immediate attention. Soreness of the muscles should not lead to discontinuance of exercise; it is the first stage of a process by which a weak muscle is made stronger.

Restlessness or sighing, indicate excessive fatigue of the respiratory organs. Irregular heart-action indicates excessive heart-work. Internal pains occurring during exercise are significant and should receive immediate attention; they may be due to a rupture of some internal support. Such rupture may cause prolapse of the bowels or stomach or other viscera. Sprains or ruptures of the ligaments, muscles, or tendons may result from excessively violent exercise.

Hernia, hemorrhoids, varicose veins, injury of the valves of the heart, hypertrophy of the heart, pulmonary apoplexy and cerebral apoplexy may result from violent exercise.

Plenty of sleep is necessary for those who engage in active muscular exercise. The number of hours of sleep should not be less than eight. Exercise taken without sleep is extremely exhausting.

The most suitable time for exercise depends upon the individual and his condition. Exercise before breakfast produces the greatest amount of waste; the blood and tissue juices being more alkaline, oxidation is encouraged.

Persons who wish to get thin by exercise will then do well to arrange the hour for exercise before breakfast. Strength is greatest at 10 A.M. and 6 P.M., being apparently affected by the

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barometer, which is highest at these hours. The body is weakest at 4 P.M. Strength is affected by the condition of the atmosphere. Cold increases muscular strength, heat diminishes it. Dryness increases strength, while humidity lessens it. Heat and humidity together greatly diminish the physical vigor in both lower animals and human beings. The clothing must be loose. The underclothing should be wool the year round. The accompanying cut shows an excellent gymnasium dress for women. It is impossible for a woman to take exercise in a gymnasium while wearing the conventional dress without running the risk of doing herself ~~of~~ great injury. There must be perfect freedom of movement, both for the trunk of the body as well as for the arms and legs. Avoid rubber boots and shoes as far as possible; if necessary to wear them, remove them as soon as possible. Impervious covering for the feet cause retention of moisture and a liability to take cold. A Mackintosh thrown over the clothing, after a few hours causes an accumulation within the clothing of large quantities of effete matters generated by the skin together with a considerable quantity of water.

Exercise which produces prolonged breathlessness or sighing should be carefully avoided, also exercise which excites the heart to such a degree that the pulse does not quickly return to the normal number of beats per minute after the exercise. Prolonged difficulty in breathing, palpatation, or a rapid beating of the heart, is an

("Gymnastics Course.")



indication that the exercise has been too violent or prolonged. If these symptoms increase each time the exercise is undertaken, instead of diminishing, it is an indication that the exercises taken must be forbidden altogether. The condition of the patient being evidently such as to render such exercise dangerous and damaging.

EATING FOR STRENGTH.

As a person's muscles are made of what he eats, it is evident that the character of the food eaten must have a very important relation to his capacity for muscular work. This fact has long been recognized. The gladiators who fought in the amphitheaters of ancient Greece and Rome were, in the palmiest days of those nations, fed upon barley. Later, when national degeneracy had begun, they were fed upon raw meat to develop brutal ferocity.

The amount of food must be regulated according to the amount of exercise. Nature assists in this regulation in some degree through modifying the appetite. Nature, as well as inspiration declares that he who will not work shall not eat. The man who will use his muscles most energetically, has, as a rule, the best appetite and the greatest ability to digest.

Unusual exercise demands an increase of food; a lessened amount of exercise demands equally that the amount of food taken should be diminished. It is not necessary that the proportion of nitrogenous material in the food should be increased for a person who is undertaking unusually muscular work, but it is all important that there should be no deficiency in the nitrogenous element. One part of nitrogenous material to seven or eight of carbonaceous is amply sufficient to supply the wants of the system.

It is interesting to note how different nationalities obtain the required nitrogenous element. Instinct has apparently led to selections which, under the circumstances, are doubtless the best that could be made. The Irishman for example adds beans and milk to his potatoes, thus making a physiological combination. The Italian adds to his carbonaceous elements, chestnuts, peas, beans and maccaroni, while the Arab adds milk and lentils as a supplement to the fruit of the date-palm which comprises the major part of his diet. The East India man, the Japanese, and the Chinaman add beans, lentils and millet to rice, one of the most universal staples of diet among those populous nations. The peasantry in Japan who are much more vigorous than the residents of the cities in that country, live almost wholly upon millet. The Prussian peasant completes his physiological bill of fare by adding milk and dried peas to his baked or boiled potatoes. Milk, rye bread and mushroom soup enable the Russian to subsist very comfortably upon cabbage and buckwheat. No class of laborers excel the Smyrna porters in strength, and ~~xxx~~ these vigorous fellows will sometimes carry off half a ton of freight upon their shoulders and yet they subsist almost wholly upon figs and barley meal. The Canary Islanders thrives upon gofio (parched corn and water). The porters of Constantinople and Rio Janeiro, are all famous for their great strength, and likewise choose the products of the soil as the source of their sustenance.

Contrary to the generally received opinion, flesh food is not required for muscle workers. As matter of fact the ability to digest carbonaceous elements is much more important for muscle workers than the ability to digest other classes of food elements, for the reason that the muscle derives its energy chiefly from carbonaceous elements. We have a practical illustration, also, of this principle, in the fact that the ox, the elephant, and the gorilla, three of the strongest animals known, subsist wholly upon a non-flesh diet. The famous soldiers of ancient Greece subsisted upon rye meal, fruits, and milk, while the Roman soldier carried his heavy armor and a ration of one pound of barley and three ounces of oil daily. Barley cakes and olive oil was the diet of the old Roman gladiators. Coarse vegetables are not suitable for the support of muscular activity, and it would be as absurd for a laboring man to undertake to subsist upon cabbage and potatoes as to undertake to sustain a hardworking cart horse upon straw and chaff.

A meat diet is used, to some extent, by modern trainers, but we are convinced that the practice is eroneous. One of the champion wrestlers of the United States informed the writer that he had found ~~that~~ a strict diet of cereal preparations, especially the health food manufactured by the Sanitarium Health Food Co., Battle Creek, Mich., more servicable in training for a wrestling match than any other diet he had ever been able to employ.

Flesh food contains the same sort of poisonous substances which are found in the tissues themselves and which, when they accumulate to an undue extent, give rise to symptoms of exhaustion. This , together with any surplus flesh food which is not required for the building up of the body, is treated by the system like so much waste matter to be converted into uric acid or urea for elimination through the kidneys. The meat diet which some trainers adopt is only made possible by the excessive perspiration which results from the hard work involved in the course of training. It has often been known by trainers that the health breaks down if the training is too long continued ; the cause is evidently the excessive work thrown upon the kidneys and other excretory organs by the use of animal food which increases enormously the work of the kidneys, and second, because of the large quantity of

? ...

That flesh food is easily capable of sustaining life is evident by the fact that the ox, the horse, the bison, the elk and the elephant are able to derive from so gross a vegetable substance as grass and herbage an enormous amount of muscular It is only necessary to remember that all food comes originally from the vegetable kingdom, and that the best vegetables contain quite as much of the nitrogenous element as meat or other flesh foods, for example, a pound of beans contains more beefsteak, or rather a larger amount of nitrogenous material in the shape of vegetable caseine, more than equivalent to the entire nutritive value of an equal quantity of beefsteak. The high nutritive value of the better classes of cereal and vegetable food will be readily seen by the following table:

The fact that athletes often get out of training easily, and that they sometimes fall sick while under training under conditions which have been attributed to overtraining, but which seems to the writer to be due rather to their errors in diet, is a fact worthy of consideration. A Smyrna porter living on figs could carry off Sullivan on his shoulder, and he is always in training. A horse, subsisting on his vegetable diet regularly, never gets out of training. A hunting dog, to be kept in training, must, as every hunter knows, be fed upon oatmeal, corn mush, bread or bread and milk, we have learned that the best hunting dogs are never fed meat as they do not have so good a wind.

The use of tobacco by many young men stands directly in the way of physical development. Lombard and others have shown that tobacco immediately and greatly diminishes muscular vigor. Louis St.Cyr, the Canadian giant, who was able to lift nearly two tons, found that his strength was greatly increased after two years' abstinence from tobacco and liquors. Both Dr.Seaver of Yale and Dr.Hitchcock of Amherst have both called attention to the damanaging effect of tobacco upon physical development. This fact has also been well recognized in France where there exists a law against the use of this poison.

An excellent illustration of the staying qualities of a vegetable diet was afforded a few years ago by the European walking match in which two vegetarians participated, winning first and second prices. The course was from Berlin to Vienna. Both young men subsisted wholly upon vegetable food during the journey; one ate nothing but fruits and nuts. The London Spectator, referring to this interesting fact, remarked as follows:

"You look pale this morning."

"Yes," replied the young man, "I feel very much out of condition. You see, there's a girl living in our house who practices her vocal lesson continually, and I guess I've gotten high C sick." — *Washington Star.*

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VEGETARIANISM FOR PEDESTRIANS. — We quote the following from an editorial in the London *Spectator*, referring to the European walking-match, which took place sometime since, in which vegetarians won the first and second prizes : —

"If there is one thing certain about the races which eat no meat, it is that they can march. Sikhs and Hindostanees who live on millet and milk and whose ancestors have done so for two thousand years, can walk rapidly as long as life remains in them. A Sepoy regiment will walk a European regiment to death on food their competitors would pronounce wholly insufficient to sustain vigorous life. A Hindostanee carrier, with a weight of eighty pounds on his shoulders, — carried, of course, in two divisions, hung on his neck by a yoke, — will, if properly paid, lope along over a hundred miles in twenty-four hours, a feat which would exhaust any but the best-trained English runners.

"Nor is this confined to any particular race. Highlanders, fed on milk and porridge, are the most active gamekeepers in the world ; and half a century ago the best rough masons in Scotland and the best ploughmen in England, were men reared on a diet in which meat played no part. These facts prove that men can live and grow strong when fed only on vegetarian food."

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THE man who is perfectly proportioned weighs exactly thirty and three quarters pounds for every foot of his height.

Star 26.

A fact which ought to be more generally known than it is, is, that gigantic strength is not consistent with long life or the best health. Strong men often destroy themselves by their violent exercises. The condition most essential for a long life is high, vital resistance and symmetrical development. Excessive strength in one part is likely to endanger the integrity of some-other part which is less strong. Thousands of people destroy their kidneys and lose their lives by reason of their extraordinary digestion. Finding themselves "able to digest everything," as they say, they eat everything and suffer the consequences. Lifting-machines had their day twenty years ago, and doubtless did some good, though probably a considerable number of persons were damaged by them. The practice of heavy lifting is attended with considerable danger, not only from the sudden failure of some weak part, but from the great exhaustion resulting from these Herculean feats. Charles Bennett, of San Francisco, lifted 967 lbs. of pig-iron with his hands, lifted 14 tons of iron in a minute's time, put up a 158 lb. dumb-bell, swung a pair of 10 lb. Indian clubs 4309 times in less than an hour, turned 206 back somersaults in 54 minutes 10 seconds, and performed a great number of other similar feats, but died of consumption in 1889 at the age of 35 years. Richard Pennell, who was the champion strong man of America a generation ago, and able to put up a dumb bell weighing over 200 lbs., was a broken down invalid the last years of his life as the result of his over-exertion. The strong men of the present day, and recently before the public, may do better; they have, at any rate a pretty good chest-development. The following chest-measurements may be interesting,--St. Cyr, 53 inches; Sandow, 45 1/2 inches; Samson, 44 inches; Miller, 47-1/2 inches.

(Note under Head of General Effects of Exercise.)

John Wesley, a man of many accomplishments besides those which render him famous as a teacher, declared that he owed his good health to the fact that when he went up to the London School, his father charged him that he should run three times around Charter House Square every morning before breakfast. A friend measured for me the distance around Charter House Square and found it to be 445 yards or a little more than one quarter of a mile. If every school boy would take a vigorous run of three quarters of a mile every morning before breakfast there would ~~not~~ be a good deal less complaint of headache and stupidity in school, and fewer instances of failure to make life a success after school days are ended by reason of ~~the~~ neglect to cultivate the muscles as well as the brain.

(Note under head of "Eating for Strength.")

The South American bark-gatherers who collect the bark of the cinchona-tree, from which quinine is made, live almost wholly upon bananas and other equally simple vegetable food, and yet are by no means the weak and feeble creatures which the majority of persons who imagine flesh to be a necessary element of human diet, would expect them to be. The daily task assigned these hardy mountaineers is to gather and bring to camp two hundred pounds of green bark, which they carry upon their backs, threading their way through dense and trackless forests, clambering over hugh rocks, climbing steep mountain-sides, crossing deep ravines and dense jungles and often being obliged to travel many miles in the accomplishment of their arduous task. How many English or American meat-eaters would undertake to carry upon their shoulders all day or for a part of a day half as heavy a load as the South American bark-gatherer.

(Note to "Remarks on Over-exertion.)"

Short distance running is an exceedingly dangerous form of exercise, as it produces excessive development of the heart and serious systemic disturbances in consequence. Professional short distance runners are usually short lived; the famous runners of Tunis are also short lived.

THE DECADENCE OF WOMEN.

The most familiar toast at an annual medical society dinner is, "Woman, God's best gift to man and the chief support of the doctors." The toast expresses a truth in relation to the women of civilized lands,-- at least so far as the doctors are concerned--but there seems to be no good reason why women should have so large a monopoly of the invalidism of the country. The idea that woman is the weaker vessel seems to be so thoroughly fixed in the public mind that it is to be feared that a large number of women have become more or less reconciled to the idea of being looked upon as semi-invalids, and not to be expected to possess any considerable degree of physical endurance. The facts , however, seem to indicate that women are naturally more vigorous than men, or at least are possessed of more vitality. This fact appears ~~xx~~ early in life , although an equal number of girl and boy babies are born into the world there is a considerably larger number of girls alive at the end of five years than boys. At the end of 14 years girls are, on the average, larger than boys, and one inch taller. From this time on the superiority disappears. Although the superior vitality of woman disappears before she is twenty years of age, it reappears again later, for the "oldest inhabitant" is always a woman. Another evidence of woman's superior vigor and vitality is shown in the fact that girls learn to walk , to read and to talk sooner than boys. Girls seem to be better adapted than boys "to live in the world into which they are born." The anatomists that woman has a larger brain, a larger liver, stomach, kidney and spleen and a longer intestinal canal and larger vital organs generally than a man of the same size. This is perhaps the reason of their superior endurance. Woman's brain weight in comparison with man's is as 90 to 100 ; her bodily weight as compared with that of man is as 83 to 100, hence woman's brain is larger in proportion to her body weight than is man's; but , as woman has naturally somewhat more fat in her composition than man, the really active tissues of her body are to man's, only as 70 to 100. Taking this fact into consideration, the brain-proportion for woman is still larger than man's, being nearly one third greater.

Among savage nations women do the greater share of hard work. The Tasmanian women, who are capable of capturing fishes by diving like an otter, and to climb the smooth trunk of the gum tree after opossum hiding in the tops. The men of the Indian tribes of Guiana are declared to be little if any taller than the women. H.H.Johnstone states that among the Andombies of the Congo, the women are even stronger than the men and more strongly developed, that the Manyema women carry loads as heavy as the men and do it quite as well. A North American Indian chief remarked to the traveller Herne, that in his opinion "women are made for labor," adding "one of them can carry or haul as much as two men can do."

According to Schellong the women of New Guinea, the natives of which ~~whom~~ he carefully studied, are more strongly developed than men. The women of the Pueblos of North America, the Patagonians of South America, and some of the races in India and in Africa are as large as the men of the same tribes.

Among several African tribes the men do the family sewing and other domestic work, making garments for their wives as well as for themselves. Macdonald tells us that this custom is so well recognized that the only evidence that a wife needs against her husband in order to procure a divorce is an neglected rent in her petticoat.

We have taken some little pains to investigate the causes of the feebleness of the women of civilized nations.

(Here add an article from Good Health relating to "ENGLISH WOMEN" supposed to have been written four or five years ago.)

We have made a large number of measurements "(See also Influence of Dress").

While at the World's Fair I made a number of visits to the Midway Plaisance for the purpose of studying the physique of the natives of different countries who were gathered there. I made a number of measurements of men and women of different nationalities, some of which are of interest in this connection. I found the average height of the Samoan women to be 64-3/4 inches; the average waist measurement 30.75 , giving an average waist proportion of 47.5 per cent, almost exactly that of the Venus de Milo. The average from ~~the~~ three Egyptian dancing girls was found to be 61-1/2 inches; the average waist measurement 30 inches, giving an average waist proportion of 48.3, a trifle more than that of the Venus de Milo. A Nubian woman had a waist proportion of 44 inches. A well proportioned South Sea Island man had a height of 71 inches and a waist measurement of 33 inches , giving a waist proportion of 46.5, a little less than the average for the South Sea Island woman.

The following facts in relation to the causes which have brought about the great physical weakness of American women and the prevailing lack of beauty and symmetry of physique may be of interest in this connection.

(Here insert Figs. in reference to measurements made of nurses quoted from "Influence of Dress.")

The accompanying cut, copied from a Ladies' Tailors' advertisement in a popular magazine helps to explain the cause of this physical degeneration. Waist constriction certainly must be charged with a great share of the notorious weaknesses of women. The head nurse in a Chicago hospital said to one of the nurses in the hospital of which I have charge, a few years ago, when she found that corsets are not tolerated in our hospital and are worn by none of the nurses, with a look of great anxiety "How do you manage to keep your stomachs down?" She evidently had the impression that the stomach was likely to rise and rise indefinitely unless held down by bands of bone or steel. The ancient Gauls seemed to have the same notion for they went so far as to wear metal rings about their hips for the purpose of preventing obesity.

The cure for this growing weakness of our women is to be found in the adoption of a healthy dress and the cultivation of the muscles. It is not to be expected, perhaps, that women will become equally strong with men, but there seems no good reason why a woman should not equal a man of the same size in strength. I have tabulated strength tests including tests for every important group of muscles in the body, of nearly two thousand women, and find that the total strength of the average woman of .... height, compared with that of the average man of the same height, is ..., from which it appears that the average woman is a little more than half as strong as the average man of the same height.

Women are, however, stronger in their legs in proportion to their general strength than are men. Women have different aptitudes than men but, in their own sphere, they ought to be as healthy, as vigorous and as enduring as men, --or even more so.

Women often excel in gymnastics, particularly in such feats as require perfect coördination, as in balancing. It must not be expected, however, that a young woman who has neglected exercise until she is 25 years of age can be made as strong and vigorous as she might have been if her training had begun in childhood. By the time a young woman has attained the age named, she will, in all probability, have acquired more or less serious deformities which are likely to be aggravated by exercise unless first corrected.

EXERCISE FOR WOMEN.

Women are not so well suited as men for leaping and running exercises, but, as before remarked, are better adapted for balancing or coordinate exercise. Swedish Gymnastics have been found to be especially helpful for women, as they are especially useful in the development of the muscles of the trunk which are disproportionately weak in the majority of American women. Rowing, bicycle riding, and horseback riding, if properly managed, are excellent exercises, but the gymnasium with a trainer, is essential for the correction of numerous deficiencies and weaknesses which the aver-

# Hom

## NOTES ON PRACT

BY J. H. KEI

It is a fatal idea that all knowledge, or even the best knowledge, is to be found in books. With the exception of the Bible, the knowledge obtained in books is chiefly of value only as it calls attention to, and opens the way for, the objective study of things not in books. Even the knowledge of infinite value contained in the Bible is also in the great book of nature, for the apostle Paul says, "The invisible things of Him from the creation of the world are clearly seen, being understood by the things that are made."

The idea that school is the only place where the child can learn, results in two great evils: First, parents in their anxiety that the child shall secure an ample education, send the little one off to school long before it is old enough to graduate from the nursery; second, the education of the child is utterly neglected from the time it leaves the cradle until it is considered old enough to enter the schoolroom.

Education of some sort begins with the earliest dawn of intelligence; from the time the child begins to think, on through its entire life, every moment of conscious activity an educational process is taking place. The little one, sitting unnoticed in a corner while the mother bustles about at her work, gazing with wide-eyed wonder at the domestic tableaux spread out before it, starting with alarm when the older children come rushing in with a shout, is being educated by its surroundings. Robert Burns seems to have recognized this fact, for he says in one of his poems, "There's a child amang ye, takin' notes." The statement is liter-

Physical Differences between Boys and Girls. — In the Ninth Annual Report of the American Association for the Advancement of Physical Education, Dr. E. M. Hartwell has an interesting paper on "Physical Education as an Educational Discipline," in which he calls attention to some very interesting facts, a few of which we summarize. The physiological fact determined by Bowditch and others, that girls are larger than boys at twelve or thirteen in consequence of a more rapid growth after ten or eleven years, is made the basis of the suggestion that the attainments in physical training made by boys and girls between the ages of ten and fifteen years should not be identical. This quite agrees with the views expressed by others upon this point. But Dr. Hartwell reverses the proposition as it usually stands, asserting "that we must protect the boys if we are to save them alive from the undue burdens laid upon them, *i. e.*, from the undue burdens laid upon them which are better fitted to the shoulders of the girl of that age than to those of the boy."

The doctor also calls attention to the interesting fact that female children seem to possess a higher degree of vitality than males, the evidence for which is the following: More male children are born dead than females. More male than female infants die before they are twenty-four hours old. The same is true with reference to male children at the ages of three days, a week, ten days, — indeed, all ages up to five years. The additional fact might have been added, that "the oldest inhabitant" is always a woman, that is, the last person alive in a million is always a woman.

Among the interesting facts bearing upon the educational questions are the following: While three fourths of one per cent of Boston children stammer, there are found to be three times as many boys who stammer as girls. It is also asserted that girls learn easier and earlier than boys; that they learn to talk more readily and at an earlier age than boys, from all of which Dr. Hartwell concludes that girls are better adapted than are boys, to live in the world into which they are born. Dr. Hartwell advances the idea that the stammering is the result of incorrect language instruction, children being pushed forward too rapidly before they are able to reproduce sounds accurately and easily.

age young woman has developed before she has reached the age of 20 years.

The greatest care must be exercised in beginning a course of exercise for such a young woman. Young women are especially unfitted for heavy gymnastics, and unless trained in gymnastic work from early girlhood should not undertake such work unless assured by a careful medical examination that she can do so without injury.

The nature of the weaknesses which are developed as the result of incorrect dress and inattention to proper exercise are such as to render especially dangerous and detrimental such exercises as induce straining and subject the body to severe jogs, as in jumping.

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Battle Creek, Mich.,

Exercise.

Wall position:-

1. Arm raising, head bending, bean standing.

2. Arm raising, trunk forward bending, foot forward placing.

3. Trunk downward bending.

4. Arm circumduction, breathing, chest lifting.

5. Head bending, breathing

6. Chair lifting.

7. Knee bending, jumping.

~~8.~~

~~Exercises Sitting in Chair~~

Chair Exercise:-

Sitting position.

1. ~~Head bendings~~

~~2~~. Arm raisings

#1. Arm circumduction, chest lifting.

#2. One arm raising, one arm holding seat.

3. Arm raising, and breathing.

4. Arm swinging, right, left, both.
with alternate head turning.
#. Head movements.

Leg movements.

1. Half sitting, one arm support, one leg extended forward and backward.

Trunk bendings

1. Arm swinging, right left, both, with trunk bending.

2. Arm swaying, sidewise.

3. Trunk backward leaning.

## ~~RECLINING~~ TABLE Exercises

SERIES OF EXERCISES ARRANGED FOR BATTLE CREEK PATIENTS.
(See Instructions on last page.)

~~Place the table with the end on which the feet are resting some 22 to 24 inches from floor.~~ Catch feet under strap and lie ~~without~~ resting ~~tension for 2 or 3 minutes~~, resting. while taking ten breaths

### Exercise I.

and reach down far as possible

First straighten ~~down~~ the arms by the side, palms against thighs, Begin to raise the well-stretched arms upward over the head, saying to yourself, "stretch, stretch, stretch", etc., until the whole arm reaches the board and rests firmly, still stretching, beside the head, hands touching the floor over head, elbows not bent.

Return, still stretching. When about 10 or 12 inches from table relax the arms and drop them by the side. Rest a few moments and repeat twice more.

with foot extended.

### Exercise II.

Take hold of thehandles and take feet out of strap. Stretching left leg, raise it from table until ~~about~~ at a right angle with body. ~~Keep up the~~ stretching and lower. When nearly down relax the leg.

Same exercise with right leg. Repeat each leg from 3 to 5 times.

Continue

### Exercise III.

Place both hands upon abdomen trying to cover whole surface.

1st. Take in a slow, full breath allowing the abdomen to rise with the breath while chest remains passive.

2nd. Hold the breath while forcibly drawing back the abdomen and elevating the chest to greatest degree.

3rd. Remove hands and slowly exhale.

Repeat from 3 to 6 times or more, increasing as one grows stronger and chest becomes more flexible.

### Exercise IV.

Take hold of handles. Bend left knee close up to chest. Begin to stretch leg forward, then draw knee back close to abdomen or chest again. Continue this movement from 6 to 8 times. Then same number of times with right leg. Repeat the whole exercise from 4 to 8 times.

### Exercise V.

Place hands over chest, fingers interlocked. Take in full, deep breath by forcing arms out straight above head or toward ceiling while reversing the palms, fingers still interlocked. Breath out and return hands to chest.

Repeat from 6 to 10 times very slowly and steadily.

Exercise VI.

Take hold of handles. Bend both knees to chest. Now move them from right to left, tilting the body over far enough to raise each hip from table. Repeat for 16 counts. Rest 2 or 3 minutes and repeat again for 16 counts.

Exercise VII.

Take hold of handles. Raise head and shoulders, looking at the toes, very slowly. Rest and repeat. Continue resting and repeating 4 to 8 times. When strong enough try raising both head and feet very slowly. Repeat from 4 to 6 times.

Exercise VIII.

Raise left leg short distance on count 1; carry it across right leg, raising hip on count 2; bring it back on count 3; lower it on count 4. Exercise right leg in same manner.

Repeat the movement from 4 to 8 times with each leg. Not too fast.

Exercise IX.

Hands and arms stretched down by side, backs turned upward. Now turn palms over and take in a full breath. Reverse hands and exhale. Repeat 6 to 8 times.

Exercise X.

Hold on to handles. Bend both knees close to abdomen. Circumduct the knees; that is, move them in a circle to the left, to front, to the right and back to starting place. Continue circling for about 6 times. Rest the feet upon the table and gradually begin to slide them down until nearly down, when they must be relaxed and allowed to drop to table.

Rest a minute or two and then bend them up and repeat the exercise. Slide feet down and relax.

Exercise XI.

Raise left arm straight up over head, touching floor overhead. Take in a breath while raising arm. Hold the breath and percuss under the arm and down the side and back again. Return arm to place and breathe out. Same exercise with the other arm. Repeat each arm 3 to 5 times.

Exercise XII.

1. Hold on to handles. Bend both knees close to abdomen. Pedal the legs outward toward the front, first the left and then while bringing it back, take out next the right. Continue this "bicycle" exercise for about a minute. Rest the feet on table, knees still bent, still holding on to handles.

2. Breathing exercise. Slowly raise the hips from the table until the choulders and neck only rest upon table supported by the feet. While raising, take in full, deep breath. Slowly lowerthe body and bréathe out. Repeat 3 times.

3. Now repeat the"bicycle" exercise as in 1.

4. Repeat the breathing exercise as in 2.

5. Repeat the "bicycle" exercise as in 1.

Exercise XIII.

Hold on to handles. Raise both legs straight up over the head until the hips are well off of the table, then slowly lower them. Repeat 3 to 5 times.

Exercise XIV.

Hold on to the handles. Raise the left leg straight up to an angle of 45° or less. Slowly lower it and when it is half way down start to raise the right leg, moving both legs at same time,- left down, r ght up. Change the position as at first, bringing left up and right down. Do this once again and then rest both legs on table and completely relax. Repeat the exercise 2 or 3 times more.

NOTE--Do not use this exercise unless quite strong. After using all of the preceding for 5 or 6 weeks one may <u>try</u> this exercise. It must be dome slowly with good muscular control and in even, smooth rhythmical time.

Exercise XV.

Side exercises. 1. Lie upon left side. Raise both the right arm and leg and then lower both in somewhat quicker time than all of the preceding. Continue for 16 counts.

Exercise XVI.

2. Bend the left knee close up to abdomen on count 1. Stretch the leg out and a little up on count 2. Lower the leg and rest on count 3. Repeat this exercise from 6 to 8 times.

Turn over on right side and go through same movements with left leg and arm (Exercise XV) and then with leg alone (Exercise XVI).

Exercise XVII.

Knee-chest exercise. Resting on knees which are bent with thighs at right angles with the surface of the table, lower the head to table trying to "chest" the table, arms bent, head resting on arms. Remain in this position from 1 to 3 minutes. Rest and repeat.

Exercise XVIII.

Raise the hips while resting entirely upon hands, (arms straightened out) and upon the toes. The hips should be forced upssome distance. Remain in this position from ½ to 1 minute. Rest and repeat.

Exercise XIX.

Stand upon the floor very erect, chest well up, head in erect position, hips held back. Slowly raise both arms forward while taking in deep breath. Continue raising arms up over head still breathing. Now hold the breath while counting 10. Lower the arms toward the side, breathing out. Continue lowering the arms while breathing very slowly outward. Repeat from 3 to 6 times.

Instructions.

1. These exercises should be done when nothing tight whatever is worn, no bands, belts, nor garters.

2. One should not feel hurried and the mind should be concentrated upon each movement.

3. The relaxing and resting throughout are very essential to the success of the exercises.

4. They may be done lying upon a firm <u>level</u> surface such as the floor offers (comfort placed first on floor but nothing too soft). They <u>should not</u> be done on a spring mattress or soft bed that "gives" to every movement.

5. They will consume from 25 to 35 minutes and if taken twice a day, the forenoon (10:30 to 11:30) and just before retiring are the best times. If once a day, let it be the forenoon in preference to evening. Always rest, lying or sitting, some 10 to 15 minutes afterwards.

# T A B L E  E X E R C I S E S .

Table may be used in three positions:

First position--level,

Second position--head low,

Third position--head high.

The head in low position may be full position

or half position.

<u>Breathing Exercises</u>

With level table.

In each of the following exercises the chest should be expanded as fully as possible, then the chest should be held high while breathing out, the purpose being to force the air out by contracting the abdominal muscles. The air should be inhaled and exhaled slowly at the rate of about ten breaths a minute. Each exercise should be repeated eight times.

1. Hold the chest high. Grasp the sides of the table tightly and breathe deep. The upper part of the chest should remain stationery during the exercise. Repeat.

2. Hold chest high. Take a deep breath. Pull on strap during exhalation. Repeat.

3. Place hands under the hips. Take a deep breath, lift against hips with the hands while breathing out. Repeat.

4. With the hands placed at the back of the neck and the arms resting upon the table, breath deeply, pressing against the neck with the fingers while breathing out.

Repeat the same exercises in the head low and head half low.

# T A B L E  E X E R C I S E S.

(Continued)

Replacement Exercises.

Table position:-Head low. Feet engaged in loops at the foot of the table to prevent body sliding down. Hold the chest high continually during the exercise.

1. Breathe deeply while percussing and beating the abdomen vigorously.
2. Deep breathing, hands grasping sides of the table, pull with hands while breathing out.
3. Deep breathing, hands clasped over lower abdomen, pressing firmly during both inspiration and expiration.
4. Deep breathing with hands clasped, make pressure with the little finger side of the hands, starting just above the pubes and working slowly upward an inch or two at each breath. The pressure should be continuous during expiration and inspiration. Repeat six or eight times.

# T A B L E   E X E R C I S E S

(Continued)

Leg Exercises

Position:-Head low. Patient lying on back, legs fully extended, arms extended at sides.

Flexing and Extending the Legs.

At first let the feet slide on the table. Later as the muscles become stronger, lift the feet off the table. Extend the legs quickly so when the feet are lifted, the extended legs will be lifted free from the table.

Leg Raising.

1. With one leg flexed, the other leg extended.

2. With both legs extended.

3. Legs raised to perpendicular, abduction and adduction.

4. Legs swaying, first legs flexed, thighs perpendicular, swaying from side to side, second, legs extended vertically, swaying.

These exercises should be taken with head low. Persons who have a tendency to cerebral congestion or are embarrassed by the low position may use a level table, or head half low.

# TABLE EXERCISES.

(Continued)

Head and Trunk Exercises.

1. Head raising:--(a) With strap
   (b) Without strap.

2. Trunk raising:--(a) With strap
   (b) Without strap.

3. Head backward bending.

4. Head and trunk backward bending.

These exercises may be graduated for feeble patients, by beginning with head high, then level table, finally with head low.

## TABLE EXERCISES.

(Continued)

<u>Combined Exercises.</u>

1. Increase the abdominal work by placing the hands in the neck firm position.

2. Combine head-raising with leg movements.

# T A B L E   E X E R C I S E S .

(Continued)

Mincellaneous Movements.

With level table.

Arm Exercises:--Lying on back.

1. Finger flexion and extension;
2. Arms flexion and extension;
3. Arms rotating;
4. Arms raising, (a) Sidewise
   (b) Forward
5. Fingers engaged pulling;
6. Arms sidewise fling; (a) Alternating
   (b) Together
7. Hands twirling;
8. Chest beating/

Position, Lying on face: 2, Prone breathing

1. Prone breathing, hands grasping side of table and pulling downward a, during expiration; b during both Ex & Ins,

2. ~~Body twisting, first one side, then the other;~~

3. Trunk raising, arms extending and flexing;

4. Swimming.

## T A B L E   E X E R C I S E S.

(Continued)

Spine Exercises

Four Series:

1st:--For flat chest, round shoulders, straight back;

2nd:--For lateral curvature, right and left, and double;

3rd:--Lateral curvature with rotation right;

4th:--Lateral curvature with rotation left.

Exercises on side, lying (concave side). Armx on concave side upward stretch. Hand of convex side on hip. Trunk sidewise raising. With feeble patients, graduate the exercises by employing three positions:

1st:--Head of the table raised;

2nd:--Level table;

3rd:--Head low;

4th:--Trunk extended beyond on table.

(Have provision made for attaching strap in the middle of the table so as to provide for exercises with the trunk projecting beyond the end of the table.)

Exercise,-face lying, trunk backward raising.

Head high; 2. Level table. 3. Head low, feet fastened in loops

For rotation of spine

Face lying, head low, body twisting, trunk twisting, always toward concave side.

# TABLE EXERCISES.

(Continued)

Trunk Raising

Table 1: Head high; 2: level; 3: head low positions.

1. Hands assisting
2. Hands at sides
3. Hands on hips
4. Hands at back of neck.

Leg Exercises

1. Flex and extend feet
2. Rotate legs
3. Reaching
4. Flex and extend

Knees flexed

1. Knee separating
2. Hips raising
3. Knees separating, hips raising
4. Hips rolling, knees extending and flexing.

# T A B L E   E X E R C I S E S .

(Continued)

Leg Raising

Head low.

1. One knee flexed, one leg raise
2. Two legs raise, and alternate
3. Head raise, legs raised
4. Hands neck, legs raise.

Legs flexed

1. Flex. Extend
2. Knees separating
3. Hips rolling (feet free from table)
4. Hips rolling, legs flex and extend.

Legs extended upward

1. Abduction
2. One leg circumduction
3. Hips rolling
4. Two legs circumduction.

# T A B L E   E X E R C I S E S .

(Continued)

**Stretchings.**

1. Yawning. Neck stretching
2. Arms side, stretch
3. Back stretch
4. Arms and legs alternate stretch.

# Exercise.

1. Full set of manual Swedish
2. Inclined table exercises
3. Massage
4. Vibration
5. Chair exercises
6. Trunk
7. Mechanical Horse

   Automatic

# Book on Exercise

Summary of Phys.Effects of Exercise and Massage

Posture

Gait

Breathing

Faults of Development

Dispituitrin,etc

cle
Mus~~cular~~ Work

Automatic Exercise

Diet and Work

Static Work

Metabolism and Special Exercises or Drills

Summary of Digestion

(Cause<br>
(Poisons<br>
Fatigue (Constipation<br>
(Nerve tension consuming energy

Diet and Endurance

Muscle Lock

Strength Graphic

Comparative Studies

Special Muscle Groups

Abdominal<br>
Chest<br>
Diaphragm<br>
Expression

## DISEASES

Obesity<br>
Diabetes<br>
Arrested Development<br>
Neurasthenia<br>
Dispituitrinism<br>
Constipation<br>
(Spinal Curvature<br>
Corrective(Weak Trunk<br>
(Weak Legs

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MUSCULAR MOVEMENTS: Memo.

Association of movement--whole body works, when single group contract

A fixed point required for muscle movement.

General muscular action required to preserve body balance.

Arm and leg movements associated as in striking.

Men without any legs cannot strike.

Men without arms run with difficulty.

Experiment: Running with hands in pockets or tied behind.

Extensors act with flexors.

Illustration: Two men wheeling a barrow down hill, one pulling the other holding back.

Training the muscles

1 Walking, writing, balancing movements.

Training of the muscles on one side; trains the muscles of the opposite side.

Use of the muscular sense in training, in co-ordination.

Illustrate with touching fingers overhead; touching different parts of the body with the eyes closed.

Muscle sense destroyed in locomotor ataxia; highly educated in jugglers.

2 Static and dymanic muscular contraction.

Static is contracture, greater expenditure of energy according ~~to~~ to Beclard

3 Contracture or stiffness fault of beginners in muscular movements - young piano players; learning to walk; learning to write.

Muscular movements must be learned.

4 New association of muscles must be learned.

5 Exercises become easier and require less expenditure of energy by practice.

6 Walking a tight rope and railroad irons very laborious at first always causes more effort than ordinary walking.

Well trained muscles like a trained army.

Relation of exercises to breathing.

Strain - illustrate - cracking a nut; pulling on shoes or boots

Interruption of breathing in strain.

The effect on the system - compression of lung, heart and other vessels in the chest.

Influence on the abdominal viscera.

General effects of exercise.

Increase activity.

Illustrated by cerebal excitement, arising from exercise.

Maniacal excitement of Dancing Dervishes;

Indians in war dance

Ancient gauls in battle

Children at play

Protruding of the eyes

Flushing of the cheek

Animated conversation

Adde[illegible] resistive movements

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# MEDICAL GYMNASTICS.

The physiology of exercise:

Source of muscular energy,

Relation of muscles and nerves.

[illegible]muli,

Nerve energy,

Electricity,

Heat,

Cold,

Mechanical,

Chemical,

Products of muscle work,

Fatigue, products

Blood supply of muscles,

Influence of exercise upon blood supply,

Relation of heat production and exercise,

Fatigue,

Local,

General,

— Secondary,

— Influence of exercise upon muscular development, big muscles not needed

Effect of overstraining of muscle,

Overweighting of muscle,

8 — Influence of heat and cold upon muscular excitability,

Muscle reflexes temp

Superficial and deep

— Coordination

Relation of exercise to heart action,

Rate of contraction

Force of contraction,

Blood pressure,

(Med. Gym. 2.)

- Influence of exercise upon blood supply

    Brain,

    Lungs,

    Portal circulation,

    Muscles,

Exercise and respiration

    Volume of tidal air, in lying, sitting, walking, rapid walking, running.

    Respiratory coefficient,

    Oxygen absorbed and $CO_2$ eliminated under above conditions.

Respiratory field,

    Area of lung

9 Area of red blood corpuscles, 30,000 sq. feet

Normal respiratory movements,

    Costal, diaphragmatic, ~~fw~~ full respiration,

Relation of pulmonary circulation to general circulation,

10 Significance of coughing

Strain

Danger of sudden exhalation through compression of the heart.

Influence of heat and cold upon respiratory coefficients.

Influence of inhaling oxygen upon respiratory coefficients.

Influence of altitude upon respiration.

Influence of atmospheric pressure upon respiration.

Rarefied air.

Compressed air.

Influence of exercise upon digestion,

    Increased appetite

14 Improved assimilation.

    Increased secretion of acid gastric juice.

    Improved motility as shown in increased peristalsis.

(Me . Gym. 3.)

Exercise a sovereign remedy for constipation.

Relation of fats, carbohydrates and proteids to exercise.

Diet and secondary fatigue

14 Amount of food.

Exercise and Excretion.

Renal activity

Uric acid

Urea,

Phosphates.

Hepatic activity

Skin activity.

Effect of one-sided training upon aptitude of muscles of opposite side.

Is it bet to be ambidextrous

Confusion from development of both sides of the brain.

Incorrect attitudes

Lying

Sitting

Walking

17 Significance of peculiar gaits

(Med. Gym. 4.)

Other deformities.

- Flat chest
- Spinal curvatures
    - Posterior, 3 classes
        - Lateral
        - Single
        - Double
    - 18 Rotation.
        - Cause of rotation (Illustrate by means of a rod.)
        - Show how to detect rotation.
    - Diagnosis
    - Prognosis
    - Corrective exercises.
        - To correct flat chest
        - Protruding abdomen
        - Lateral curvatures.
        - Rotations.
        - Weak abdominal and trunkal muscles (enteroptosis)
    - Respiratory exercises
    - Exercises for obesity
        - Diabetes
        - Rheumatism
        - 19 Paresis
        - Cardiac insufficiency
        - Flat-foot
        - Sprain
        - Occupation neuroses
        - General deficiency in development
        - Elmira prison experiment

(Med. Gym. 5.)

Diseases of women

Swimming

Outdoor gymnasium

Exercise in connection with baths, before and after.

LECTURE ON BREATHING.

Lung Capacity.

240 cu. in.--2000 sq. ft. lung surface.

Breathing Capacity.--tidal air--residual air

30,000 sq. ft. of blood.

Chest Strength. C

Chest Rhythm .

Types of Respiration.

Costal breathing

Waist constriction, abdominal pain, adhesion of lung, high diaphragm.

Diaphragm.

Sleep--senility--(ossified cartilages)--strain--stooped posture.

Full Breathing.

Pathological breathing.

Cough--explosive expiration
Hiccough--spasmodic inspiration
Shallow costal breathing--high diaphragm
Shallow disphragmatic breathing--low diaphragm--stooped posture.
Asthmatic--dyspnea--apnea--Cheney-Stokes.

Effects of Normal Breathing.

Aeration
Circulation
General
Pulmonary
Abdominal

Digestion
Gastric and duodenal digestion
Absorption
Colon stasis
Liver action Gallstones.

Dress and Breathing--viscera--lung space

## Unconscious Respiration.

During sleeping hours the breathing movements are more superficial than when one is awake and active. They are also slower. The lungs and chest are a great central engine, which influences the activity of every organ, even every cell in the entire body. Lessened breathing during sheep slows down every function. It is necessary th t activity should be lessened in order that sleep and rest may be secured, but the work of the liver, kidneys, and the repairing work of the living cells goes on during sleep, and this requires exygen. Hence the body should be supplied with an abundance of fresh air during sleep by proper ventflation of the sleeping rooms. The lassitute experienced on rising in the morning after sleeping in a close, over heated room, is evidence of the injury resulting from such practise. The temperature can be avoided, and a lower temperature will be found beneficial. .Sleeping in cool air, provided the body is kept warm, is far more refreshing, invigorating, and energizing than in a warm atmosphere. Cold air has a tonic effect upon the tissues which is highly beneficial.

The amount of air taken in during sleep may be increased by development of the vital capacity and the activity of the lungs through suitable exercise, and this to a very remarkable degree. An eminent French physiologist found that the amount of air taken into the lungs during sleep was doubled in students whose general breathing capacity had been increased by exercise. Exercise in a gymnasium, chopping and sawing wood, digging, laundry work, scrubbing, running of errands, --all sorts of active house work and farm work,--are exeelient means of developing the chest. Any exercise which accelerates the breathing, compelling deep, full breathing, is valuable as a means for developing the lung capacity.

Languor, nervousness, and mental cloudiness are driven away by the increased ventilation of the body secured by deep breathing. The pure oxygen taken in, burns up the rubbish which obstructs the brain and the tissues, while the deep breathing movements accelerate the circulation, drawing the impure blood toward the chest for purification, and so cleansing the tissues of the paralyzing poisons which are sure to accumulate in them unless constantly removed by vigorous movement of the blood and energetic breathing. The heightened color of cheeks, the increased luster of eye, and general buoyancy of feeling which follow a brisk on a frosty morning, are evidences of the benefits that are to be derived from taking into the body an increased supply of oxygen through active breathing.

While the lungs are to some extent subject to voluntary control, their action is like that of the heart, automatic. During sleep, as well as during the waking hours, their movements are carried on with rhythmical regularity, except when necessarily interrupted by speech, and without any conscious or voluntary effort.

EXERCISE AND FATIGUE.

What is the cause of fatigue in a muscle? Fatigue is a part of result of the destruction of stored up oxygen.

There is another element-- fatigue--formations of poison.

How is activity restored by rest?

Fatigue involves the nerve centers as well as the muscles.

Fatigue of the internal organs.

Exact physical examinations are essential in the scientific treatment of chronic invalids for the reason that the powerful physiological agents employed in the rational method have a positive and known value and are capable of producing positive and definite results when intelligently employed. Repeated examinations are essential for determining the progress the patients make under treatment, and the necessity for any changes in any case.

Examinations of the stomach fluid, for example, show whether there should be a decrease or increase in the amount of hydrochloric acid produced as the case may require. Other examinations of the stomach indicate whether its position or its size has changed for the better, and to what extent..

Examinations of the urine give important indications respecting the nutritive processes of the body and function of the liver and kidneys

Examinations of the blood are highly important, as they indicate the state of this most important of the bodily healing agencies.

Determinations of the weight indicate clearly whether assimilation or disintegration is in the ascendency.

Determinations of the muscular strength give important information, not only respecting the muscles, but also the general state of the body as regards tone and vital resistance.

The Sanitarium method is thoroughly scientific and cannot be carried on successfully without the information to be obtained through well equipped laboratories and especially trained chemists, bacteriologists, and other experts in laboratory methods, as well as physicians, nurses, and attendants who have made a special exhaustive study of hydriatic and other physiological measures of treatment. With these in hand, and the thorough coöperation of the patients, all curable maladies are curable by persevering effort, and the list of so-called incurable diseases has been largely diminished by the success obtained in the treat[illegible] of maladies which are utterly intractable to ordinary remedies. Even incurable cases are not entirely hopeless,for,in the great majority of cases, the disease can be arrested,or the rate of progress greatly lessened, and distressing symptoms may be wonderfully ameliorated if not wholly controlled.

## R E S P I R A T I O N

Lying:

Guy noted thirteen respirations per minute in adults; in children Gorham noted 24 respirations per minute during sleep.

Prout in 1813 found that the amount of $CO_2$ expired seemed to vary according to the time of day, reaching the maximum between 11 a. m. and 1 p. m., and the minimum at 8 or 9 p. m., after which it remained low until 3 or 4 a. m., when there was marked increase.

Speck and Vierordt confirmed this daily variation and attributed the rise to the maximum influence of food and muscular activity.

Shäfer also calls attention to a sort of periodicity which the long continued custom of the day of work and night of rest stamps upon the organism, thus explaining the persistence of the daily variation, even when the animal is kept at rest without food.

Sitting:

Guy found that adults breathed 19 times a minute in a sitting posture.

Standing:

Adults, 23 a minute (Guy).

Children, two to four years of age, 32 a minute (Gorham).

The average volume breathed in the first month is 1300 c. c. per minute; at 12 months, 3,000 c. c.; from two to 13 years of age, 2,000 to 5,000 c. c. The average volume of air taken in by the adult at an ordinary breath is 500 c. c.

Quetelet found the average rate of respiration under one year to be 44. From one to five years, 26; fifteen to twenty years, 20; twenty to fifty years, 16--18. In the new-born the rate is between 60 and 68.

Under the influence of physical exertion the respiratory rate increases before the rate of heart-beat increases. This increase is due to certain metabolic products resulting from the activity of the muscles.

Physical exercise increases the oxygen consumption and the elimination of $CO_2$. In walking the oxygen consumption and $CO_2$ elimination may be three times as great as when lying quietly.

Each 300 kilogram meters of work add one gram ~~of~~ to the $CO_2$ eliminated.

The increase in the gaseous interchanges is apparent almost immediately after work begins, and during the time of physical exercise is increased from seven to nine times the amount interchanged at rest. After the cessation of the physical exertion the oxygen consumption returns to the normal rest rate in from three to fifteen minutes.

The production of $CO^2$ may be diminished with practice.

The respiratory quotient is practically unchanged even during severe work. In running the respiratory rythm is changed. Normally the inspiration is shorter than the expiration, the time of the two being in the proportion of about ten to twelve. In running inspiration is much longer than t the expiration. More air is drawn into the throat involuntarily before the lungs have had time to become empty. Inspiration is easy and satisfactory. Expiration is short and insufficient, more air being involuntarily drawn into the lungs before expiration has been completed.

Zuntz in his observations on soldiers found that when the rate of breathing reached 35 or more per minute from fatigue there was marked cardiac dilatation, venous congestion, shown by increased cardiac dulness and by enlargement of the liver.

From their observations Zunts and Schumburg conclude that the rate of respiration should not be increased more than 75 per cent by exertion, and should not be more than 30 percent above normal after a fifteen-minute rest.

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Respiration:

In England the mid-breathing capacity in males is 217 cubic inches; in females 132 cubic inches (Ellis).

The vital capacity of a man 60 inches tall is usually 2,350 c. c. A woman of the same height has a vital capacity of about 2,000 c. c., according to McKendrick.

Arnold holds that for an increase in height of 25 c. c. there is an increase in vital capacity of 150 c. c. in men, and only 130 c. c. in women.

The ratio of inspiration to expiration is 67 in male adults and 68 or 69 in women, children, and old persons (Sibson).

Andral and Gavarret showed that the amount of carbon burnt hourly is 7.8 grams in boys 8 to 15 years, and 6.4 in girls of the same age; from 16 to 30 years 11.2 grams in men, and 6.4 grams in women, during pregnancy and just ~~atis~~ after the menstrual periods. The child eliminates relatively twice as much $CO_2$ as the adult. Among individuals of the same weight the less active excreted less $CO_2$.

Burdach believes that women have less absolute necessity for air. When men and women are exposed to charcoal fumes the women, who have less need of oxygen are more likely to survive. Ellis believes this makes plain why women criminals have survived hanging much more frequently than men.

Loewy and Johansson found that 0.3 grams of carbon dioxide were eliminated hourly per kilogram of body weight. The most exacting investigations concerning the respiratory exchange, the temperqture of the body, and the sensations of effort and fatigue have been carried onchiefly by Zuntz and his pupils and Johansson on the Continent, and by E. Smith in England. The following table given by Smith shows the output of carbon dioxide per minute for the adult man under varying conditions:

| | |
|---|---|
| Sleeping, | 161.6 c. c. |
| Walking (2 miles an hour), | 569.5 c. c. |
| Walking (3 miles an hour), | 851.2 c. c. |
| Walking, in a treadmill, | 1581.9 c. c. |

Numerous experiments have been made upon horses, dogs, and men under varying conditions of work and rest.

Johannson showed that the sensation of fatigue is not in proportion to the output of carbon dioxide.

Johansson also found that the output of carbon dioxide is in direct relation with the load and the number of contractions in a given time, increasing with the increase in the load and rate. The following table is given by Zuntz and Lehmann, showing the relation of speed in horses to the output of carbon dioxide. While the respiratory exchange is very greatly increased, there is no appreciable division in the respiratory quotient:

| Condition | Air expired in liters per minute | Carbon Dioxide Discharged in liters per min. | Oxygen Absorbed in liters per minute | $\frac{CO_2}{O_2}$ |
|---|---|---|---|---|
| Rest | 44 | 1.478 | 1.601 | .92 |
| Walk | 177 | 4.342 | 4.766 | .90 |
| Trot | 333 | 7.516 | 8.093 | .93 |

## EXERCISES FOR HOME.

### Relief for Flat Chest.

1. Lying, breathing, chest lifting.

2. rest standing, backward bending.

3. S imming.

4. Rest standing, twisting, side bending.

5. Arm upward reaching, extending until they touch the floor.

6. Lying, head backward raising.

7. Lying on face, leg backward raising.

8. Arm side raising.

9. Lying on face, climbing ladder with hands.

10. Lying on face, climbing latter with feet.

11. Side rest standing, nearly bending, with arms raising, and breathing.

12. Sitting, arms alternate upward stretched, seat grasped, downward pull, with opposite hands.

Exercises for Home.

## EXERCISES WITHOUT APPARATUS.

### Of the Arm and Hand.

1. Fingers abduction and adduction.
2. Fingers flexion and extension.
3. Wrist flexion and extension.
4. Combine the above, beginning with abduction.

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5. Forearm rotation.
6. Forearm flexion and extension.
7. Forearm pronation, flexion, and extension.
8. Forearm flexion and extension, with fingers abduction, adduction, flexion, and extension, and wrist flexion and extension.

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9. Arms flexion across chest, with extension outward and backward.
10. Arms upward raising, arms sidewise raising, upward reaching, sinking, downward reaching.
11. Arms rotating.
12. Arms rotation, shoulder joint.
13. Circumduction.

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### Leg Exercises.

Note A. Finger and wrist exercises may be repeated, with arms in the following positions.

Note B. In taking the following exercises the movement should be voluntarily controlled; that is, in using the flexor muscles, resistance should be made by the extensors, and vice versa. By this means each set of muscles may be able to do as much work as is required for its healthy

development, and a perfect balance will be maintained between the antagonizing muscles, and so symmetrical development will be secured. It should be remembered, however, that in order to ~~make~~ secure results from this method of exercise, it is necessary that the acting muscles shall be thoroughly energized,-- that is, the highest possible degree of tension should be maintained during the muscular movement, and the movement should be executed very slowly.

The movements should begin with the joints most removed from the trunk, and each group of muscles should be exercised in succession, until the trunk is reached. Care must be taken to bring the will to bear upon individual groups of muscles. The effect of this is not only to develop the muscles, but to bring it under perfect control of the will.

(1.) Downward reaching.
(2.) Elbows at sides, forearm half flexed, extending outward.
(3.) Forearm half flexed, extending forward.
(4.) Arms forward reach.
(5) Arms outward reach.
(6.) Arms upward reach.

...................................

<u>Exercises Feet and Legs.</u>

1. Abduction and adduction of toes.
2. Extension of ankle, with flexion of toes.
3. Flexion of ankle, with extension of toes.
4. Flexion and extension of leg from the thigh.

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5. Abduction and adduction of leg.
6. Flexion and extension of thigh from the trunk.
7. Rotation of leg at the hip joint.
8. Circumduction of leg at the joint.

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~~The following~~ Exercises for strengthening the abdominal muscles.

~~Exercises~~ for developing the abdominal muscles should be taken in the horizontal position. The exercises should begin with breathing movements in which the lungs should be ~~freely~~ fully inflated. In breathing out, the abdominal muscles should be well drawn in. One to three deep breaths should be taken after each movement before the next is made. In the following tables the exercises are made progressive.

<u>Position</u>. Patient lying on back, hands grasping support or clasped above head.

1. Leg flexing. (a) Each leg, 2 to 8 times.
   (b) In alternation "
   (c) Both together. "

Remark: At the beginning of this exercise the feet should be drawn up as close to the thighs as possible. When the patient becomes stronger the knees may be drawn still nearer to the chest the feet being raised from the ~~cough~~ couch.

2. Leg flexing, knee extension. (a) Singly, 2 to 8 times
   (b) In alternation "
   (c) Together. "

Remark: The movement is executed in four counts:
   (1) Legs flexed till thighs are at right angles with body.
   (2) Leg extended till as straight as possible.
   (3) Knee flexion.
   (4) Leg extension.

3. Knee half-flexing, leg extension.
   (a) Singly
   (b) In alternation
   (c) Together.

Remark: ~~Legs are~~ The leg is drawn to half-flexing (flexed) position, that is, an angle of 45°. ~~Knees~~ Leg extended and allowed to sink to the table while extended without flexion of knee.

4. Leg raising, (a) Singly, 1 to 8 times, (b) in alternation, (c) together.

Remark: In leg-raising the toe should be pointed as much as possible and the leg should be raised higher and higher as the patient gains strength. After the patient has gained sufficient strength slight resistance may be made either with the hand or by means of weights. The vigor of the exercise may be increased in all the above movements by ~~xaxks~~ arresting the leg in its downward movement just before it reaches the position of rest suddenly extending it, repeating this 2 to ~~1~~8 times.

5. Knees half flexed, abduction, adduction. 2 to 18 times.

Remark. The patient may at first be assisted, thus securing as wide separation of the knees as possible. Later resistance should be added with the hands.

6. Knees half flexed, hips raising.

Remark. The legs should be vertical in relation to the table and the hips should be raised to such a position that the thighs and trunk will form the hypothenuse of a right-angled triangle. This exercise is for strengthening the muscles of the back.

7. Head raising.

Remark. The head should be raised without the aid of the arm. This requires vigorous action of the abdominal muscles. It will be noted that the recti muscles are especially brought into play when the head is raised. When the legs are raised all the muscles of the anterior trunk are brought into vigorous action.

8. Head-raising, leg-raising.

Remark. When the patient becomes sufficiently strong the most vigorous action of the abdominal muscles may be secured by combining ead raising with the various leg raising movements described above. n giving the above movements it is well to alternate the head raising and eg raising. The order should be (1) leg movement, (2) breathing, (3) ead-raising, then breathing, leg-raising, breathing, head-raising, etc. he movement should be executed while taking a deep inspiration. This secures the greatest possible increase of intra-abdominal pressure, thus horoughly emptying the visceral bloodvessels of the abdominal and pelvic avities.

Position.-- On face lying grasping support above head.

1. Knee flexing. (a) Singly (b) in alternation, (c) together.

Remark. As the feet are raised the hand should grasp the su port irmly, and flexion movement of the arm should be executed. That is, downward pull should be made with the arms. As the feet are lowered o position the movement should be repeated; just before the foot reaches he table, the leg suddenly returned to a vertical position. This secures igorous contraction of the lumbar muscles. This same plan should be ollowed in all the backward leg movements. This movement should be executed in two counts, (1) raising vertical, (2) lowering.

2. Knees 1/2 flexing, leg backward raising. (A) Singly, (b) in alternation, (c) together.

Remarks. The thighs should be raised backward by forcible contraction of the muscles of the ~~trunk~~ back, lifting the knee from the table. his movement is executed to counting as follows: (1) Knee flexion, (2) thigh raising, (3) thigh sinking, (4) knee extension.

3. Knee flexion, leg backward raising. (a) Singly, (b) in alternation, (c) together.

Remark. The leg should be flexed upon the thigh as completely as possible. An attendant may assist at the end of the movement by pressing the foot down against the thigh. In making the flexion as complete as possible the knee should be lifted from the table and the muscles of the back will be brought into vigorous action.

4. Legs backward raising. (a) Singly, (b) in alternation, (c) togeth

Remark: This is a difficult exercise, and care should be taken to avoid straining the muscles of the back. The patient may at first simply lift the leg free from the table and allow it to return to positio In very feeble patients the leg may be raised and lowered while the patient endeavors to hold it in positien. After a time the patient will be able to control the movement of the leg while sinking to position. Later, will be able to raise the leg. when the patient acquires a little strength slight resistance may be made with the hand placed upon the ankle.

5. Elbow-support-lying, hips-raising.

Remark.--This movement executed properly brings the abdominal muscles into vigorous play. First the patient may need the assistance of the attendant to lift the hips, especially in the case of feeble patients who are very fleshy. The movement should be executed but two to four times. When the muscles become stronger the movements may be repeated 8 to 16 times.

6. Elbow-toe-support-lying, hips-raising.

Remark.--This is an exceedingly vigorous movement for developing the abdominal muscles. It must be executed carefully at first, and with assistance.

7. Head backward raising. (a) With hands grasping support, (b) tips of fingers resting upom top of head, (c) with fingers touching back of neck.

8. Head backward raising in combination with the different leg movements. The head-back-ward raising should be practiced in alternation with the variokus leg movements from the beginning as the patient acquires strength

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MEMORANDA FOR CIRCULAR RELATING TO EXERCISER.

Show photographs of instrument adjusted for three positions: erect, sitting, rowing.

Show also adjustment of springs:

1. Two springs, one at bottom, one at top.
2. One spring at the bottom.
3. Three springs, one at top, two at the bottom.
4. Two springs at bottom.
5. Three springs at bottom.

Height: Adjustment six and one-half feet above the floor.

List of Exercises.

Breathing exercises:

1. Standing.
2. Sitting.

Leg Exercises:

1. Standing.
2. Sitting.

Trunk Exercises:

Sitting.

Rowing Exercises: exercises in combination with Swedish movements.

Exercises for prolapsed stomach and bowels, floating kidney.

Exercises for retrofelxion.

Exercises for consumption.

Special exercises for posterior curvature, round shoulders, and flat chest.

Special exercises for lateral curvature, right and left.

Exercises for double lateral curvature:

1. Dorsal to right, lumbar to left.

2. Dorsal to left, lumbar to right.

Exercises for rotation of the spine, for combination of different forms of curvature.

Exercises for different classes:

1. Old Men,

2. Vigorous young men.

3. Boys.

4. Old ladies.

5. young ladies.

6. Girls.

7. Rheumatics.

8. Obese persons.

9. Bed-ridden invalids.

10. Wheel chair invalids.

11. Neurasthenics.

12. Exercises for developing the chest, to develop the arms, the develop the legs.

Athletic Exercises:

1. Rowing.

2. Bicycling.

3. Putting the shot.

4. Striking with base ball club.

Labor Exercises:

1. Wood sawing.

2. Wood chopping.

3. Mowing.

Show how to use the apparatus as means of determining strength for arm flexors and leg extensors. Give table showing the total strength of individuals having certain strength of arm flexor and leg extensor muscles, making avarge of for four different groups.

Arrange the day's orders for persons of different strengths. Give table showing the amount of work done by use of apparatus in different ways, extending springs to a certain degree, showing also the proportion of work for different degrees of extension.

Devise a simple means whereby ~~in~~ every grou p of muscles may be exercised, ~~XX XX~~ such as hand and foot, flexors and extensors.

By photograph show machine with two springs above and two below.

Prepare for publication material for book on gymnastics, giving illustrations of Whitely and McFadden exercises. Experiment with apparatus with weights with spring attached. The advantage of other arrangement would be the gradual development of weight to the maximum w th increased power of mus les to lift.

# THE GYMNASTICS OF HOUSEWORK.

Star page 5. The following is a simple rule for getting a good standing position. Standing with the back to the wall ( a door is best as there is no baseboard in the way) press the heels against the wall,then the hips,shoulders, and finally the head,taking care not to bend the head backwards . This will straighten the body and in part correct flatness of the chest (Fig.I). But one step further is necessary to acquire the correct standing attitude. Keeping the heels and the hips against the wall,bend the head backward,allowing the chest in the mean time to be pushed forward.(Fig.2) Holding the chest and trunk in position,raise the head forward to the natural erect attitude,and the body will be in correct standing poise. (Fig.3) Now while holding the trunk rigid,step forward from the wall,swinging the arms slightly;and one will thus find himself in correct walking poise. If this position seems a little awkward and stiff at first,it will with practice become easy and natural,and the erect vigorous carriage will give dignity to the physical bearing which may contribute not a little to ones influence and usefulness as well as add immensely to ones vigor and endurance.

EXERCISES TO COUNTERACT ONESIDED DEVELOPMENT.

Exercise I. Sitting in a chair, grasp the seat of the chair with one hand, extend the other arm above the head as high as possible. Pull down with the hand grasping the seat while reaching upward with the other arm. The tendency will be to bend the spine toward the dide of the raised arm. In general the seat should be grasped with the left hand, the right arm being raised above the head; for the reason that the overuse of the right arm has a tendency to curve the spine toward the left. It is for this reason that the right shoulder is usually lower than the left.

Exercise 2. Lying upon the face, bend the head and spine backward as far as possible. Repeat a number of times. This is an excellent exercise to strengthen the muscles of the back.

EXERCISES TO RELIEVE FATIGUED MUSCLES/

Exercise 3. Passive exercise by rubbing the parts or having the overused parts rubbed by another person is the best of all means for affording relief from muscular overwork. Five minutes rubbing will sometimes restore a fatigued muscle or group of muscles to full power, when the work has been confined to a small number of muscles. Bathing the affected parts with cold water in connection with the rubbing is also beneficia

Exercise 4. Local weariness may be relieved by exercise of the muscles of some other part of the body. Tired arms may be rested by walking or other exercises of the legs. If the muscles of the back are tired from long-continued strain and bending forward, relief may be afforded by backward bending ~~xxx~~

exercises,of which the following is a good one.

Sit on the floor with the ~~feet~~ legs extended so that the feet are under the edge of a sofa. Placing the hands at the side, bend backward (Fig. ) Returning to position,take a breath and then repeat the exercise,doing this eight or ten times.

So-called nerve strain or nervousness is best relieved by general relaxing exercises and by resistive exercises taken while lying down. The following relaxing exercises are useful.

Exercise 5. Sitting on a stool with the arms falling relaxed at the side,relax the muscles of the neck so that the head will fall forward,and allow the head to slowly roll about ~~i~~ in a circle,using slightly directing effort as follows. Roll first in one direction and then in the other,keeping the eyes closed.

Exercise 6. Still sitting on the stool,place the hands at the side,relax the muscles of the trunk,and allow the body to drop forward. Slowly describe a circle with the trunk,allowing the head to drop back as the trunk falls backward. After completing the circle reverse it.

RESISTIVE MOVEMENTS.

Exercise 7. ~~LYING FLA~~ Lying flat on the back with the eyes closed,alternately contract and relax in succession every group of muscles in the body. Thus slowly close and open the right hand,contracting and extending the muscles as forcibly as possible. Repeat the exercises with the left hand. Slowly bend and extend the right arm. Repeat with the left arm. Raise the right arm sidewise ~~as fa~~ extending it as far as possible. Then the left. Raise the right arm over the head,reaching as far as possible. Repeat with the left. Extend and flex the one foot,then the other. So continue with all the leg muscles.

First flex and then extend the leg. Then draw the leg sidewise. Draw up the knee and raise the leg. Close the eyes, contract ~~the~~ them, open the eyes as wide as possible. Shut the jaws closely, then open the mouth widely. Twist the head to the right, then to the left. Raise the head forward and roll the head backward. Other movements may be devised. The purpose is to draw the blood into the muscles and away from the nerve centers but without at any time bringing into play a sufficient number of the muscles to induce fatigue or interfere with the breathing.

Exercise 8. Lying flat upon the face on a hard surface ( the floor is the best ) breathe deeply. The effect will be strong compression of the abdominal ~~muscles~~ organs and their blood vessels by the vigorous contraction of the diaphragm. This will empty the abdominal vessels of blood and thus relieve congestion in the nerve centers, which is often a cause of nervousness. This is an excellent exercise to be taken by one who is nervous and weary from mental or physical effort in the standing position or for one who is weary from long-continued work in a relaxed sitting posture.

BREATHING EXERCISES/

The best breathing movements are those ~~which~~ simple exercises which create a thirst for air, such as rapid walking or any other rapid exercise which increases the rate and depth of respiration. Such exercises are far better than any kind of breathing gymnastics. The following exercises are useful, however, as a means of stretching and exciting the respiratory muscles.

Exercise 9. Extend the arms in front of the body and swing them sidewise with a vigorous movement, breathing in at the same time. Slowly return the arms to position while breathing out. Repeat ten to twenty times.

Exercise IO. Extending the arms sidewise, describe large circles with the arms sweeping well to the front and to the bac making the circles as large as possible, breathing in while the arms are moving backward and upward, and breathing out while the arms are moving downward and forward. Numerous other excellent breathing movements may be executed with the arms. All vigorous arm movements may be regarded as breathing movements.

Proper exercise should be taken for ten minutes three times daily.

MEMORANDUM.

There should be prepared a series of exercises known as household gymnastics. These should show how to perform all the household duties with correct poise and should also give a series of corrective exercises which could be taken with the simple apparatus of the home. I would suggest the above.

6/3.7

MEMORANDUM.

There should be prepared a series of exercises known as household gymnastics. These should show how to perform all the different household duties with correct poise, and should also give a series of corrective exercises which could be taken with the simple apparatus of the home. I suggest the following.

CORRECT POSTURES IN THE FOLLOWING.

Washing, sweeping, kneading bread, picking up things off the floor, lifting and carrying, going up and down stairs, scrubbing, blacking stove, sitting paring apples, sewing, knitting, running sewing machine playing a piano, putting down carpet, mopping, making beds.
Show correct and incorrect postures in all these and other household occupations.

HOUSEHOLD GYMNASTICS.

CORRECTIVE EXERCISES. Wall, chair and floor exercises.

Another series.

FARM GYMNASTICS.

Sitting position in driving, sitting on fence, on log, lying on ground or reclining on bank, correct resting position, plowing, hoeing, weeding, sawing wood, splitting wood, chopping wood, digging, riding reaper or mower, cradling grain, swinging scythe, cutting corn, husking corn, pitching hay, riding horseback, milking cow.
Correct and incorrect positions of the above.

GYMNASTICS FOR FARMERS.

Setting up drill, using how in place of musket, exercises with board fence, exercises with barn door for standing poise, exercise sitting on a log, on a stump or on a milk stool, exercise with a one-legged stool, exercise with a barrel, Memorandum 2.

Illustrate with photographs of the different positions,and show picture of German woman working in field stooping without bending knees.

A series.

## BREATHING MOVEMENTS.

Rapid by movements to cause thirst for air:-

Heel raising, feet placing, running in place, walking, skipping, running.

/1. Place hands on abdomen, at sides, at top of chest and breathe in such a way as to force them outward.

2. Wing standing, fill chest, hold in position while exhaling slowly through nose by contracting abdominal muscles. Place hands at lowwe abdomen and lift upward. May utter syllable <u>ah</u> or different vowels.

3. Same as (2), but hold breath for 10 to 30 while alternately d dropping and raising chest to fullest extent possible.

6. Arm sideways raising, breathing
7. Swimming movements
8. Arms circumduction
9. Arm sideways raising,heel raising, knee bending, breathing.

4. Standing against wall (heels, hips, shoulders and head against the wall) Raise heels and roll head backward against wall. The chest will rise forward while the head rolls backward. Inhale while rising, exhale while returning to position. Arms at side, thumbs out--forward bend--sideways stretch-rest-upward stretch. Standing against a wall(heels, hips, shoulders and head against the wall)

5. Roll head backward as far as possible, pushing chest forward and upward and inhaling at same time keeping hips, heels and head in contact with the wall.

10. Respiratory walking--running, skipping, changing step.

a. walk eight steps, then breath during eight counts.(Nos. 3, 6,7,8,9).

b. Ditto--with walking.

c. Skipping 8 steps, breathe same, with counts. Nos. 3,6,7,8,9

1 & 2, 3 & 4
1 & 2 & 3 & 4.

d. Skipping, heel raising, breathing, in wing or rest position.

e. Walking, changing geet, arm raising, breathing.

f. Walking, swimming, breathing.

g. Wing position, jump, breath (5,6,7,8,9).

B SERIES/

BREATHING EXERCISE.))SITTING POSITION.

Sit erect on chair or stool, feet separated and pushed a little forward, back free from chair. Rapid leg and arm movements. Exercise same as(A1,2,3).

4. Wing sitting, head back bending, breathing.

5. Wing sitting, head forward, eyes to ceiling, exhaling, backward raise, neck bending backward, inhaling.

6,7,8 same as (A 6,7,8).

Sit forward on chair, knees separated, heels braced against chair legs.

9. Grasp chair seat at sides, far back as possible, Bend head back, raise chest, as far as possible and inhale and exhale, pushing chest up high aspossible at each inhalation.

10. Drop on knees in front ofchair knees separated, place hands on hips far back as possible and bend backward, inhaling return to position with exhalation.

11. Kneel between two chairs and in front of them place one hand on each chair with arms extended and bend forward, let chest sink between chairs, bending head back and inspiring while making exhale when rising to chair level.

12. Sitting stride of chair facing back, place fron of chair against side of bed or high end of sofa. Brace heels against chair legs., bend backward inhaling, exhale when rising.--Position wing, rest, ~~are~~ arm upward stretch.

SERIES.

BREATHING EXERCISE ~~EXERCISE~~. BICYCLE POSITION.

Preparatory exercise, leg raising and rolling over in bed till respiration is quickened.

Ex. 1,2,3, same as A series. Position

Thumbs out, wing, sideways stretch, upward raising breathing, bend breathing, half bend outward rotating breathing, rest, breathing, arms sideways stretch half flexingbreathing. Keep elbows touching floor during flexions.

Ex. 5. Slowly bend head back, raising chest high aspossible breathing inhale with backward movement, exhale while returning to position as in 1,2,3.

Accessory movements.

Touching different parts of chest, especially apices and sides.

Percussion when filled.

Compression when emptying.

Diaphragm exercises, as laughing.

## STRETCHING MOVEMENTS.

### Standing or sitting.

ARMS. 1. Downward

2. Sideways

3. Forward

4. Upward

5. 1/2 up 1/2 down

6. 1/2 forward upward, 1/2 backward downward

7. Arms circumduction.

8. Trunk standing move hands back and forth far as possible.

9. " " " " sideways.

10. Standing against wall, reach up with hands to tough the highest point possible.

Sitting hold seat with one hand, reach with the other up as high as possible.

OTHER MOVEMENTS/

Trunk standing against wall.

1. Standing, breathing.

2. Arm movements.

Arms forward raise, sideways move.

OBJECT OF EXERCISE OF INVALIDS.

E
eXERCISE A REGULATOR OF NUTRITION regulates heart strength i.e. distribution and oxidation and consumption.

1. To increase metabolsim. Bouchard Ralentissement de Nutrition.

2. To improve respiration, relation to liver, stomach, all viscera.

3. To consume $CO_2$.

4. To oxidize and remove uric acid etc.

5. Cure of muscular and physical faults.

a. of physique-small chest, legs, arms small, big belly.

b. of ~~p~~ose, wrong standing, and sitting positions.

c. of movement-gait.

d. of form-deformities.

External Spine
- antropost.
- lateral
  - 1
  - 2
  - 3
- rotary,
  - single
  - double

Chest
- sound
- flat and hollow
- pigeon breast

Internal ~~to~~
Visceral displacements.
- colon
- stomach
- kidneys
- liver
- spleen
- uterus
- ovaries
- hernia
  - inguinal
  - femoral
  - ventral

POSITIONS.

| | | | |
|---|---|---|---|
| 1. | On back lying | 1. | feet 60° |
| 2. | " " " | 2. | feet close |
| 3. | " " " | 3. | knees half flexed. |
| 4. | " " " | 4. | Knees fully flexed |
| | | 5. | arms flexed |
| | | 6. | arms sideways stretch |
| | | 7. | arms forward stretch |
| | | 8. | arms upward stretch |
| | | 9. | Hands at forhead. |
| | | 10 | Hands at top of head |
| | | 11. | Hands at top of shoulder |
| | | 12. | Hands at back of neck. |
| | | 13. | Knees flexed-shoulder and heels support. |
| | | 14. | hands and heels support. |
| | | 15. | Hands and heels support. |
| | | 16. | Head and heels support. |

## ON FACE LYING.

1. Feet 60°
2. feet close
3. knees 1/2 flexed
4. knees fully flexed
5. arms outward rotated
6. arms sideways stretched
7. arms at top of head
8. arms at back of neck
9. elbow chin rest
10. elbow knees stand
11. knees toe stand
12. hands toe stand.
13. 1 hand and two toe stand (alternate)
14. 2 hand and one toe stand (alternate)
15. One hand and opponete toe stand (alternate)
16. Knee chest.

ON SIDE LYING.

Elbow support 1/2 wing.

" " 1/2 rest.

" " 1 arm sideways stretch.

" " one arm upward stretch.

" " foot support--each arm position.

H Hand and foot sup port- each arm position.

Reverse to other side.

## FLOOR EXERCISES.

Knees flexed, legs raising.

Knees flexing, separating raising.

Knees flexed, abduction.

Legs extended- abduction.

Legs rotation.

Legs rotation-knees flexing.

Rolling to one side and the other.

Feet flexing and extending.

Arms totating .

Arms flexing.

Arms extending sideways.

Arms extending upward

Arms extended--flexing.

Arms extended- raising.

Swimming.

Positions on back lying.

Positions on back lying knees flexed.

## WALL EXERCISE.

1. Feet 60° standing.
2. Feet close standing.
3. Stride standing.
4. Think standing.
11. Shelter standing.
12. Rest standing.

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~~Not Complete~~
~~Tests for Strength made in Horizontal Position~~ See fig 285

Exercises for developing the abdominal muscles should be taken in the horizontal position. The exercises should begin with breathing movements in which the lungs should be freely inflated. In breathing out the abdominal muscles should be well drawn in. One to three deep breaths should be taken after each movement before the next is made. In the following tables the exercises are made progressive.

<u>Position</u>. Patient lying on back, hands grasping support above head.

1. Leg flexing. (a) Each leg, 2 to 8 times.
   (b) In alternation
   (c) Both together.

Remark: At the beginning of this exercise the feet should be drawn up as close to the thighs as possible. When the patient becomes stronger the knees may be drawn still nearer to the chest the feet being raised from the cough.

2. Leg flexing, knee extension. (a) Singly
   (b) In alternation
   (c) Together.

Remark: The movement is executed in four counts:
(1) Legs flexed till thighs are at right angles.
(2) Leg extended till as straight as possible.
(3) Knee flexion.
(4) Leg extension.

3. Knee half-flexing, leg extension.
   (a) Singly
   (b) In alternation
   (c) Together.

Remark: Legs are drawn to half-flexing position, that is, an angle of $45^{o}$. Knees extended and allowed to sink to the table while extended without flexion of knee.

4. Leg raising, (a) Singly, 1 to 8 times, (b) in alternation, (c) together.

Remark: In leg-raising the toe should be pointed as much as possible and the leg should be raised higher and higher as the patient gains strength. After the patient has gained sufficient strength slight resistance may be made either with the hand or by means of weights. The vigor of the exercise may be increased in all the above movements by ~~xxka~~ arrest-ing the leg in its downward movement just before it reaches the position of rest suddenly extending it, repeating this 2 to ~~1~~8 times.

5. Knees half flexed, abduction, adduction. 2 to 18 times.

Remark. The patient may at first be assisted, thus securing as wide separation of the knees as possible. Later resistance should be added with the hands.

6. Knees half flexed, hips raising.

Remark. The legs should be vertical in relation to the table and the hips should be raised to such a position that the thighs and trunk will form the hypothenuse of a right-angled triangle. This exercise is for strengthening the mmscles of the back.

7. Head raising.

Remark. The head should be raised without the aid of the arm. This requires vigorous action of the abdominal muscles. It will be noted that the recti muscles are especially brought into play when the head is raised. When the legs are raised all the muscles of the anterior trunk are brought into vigorous action.

8. Head-raising, leg-raising.

Remark. When the patient becomes sufficiently strong the most vigorous action of the abdominal muscles may be secured by combining head raising with the various leg raising movements described above. In giving the above movements it is well to alternate the head raising and leg raising. The order should be (1) leg movement, (2) breathing, (3) head-raising, then breathing, leg-raising, breathing, head-raising, etc. The movement should be executed while taking a deep inspiration. This secures the greatest possible increase of intra-abdominal pressure, thus thoroughly emptying the visceral bloodvessels of the abdominal and pelvic cavities.

Position.-- On face lying grasping support above head.

1. Knee flexing. (a) Singly (b) in alternation, (c) together.

Remark. As the feet are raised the hand should grasp the support firmly, and flexion movement of the arm should be executed. That is, a downward pull should be made with the arms. As the feet are lowered to position the movement should be repeated just before the foot reaches the table, the leg suddenly returned to a vertical position. This secures vigorous contraction of the lumbar muscles. This same plan should be followed in all the backward leg movements. This movement should be executed in two counts, (1) raising vertical, (2) lowering.

2. Knees 1/2 flexing, leg backward raising. (A) Singly, (b) in alternation, (c) together.

Remarks. The thighs should be raised backward by forcible contraction of the muscles of the ~~trunk~~ back, lifting the knee from the table. This movement is executed to counting as follows: (1) Knee flexion, (2) thigh raising, (3) thigh sinking, (4) knee extension.

3. Knee flexion, leg backward raising. (a) Singly, (b) in alternation, (c) together.

Remark. The leg should be flexed upon the thigh as completely as possible. An attendant may assist at the end of the movement by pressing the foot down against the thigh. In making the flexion as complete as possible the knee should be lifted from the table and the muscles of the back will be brought into vigorous action.

4. Legs backward raising. (a) Singly, (b) in alternation, (c) togeth

Remark: This is a difficult exercise, and care should be taken to avoid straining the muscles of the back. The patient may at first simply lift the leg free from the table and allow it to return to position. In very feeble patients the leg may be raised and lowered while the patient endeavors to hold it in position. After a time the patient will be able to control the movement of the leg while sinking to position. Later, will be able to raise the leg. When the patient acquires a little strength slight resistance may be made with the hand placed upon the ankle.

5. Elbow-support-lying, hips-raising.

Remark.--This movement executed properly brings the abdominal muscles into vigorous play. First the patient may need the assistance of the attendant to lift the hips, especially in the case of feeble patients who are very fleshy. The movement should be executed but two to four times. When the muscles become stronger the movements may be repeated 8 to 16 times.

6. Elbow-toe-support-lying, hips-raising.

Remark.--This is an exceedingly vigorous movement for developing the abdominal muscles. It must be executed carefully at first, and with assistance.

7. Head backward raising. (a) With hands grasping support, (b) tips of fingers resting upom top of head, (c) with fingers touching back of neck.

6. Head backward raising in combination with the different leg movements. The head-back-ward raising should be practiced in alternation with the variokus leg movements from the beginning as the patient acquires strength

- 613.71

3.



Exercises for Home.

EXERCISES WITHOUT APPARATUS.

Of the Arm and Hand.

1. Fingers abduction and adduction.

2. Fingers ~~fxxxxxxx~~ flexion and extension.

3. Wrist flexion and extension.

4. Combine the above, beginning with abduction.

---

5. Forearm rotation.

6. Forearm flexion and extension.

7. Forearm pronation, flexion, and extension.

8. Forearm flexion and extension, with fingers abduction, adduction, flexion, and extension, and wrist flexion and extension.

---

9. Arms flexion across chest, with extension outward and backward.

10. Arms upward raising, arms sidewise raising, upward reaching, sinking, downward reaching.

11. Arms rotating.

12. Arms rotation, shoulder joint.

13. Circumduction.

..............................

Leg Exercises.

Note A. Finger and wrist exercises may be repeated, with arms in the following positions.

Note B. In taking the following exercises the movement should be voluntarily controlled; that is, in using the flexor muscles, resistance should be made by the extensors, and vice versa. By this means each set of muscles may be able to do as much work as is required for its healthy

development, and a perfect balance will be maintained between the antagonizing muscles, and so symmetrical development will be secured. It should be remembered, however, that in order to xxxx secure results from this method of exercise, it is necessary that the acting muscles shall be thoroughly energized,-- that is, the highest possible degree of tension should be maintained during the muscular movement, and the movement should be executed very slowly.

The movements should begin with the joints most removed from the trunk, and each group of muscles should be exercised in succession, until the trunk is reached. Care must be taken to bring the will to bear upon individual groups of muscles. The effect of this is not only to develop the muscle~~s~~, but to bring it under perfect control of the will.

(1.) Downward reaching.
(2.) Elbows at sides, forearm half flexed, extending outward.
(3.) Forearm half flexed, extending forward.
(4.) Arms forward reach.
(5) Arms outward reach.
(6.) Arms upward reach.

...................................

Exericse Feet and Legs.

1. Abduction and adduction of toes.
2. Extension of ankle, with flexion of toes.
3. Flexion of ankle, with extension of toes.
4. Flexion and extension of leg from the thigh.

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5. Abduction and adduction of leg.
6. Flexion and extension of thigh from the trunk.
7. Rotation of leg at the hip joint.
8. Circumduction of leg at the joint.

## Exercises for the Head.

1. Flexion and extension forward and backward.
2. Flexion and extention right and left.
3. Rotation to right and left.
4. Rotation right and left, with marked flexion.

.........................................

## Exercises for the Trunk.

1. Arms upward reach, standing, backward and forward bending.
2. Wing standing, to right and left bending.
3. Think standing, right and left twisting.
4. Rest standing, to right and left twisting, with side bending.

------------------------------------

5. Lying on back, head forward raising.
5. Back lying, legs raising, singly, in alternation, and with head.
7. On face lying, head backward raising.
8. Legs backward raising, singly, and with head.

.......................................

## Breathing Exercises.

1. On back lying, breathe deeply, expanding sides and abdomen.

2. Deep breathing, expanding the chest and trunk fully and breathing out. Hold chest in position for complete expansion, ~~throwing~~ drawing the abdominal muscles as vigorously as possible.

3. Empty the lungs, close the throat, and execute the movement~~s~~ of inspiration or breathing in with the chest, raising chest as high as possible. The effect of this is to draw the stomach and other abdominal organs upward.

4. Fill the lungs full as possible, lightly percuss the chest at the sides, breathe out with firm pressure of sides, so as to completely empty the chest. The purpose of this movement is to overcome rigidity, by increasing the elasticity of the cartilages.

EFFECT OF EXERCISE UPON THE MUSCLES.

In a <u>resting</u> muscle the capillary blood passing through it is continually giving off oxygen and receiving $CO_2$. But according to Landois the muscle gives off less $CO_2$ than corresponds to the amount of oxygen it absorbs. Part of the $CO_2$ given off has been preformed in the muscle. A part arises when the oxygen is supplied.

In an <u>active</u> muscle the blood-vessels are always dilated. The actual amount of blood passing through the muscle is increased from three to four times. The reaction of the contents of the muscle changes from neutral to acid, the degree of acidity increasing in proportion to the amount of work done, and due ~~results from~~ to the decomposition of lecithin and nuclein (Landois).

The active muscle excretes considerable more $CO_2$ than a resting muscle and takes up a greater amount of oxygen. During work the entire body takes up four or five times as much oxygen as during rest. The increased interchange of gases extends into the rest period immediately following work. An active muscle contains less fatty acid, creatin, creatinin, and sarcophosphoric acid.

The amount of glycogen, normally .43 per cent, diminishes during activity.

Muscles, since they make up 40 per cent of the weight of the body and are being subjected to great activity, constitute the most important seat of respiratory exchange. Even the resting muscle is in a state of "tone." Professor Leonard Hill makes the following very important statement: "The practical importance of the great effect of muscular exercise upon the processes of oxidation in the body cannot be overestimated in these days, when over-civilization tends to weaken the physique and moral fiber of man. There is no other condition, whether it be physiological or pathological, which will produce such a great increase in the absorption of oxygen and the discharge of carbon dioxide, such a widespread effect upon the exchange of material in the body.

"One of the marked characteristics of life is oxidation; but the benefits of muscular work are not to be attributed to that alone. Muscular activity is not a simple increase of oxidation; the body is not a machine from which more work can be obtained simply at the expense of more fuel and increased wear and tear. The co-ordination of all the systems of the body is necessary, and all parts are affected; the growth and vitality of the body is favored by the work performed. In these respects muscular exercise is of the utmost importance."

Training enables one to exercise a greater economy in the utilization of his bodily energy. This has been shown by numerous authorities, but by Zuntz in particular. Zuntz found further that the effects of training especially affects the muscles needed to make the special movements, but not in the muscles which do not act. In other words, the muscles specifically trained worked more economically than those which are not much used.

Hill states that overwork entails destruction of muscle substance, and diminution of functional power which lasts fpr some time.

DEPOSITED BY Haskell Home

... IN ...

# The Battle Creek Sanitarium

Battle Creek, Mich.

Feby 28 1904

| | Dollars | Cts. |
|---|---|---|
| Bills | 4, | 00 |
| Gold | | |
| Silver | | |
| Checks | | |

#1426

$4.00 rec'd from C. W. Davis on the San. Weekly Pay Roll –

This is allready entered to the credit of the Home.

EXERCISES FOR HOME.

Relief for Flat Chest.

1. Lying, breathing, chest lifting.

2. rest standing, backward bending.

3. Swimming.

4. Rest standing, twisting, side bending.

5. Arm upward reaching, extending until they touch the floor.

6. Lying, head backward raising.

7. Lying on face, leg backward raising.

8. Arm side raising.

9. Lying on face, climbing ladder with ~~arms~~ hands.

10. Lying on face, climbing latter with feet.

11. Side rest standing, nearly bending, with arms raising, and breathing.

12. Sitting, arms alternate upward stretched, seat grasped, downward pull, with opposite hands.

# T A B L E  E X E R C I S E S .

Table may be used in three positions:

First position--level,

Second position--head low,

Third position--head high.

The head in low position may be full position or half position.

__Breathing Exercises__

With level table.

In each of the following exercises the chest should be expanded as fully as possible, then the chest should be held high while breathing out, the purpose being to force the air out by contracting the abdominal muscles. The air should be inhaled and exhaled slowly at the rate of about ten breaths a minute. Each exercise should be repeated eight times.

1. Hold the chest high. Grasp the sides of the table tightly and breathe deep. The upper part of the chest should remain stationery during the exercise. Repeat. 1

2. Hold chest high. Take a deep breath. Pull on strap during exhalation. Repeat. 2

3. Place hands under the hips. Take a deep breath, lift against hips with the hands while breathing out. Repeat. 3

4. With the hands placed at the back of the neck and the arms resting upon the table, breathe deeply, pressing against the neck with the fingers while breathing out. 4

Repeat the same exercises in the head low and head half low.

# T A B L E   E X E R C I S E S .

(Continued)

**Replacement Exercises.**

Table position:-Head low. Feet engaged in loops at the foot of the table to prevent body sliding down. Hold the chest high continually during the exercise.

1. Breathe deeply while percussing and beating the abdomen vigorously. 5
2. Deep breathing, hands grasping sides of the table, pull with hands while breathing out.
3. Deep breathing, hands clasped over lower abdomen, pressing firmly 6 during both inspiration and expiration.
4. Deep breathing with hands clasped, make pressure with the little finger side of the hands, starting just above the pubes and working slowly upward an inch or two at each breath. The pressure should be 7 continuous during expiration and inspiration. Repeat six or eight times.

TABLE/EXERCISES.

(Continued)

Leg Exercises.

Position:-Head low. Patient lying on back, legs fully extended, arms extended at sides.

Flexing and Extending the Legs.

At first let the feet slide on the table. Later as the muscles become stronger, lift the feet off the table. Extend the legs quickly so when the feet are lifted, the extended legs will be lifted free from the table.

Leg Raising.

1. With one leg flexed, the other leg extended. 8

2. With both legs extended.

3. Legs raised to perpendicular, abduction and adduction. 9 - 10

4. Legs swaying, first legs flexed, thighs perpendicular, swaying from side to side, second, legs extended vertically, swaying. 11 - 12

These exercises should be taken with head low. Persons who have a tendency to cerebral congestion or are embarrassed by the low position may use a level table, or head half low.

## TABLE EXERCISES.

(Continued)

Head and Trunk Exercises

1. Head raising:--(a) With strap
   (b) Without strap. 13

2. Trunk raising:--(a) With strap
   (b) Without strap. 14

3. Head backward bending. 15

4. Head and trunk backward bending. 16

These exercises may be graduated for feeble patients, by beginning with head high, then level table, finally with head low.

# TABLE EXERCISES.

(Continued)

**Combined Exercises**

1. Increase the abdominal work by placing the hands in the neck firm position.

2. Combine head-raising with leg movements. 17

# TABLE EXERCISES.

(Continued)

<u>Miscellaneous Movements</u>

With level table.

Arm Exercises:—<u>Lying on back</u>.

1. Finger flexion and extension;

2. Arms flexion and extension;

3. Arms rotating;

4. Arms raising, (a) Sidewise
   (b) Forward

5. Fingers engaged pulling;

6. Arms sidewise fling; (a) Alternating
   (b) Together

7. Hands twirling;

8. Chest beating.

Position, Lying on face:

1. Prone breathing, hands grasping side of table and pulling downward during expiration; 18

2. Body twisting, first one side, then the other;

3. Trunk raising, arms extending and flexing; or grasping sides of table 19

4. Swimming.

7

## T A B L E  E X E R C I S E S.

(Continued)

Spine Exercises

Four Series:

1st:--For flat chest, round shoulders, straight back;

2nd:--For lateral curvature, right and left, and double;

3rd:--Lateral curvature with rotation right;

4th:--Lateral curvature with rotation left.

Exercises on side, lying (concave side). Arm on concave side upward stretch. Hand of convex side on hip. Trunk sidewise raising. With feeble patients, graduate the exercise by employing three positions: (20)

1st:--Head of the table raised;

2nd:--Level table;

3rd:--Head low;

4th:--Trunk extended beyond the table.

(Have provision made for attaching a strap in the middle of the table so as to provide for exercises with the trunk projecting beyong the end of the table).

Exercise,-face lying, trunk backward raising.

1. Head high. 2. Level table. 3. Head low, feet fastened in loops.

For rotation. of spine.

Face lying, head low, body twisting, trunk twisting, always (21) toward concave side.

# T A B L E   E X E R C I S E S .

(Continued)

<u>Trunk Raising</u>

Table 1: Head high; 2: level; 3: head low positions.

1. Hands assisting 21 ½
2. Hands at sides
3. Hands on hips
4. Hands at back of neck.

<u>Leg Exercises</u>

1. Flex and extend feet
2. Rotate legs
3. Reaching
4. Flex and extend

1. Knees flexed
   Knee separating
2. Hips raising 22
3. Knees separating, hips raising
4. Hips rolling, knees extending and flexing.

# T A B L E . E X E R C I S E S .

(Continued)

<u>Leg Raising.</u>

Head low.

1. One knee flexed, one leg raise (23)
2. Two legs raise, and alternate
3. Head raise, legs raised
4. Hands neck, legs raise.

<u>Legs flexed</u>

1. Flex. Extend
2. Knees separating
3. Hips rolling (feet free from table)
4. Hips rolling, legs flex and extend.

<u>Legs extended upward</u>

1. Abduction
2. One leg circumduction
3. Hips rolling (24)
4. Two legs circumduction.

# T A B L E   E X E R C I S E S .

(Continued)

**Stretchings.**

1. Yawning. Neck stretching 25
2. Arms side, stretch 26
3. Back stretch 27
4. Arms and legs alternate stretch.

Miss Babcock:

Doctor would like to have this filed for future reference.

S.B.T.

# T A B L E   E X E R C I S E S .

Table may be used in three positions:

First position--level,

Second position--head low,

Third position--head high.

The head in low position may be full position

or half position.

## Breathing Exercises

With level table.

In each of the following exercises the chest should be expanded as fully as possible, then the chest should be held high while breathing out, the purpose being to force the air out by contracting the abdominal muscles. The air should be inhaled and exhaled slowly at the rate of about ten breaths a minute. Each exercise should be repeated eight times.

1. Hold the chest high. Grasp the sides of the table tightly and breathe deep. The upper part of the chest should remain stationary during the exercisd. Repeat.

2. Hold chest high. Take a deep breath. Pull on strap during exhalation. Repeat.

3. Place hands under the hips. Take a deep breath, lift against hips with the hands while breathing out. Repeat.

4. With the hands placed at the back of the neck and the arms resting upon the table, breathe deeply, pressing against the neck with the fingers while breathing out.

Repeat the same exercises in the head low and head half low.

# TABLE EXERCISES

(Continued)

Replacement Exercises.

Table position:-Head low. Feet engaged in loops at the foot of the table to prevent body sliding down. Hold the chest high continually during the exercise.

1. Breathe deeply while percussing and beating the abdomen vigorously.
2. Deep breathing, hands grasping sides of the table, pull with hands while breathing out.
3. Deep breathing, hands clasped over lower abdomen, pressing firmly during both inspiration and expiration.
4. Deep breathing with hands clasped, make pressure with the little finger side of the hands, starting just above the pubes and working slowly upward an inch or two at each breath. The pressure should be continuous during expiration and inspiration. Repeat six or eight times.

# T A B L E  E X E R C I S E S

(Continued)

## Leg Exercises

Position,--table level, patient lying on back, legs fully extended, arms extended at sides.

1. Flex and extend the legs. At first let the feet slide on the table. Later as the muscles become stronger, lift the feet off the table. Extend the legs quickly so when the feet are lifted, the extended legs will be lifted free from the table.
2. Leg raising, first with one leg flexed, the other leg extended; second with both legs extended; third, legs raised to perpendicular, abduction and adduction; fourth, legs swaying, first legs flexed, thighs perpendicular, swaying from side to side, second, legs extended vertically, swaying.

These exercises should be taken with head low. Persons who have a tendency to cerebral congestion or are embarrassed by the low position may use a level table, or head half low.

# T A B L E   E X E R C I S E S .

(Continued)

## Head and Trunk Exercises

1. Head raising:--(a) With strap
   (b) Without strap.

2. Trunk raising:--(a) With strap,
   (b) Without strap.

3. Head backward bending.

4. Head and trunk backward bending.

These exercises may be graduated for feeble patients, by beginning with head high, then level table, finally with head low.

# TABLE EXERCISES.

(Continued)

Combined Exercises

1. Intensify the leg movements by placing the hands in the neck firm position.

2. Combine head raising with leg movement.

# TABLE EXERCISES.

(Continued)

<u>Miscellaneous Movements</u>

With level table.

Arm Exercises:--Lying on back, one finger flexion and extension;

2. Arms flexion and extension;

3. Arms rotating;

4. Arms raising, (a) Sidewise
(b) Forward

5. Fingers engaged pulling;

6. Arms sidewise fling; (a) Alternating
(b) Together.

7. Hands twirling;

8. Chest beating.

Position, lying on face:

1. Prone breathing, hands grasping side of table and pulling downward during expiration;

2. Body twisting, first one side, then the other;

3. Trunk raising, arms extending and flexing;

4. Swimming.

# T A B L E   E X E R C I S E S.

(Continued)

<u>Spine Exercises</u>

Four Series:

1st:--For flat chest, round shoulders, straight back;

2nd:--For lateral curvature, right and left, and double;

3rd:--Lateral curvature with rotation right;

4th:--Lateral curvature with rotation left.

Exercises on side, lying (concave side). Arm on concave side upward stretch. Hand of convex side on hip. Trunk sidewise raising. With feeble patients, graduate the exercise by employing three positions:

1st:--Head of the table raised;

2nd:--Level table;

3rd:--Head low;

4th:--Trunk extended beyond the table.

(Have provision made for attaching a strap in the middle of the table so as to provide for exercises with the trunk projecting beyond the end of the table.)

Exercise,-face lying, trunk backward raising. Head high, level table and low, feet fastened in loops. For rotation, face lying, body twisting, trunk twisting, always toward concave side, head low, feet caught in loops. (Brief suggestions to accompany this set of exercises). Correct sitting, correct standing, correct walking, how to breathe to reduce fat. Correct avocation positions. Exercises for flat foot. Exercises on all fours.

# T A B L E   E X E R C I S E S

(Continued)

<u>Trunk Raising</u>

Table 1, 2, 3 positions.

1. Pulling strap head back

2. Hands free

3. Hands hips

4. Hands neck.

Legs.

1. Flex and extend feet

2. Rotate legs

3. Reaching

4. Flex and extend

Knees flexed

1. Knee separating

2. Hips raising

3. Knees separating, hips raising

4. Hips rolling.

## T A B L E   E X E R C I S E S

(Continued)

Leg Raising

Head low.

1. One knee flexed, one leg raise
2. Two legs raise, and alternate
3. Head raise, legs raised
4. Hands neck, legs raise.

Legs flexed

1. Flex. Extend
2. Knees separating
3. Hips rolling (feet free from table)
4. Hips rolling, legs flex and extend.

Legs extended upward

1. Abduction
2. One leg circumduction
3. Hips rolling
4. Two legs circumduction.

# T A B E E   E X E R C I S E S

(Continued)

**Stretchings.**

1. Yawning. Neck stretching
2. Arms side, stretch
3. Back stretch
4. Arms and legs alternate stretch.

## Grouping of Patients for Exercise.

### General Principles.

The main objectives in the therapeutic use of active exercise are

1. Increased activity of chest and strength of chest muscles which results in betterment of the patient's condition in regard to the following and other essential functions.

   a. Automatic lung ventilation

   b. Blood aeration-oxygen supply to tissues

   c. Heart action and systemic circulation

   d. Splanchnic circulation

   e. Digestion and absorption

   f. Bowel action.

2. Increased activity of circulation through strengthening of heart muscle and activity of peripheral vessels, from which result

   a. Better circulation of blood.

   b. Better nutrition of every organ and tissue

   c. Better elimination of wastes

   d. Better appetite and digestion

   e. Better blood making.

   f. In general, better metabolism.

3. Better physical bearing.

   Better attitudes in sitting, walking, and working.

4. Stronger and more enduring muscles.

   Better bones,

5. Increased vital resistance.

Tests.

a. Body measurements.

b. Strength tests.

c. Blood pressure.

d. Vaso-tonus.

a. Body Measurements are necessary (1) to show the type of development, (2) any existing asymmetry, (3) to show improvement from posture drill and other training.

b. Strength tests are necessary (1) to measure the capacity of the neuromuscular mechanism; (2) to reveal points of special weakness (3) to convince the patient of the need of improvement by exercise and training; and (4) to show from time to time through retests, the improvement made.

c. Blood pressure, very essential (1) as a guide to the dosage of muscular work and(2) as a basis for special precautions. Every patient should have a "graphic."

d. The vaso-tonus is desirable to thoroughly convince the patient of (1) the need of change of habits and (2) the necessity for treatment; and (3) to indicate improvement as the result of treatment.

## Groups

1. Not ambulant.

    a. In bed (Post surgical) 1. 2. 3. 4.
    (Medical )

    b. In wheel chair (Medical) 1. 2. 3. 4.
    (Surgical)

    c. Cardio-vascular cases.) 1. 2. 3. 4.

2. Ambulant.

    a. Weak, senile.) 1. 2. 3. 4.

    b. Cardio-vascular) 1. 2. 3. 4.

    c. Good lungs, heart and blood vessels (1. Young and middle aged adults (
    2. Children (1. 2. 3. 4.

    d. Disordered metabolism (obesity )
    (Diabetes )
    (Hyperthroidism) 1. 2. 3. 4.
    (Anemia )
    (Emaciation )

    e. Special conditions ) 1. 2. 3. 4.

    Deformities

    Paralysis

    Chorea

    Abnormal gait

    Parkinson's disease

    Loco-motorataxia, etc.,

## Exercises.

### Not ambulent (Bed and Wheel Chair Cases)

a. Bed Patients.

Post Surgical Cases.

Bégin 2nd day after operation with No 1. Add one exercise each day until whole program is taken. Complications wil/necessarily modify the program. Progression will sometimes be faster and some- times slower. Exercise always should be suspended if temp. rises. from any cause, or pain is increased. Leg raising is omitted in laparotom- ies. Repeat deep breathing every hour other exercises twice a day.

(1) 1. Deep breathing.
(1) 2. Finger and feet movements.
(1) 3. Arm and leg rotating.
(1) 4. Arm flexing.
(1) 5. Leg flexing.
(1) 6. Arm raising.
(1) 7. Turning over in bed.
(1) 8. Leg raising
(except laparotomies.)
(1) 9. Head raising.
(2) 10. Sitting up in bed.
(2) 11. Wheel chair
(2) 12. Standing.
(3) 13. Walking with support.
(3) 14. Posture exercises.
(3) 15. Chair Exercises.
(3) 16. Automatic Exercises.
(3) 17. Manual Swedish.
(4) 18. Out-door Gymnasium
(4) 19. Swimming.
(4) 20. Gymnasium 1, 2, 3, 4.
(4) 21. Hikes.

a--Bed Patients.

Medical Cases.

(1) 1. Deep breathing
Finger and feet movements.

(1) 2. Arm and leg rotating
flexion estension

(1) 3. Arm raising.

(1) 4. Turning in bed.

(1) 5. Leg raising.

(1) 6. Head raising.

(2) 7. Sitting up in bed.

(2) 8. Wheel chair.

(2) 9. Chair exercises.

(3) 10. Standing.

(3) 11. Automatic exercise.

(3) 12. Walking with support.

(3) 13. Out-door gymnasium.

(3) 14. Mechanotherapy.

(3) 15. Manual Swedish.

(3) 16. Inclined table ex.

(4) 17. Mechanical Horse.

(4) 18. After dinner ex. in gymnasium.

(4) 19. Swimming.

(4) 20. Regular gymnasium program.

(4) 21. Bicycle (stationary)

(4) 22 Folk dancing.

(4) 23. Graduated hikes.

Special apparatus work as inddcated by graphic.

<u>Chair Exercises.</u>

(1) Deep breathing-setting up drill.

(1) Free arm exercises (Flex. & Ex.
(Cross-a,b,c.
(Swimming.
(Fingers and arms.

(1) Hands clapping

(1) Knees clapping

(2) Foot movements.

Heel and toe placing.

Heel and toe raising.

Alt. foot raising.

(3) Head and trunk movements.

Bendings.

Twistings.

Rockings.

(4) Standing exercises.

Not ambulant

Cardio-vascular cases

(1) Automatic exercise to arms and legs only.

(2) Breathing exercises (carefully)

(3) Bed exercises (Medical cases) (1) (2) (3).

(4) Manual Swedish Shott.

Ambulant Cases

(a)

Week or senile persons.

(1) 1. Automatic ex.

(1) 2. Breathing exercises.

(1) 3. Chair exercises.

(1) 4. Mechano-therapy.

(1) 5. Manual Swedish- and inclined table.

(1) 6. Out-door gymnasium.

(2) 7. Posture drill-sitting and standing.

(2) 8. Graduated walking.

(2) 9. After dinner gymnasium.

(3) 10. Swimming.

(3) 11. Reg. gym. program-graduated.

(3) 12. Mechanical horseback riding.

(4) 13. Folk dancing.

(b)

<u>Middle Aged Persons with Sound Heart and Lungs and Average Strength.</u>

(1) 1. Full gym. program.

(1) 2. Out-door gym.

(1) 3. Inclined table.

(2) 4. Posture drills.

(3) 5. Swimming.

(4) 6. Athletic games (if doctor permits,) with caution.

(c)

<u>Cases with sound heart and lungs and fair strength and development.</u>

1. Young, fairly vigorous adults.

(1) 1. Full gymnasium program.

(1) 2. Inclined table ex.

(2) 3. Swimming.

(3) 4. Vigorous setting up drills.

(4) 5. Volley ball and other athletic games in outdoor gym. and gymnasium.

(4) 6. Daily hikes of increasing distance and vigor.

<u>Children</u>

(1) 1. School Calisthenics.

(2) 2. Swimming.

(3) 3. Folk Dancing.

(4) 4. Games.

(4) 5. Hikes.

Ambulant

Cardio-Vascular Cases.

(1) 1. Breathing exercises (carefully)

(1) 2. Automatic Exercise (arm and legs only)

(2) 3. Manual Swedish (Shott)

(3) 4. Posture drill.

(4) 5. Graduated walking.

## Disturbed Metabolism.

### Anemia

Same program as bed cases, or feeble ambulants.

### Diabetes.

(1) 1. Automatic ex.

(2) 2. Out-door gymnasium.

(3) 3. Graduated walking.

(4) 4. Gymnasium program.

(4) 5. Swimming.

If cardio-vascular disease or marked weakness is prêsent modify program accordingly.

### Obesity.

(1) 1. Automatic exercise.

(1) 2. Out-door gym.

(2) 3. Full gym. program.

(3) 4. Graduated walking.

(3) 5. Manual Swedish.

(4) 6. Swimming.

If cardio-vascular troubles, modify accordingly.

### Emaciation.

During rest cure, program for bed cases.

After first two weeks, program for

feeble ambulants progressing as

rapidly as strength permits.

Special Conditions Requiring Corrective Work.

Spinal curvatures.

Flat foot

Abnormal gait.

Parkinson's Disease.

Locomotor-Ataxia.

Chorea.

MANUAL SWEDISH MOVEMENTS.

:::::::::::::::::::::

Forearm flexion and extension---ar,s sideways and forward raising--leg flexion and extension--leg abduction and adduction--thigh flexion and extension-leg rotating--arm rotating--wrist and ankle flexion, extension and rotation. These movements should be given with resistance and subject to rules enclosed.

In cases of this patient the movements should be given with the patient lying down, trunk raised at an angle of 45 degrees and the arms should not be raised much above the shoulders at the beginning of the movements.

Before beginning the movements, sphymographic tracing should be taken, and also have the pulse pressure.

These should be repeated once or twice a week. You will find it interesting to make these examinations both before and after the bath, together with the pulse rate for the purpose of noting the effect of the bath.

:::::::::::::::::::::

# WHEEL CHAIR EXERCISES.

::::::::::::::

1. Arms forward, upward raising—full inspiration—downward sinking.
2. Arms forward, upward raising—sideways sinking.
3. Hands on shoulders, quickly flinging to side with full inspiration. Arms slowly back to position, slow expiration.
4. Foot-flexion.
5. Heel raising.
6. Swimming.
7. Head bendings.
8. Cross C. (arms sideways raise) side bending.
9. Arms forward raise—palms turn up, elbows drawn well back (full inspiration) arms forward, palms turned, arms down (Expiration).
10. Hands at waist (full breath) percussion while holding breath.
11. Hands on chest, full inspiration—percussion—exhale.
12. Arms by side—raising elbows—bringing backs of hands together, and raising arms straight over the head—full inspiration—arms sideways, sinking,—exhaling.
13. Hips firm—trunk twisting.

::::::::::::::::::::::::::::

BED EXERCISES.

:::::::::

1. Right arm upward raise— full inspiration—downward sink.

2. Left arm upward raise—full inspiration—downward sink.

3. Both arms upward raise—full inspiration—downward sink.

4. Arms sideways raise— full inspiration—sideways sink (exhale).

5. Thumbs and fingers together and placed on shoulders, elbows close to side—elbows forward, upward raise—full breath— sideways sink— exhale.

6. Swimming.

7. Head forward raise.

8. Foot Flexion and extension.

9. Leg raising—singly—then alternating.

10. Leg raising sideways— singly—then alternating.

11. Relaxing arms—arms upward raise—relax fingers, hand, elbow and arm. First right; then left; then both.

12. Inhale—hands compress upper and lower chest—exhale.

::::::::::::::::::::::::

## RULES PERTAINING TO EXERCISE.

1. Movements must be slow and uniform.
2. Follow each movement by an interval of rest.
3. Movement of the same limb or group of muscles should not be repeated twice in succession.
4. Movements should be immediately interrupted if any of the following symptoms appear,—and the patient must be watched closely to avoid the development of these signs which indicate exhaustion.

(a) Accellerated breathing.

(b) Marked movement of the nares in breathing.

(c) Slight drawing of the corners of the mouth.

(d) Paler or duskiness of the cheeks or lips.

(e) Palpitation of the heart.

(f) Sweating.

(g) Yawning.

If any of the above signs should appear in the midst of the movement, the movement must be instantly suspended, the limb being carefully placed in a state of rest.

5. The patient should not be allowed to hold the breath. To prevent this the patient should count, in a whisper, from 1 to 8 while the movement is being executed, or during each half of it.
6. Constriction of the limbs or any other portion of the body whereby the blood vessels may be compressed, must be carefully avoided.
7. The force of the movement must be very carefully graduated to the strength of the patient.

It is sometimes necessary to employ only the very gentlest resistance. Patients who are bed-ridden, and very feeble patients, cannot, at first, take all the movements——take such as are adapted to their condition or strength.

8. Examination of the heart should be very carefully made in every case

DIAPHRAGM.

Normal Breathing

Setting the chest

In inspiration there is negative pressure.

The diaphragm and elasticity of lungs in opposition.

The muscle parts of diaphragm lie in contact with chest
wall when relaxed.

Central tendon does not move in quiet respiration.

In forced insp. diaphragm becomes almost horizon.

Intra abdominal pressure important factor, causing
spreading of ribs when diaphragm contracts. Does
not occur when abd. is opened.

Costal and abd. breathing

Costal breathing in men during sleep (Mosso).

Low tones purer in costal brthg.

High tones purer in abd. breathing

Breathing capacity 1/3 due to diaphg, 2/3 intercost. muscles.

In old persons, cartgs. ossified, breathing more abd.

Position of Diaphragm.

Right side higher-due to liver

Raising arms lowers diaphg. No one knows why. Perhaps
due to drawing out sides.

Diaphragm most active lying down.

Diaphragm highest lying on back.

Lower, standing (gravity)

Lowest, sitting (relaxed abd. muscles)

On side, lower half of diaphragm higher and most active in resp.

Upper half almost inactive.

Ordinary exp. passive

Forced resp. abd. muscles active.

May use costal muscles instead of abdominal muscles in forced resp.

## Diaphragm Aids Circulation.

In insp. veins of upper parts of body emptied, and blood
from abd. sucked up also.

Circulation of lower extremities may or may not be helped
by insp. Helped when chest is lifted.

Animals, gills only, no chest, one trunk cavity only.

Amphibians have gills and lungs, a sack in abd, which
is compressed by diaphragm.

In such animals, the diaphragm aids expir. instead on
insp. by compressing the lung sac.

In all animals, the diaphragm aids circulation by compressing organs.

The viscera are like a sponge.

The diaphragm the hand that squeezes the sponge.

Ascending vena cava passes through central tendon, and its walls are
attached. When diapg. contracts, walls of V. C. are
stretched and its lumen is thus enlarged.

V. C. passes through groove in liver.

Right and left hepatic veins pass through diaphragm before entering
the V. C.

(Contrary to anatomies, Prof. Eppinger).

Deep insp. empties veins of neck, fills veins of legs.

In costal breathing abd. is drawn in the diapg usually lowers a
little. May be pulled up (paradoxical breathing)

Pericardium attached to diaphragm, sternum and ribs and is
stretched in insp., thus increasing size of heart,
helps to fill heart and increases pulse volume during insp.

In new born, hepatic veins empty below diapg. Liver large, congested. At end of year condition is corrected to normal adult condition.

Diapg. under control of will.

Diapg. excited by emotions.

(a) Sights and smells may cause vomiting

(b) Sneezing another example

(c) Hiccough due to reflex irritation of diapg.
Hippocrates cured hiccough by causing sneezing.

Diapg. may be too high or too low.

## TOO HIGH DIAPHRAGM.

May be due (a) Inc. abd. tension as contracted abd. mscls,

(b) Contraction of lung (c) Relaxed diapg (loss of tone)

(a) Inc. abd. tension may be due to tympanitis, accumulation of fluid, pregnancy, or contracted muscles, or bands or corsets.

Diapg is pushed up by lying on face.

In high diapg, Apex beat is pushed up.

In enteroptosis, the diapg, changes position greatly with position of body.

High diapg hinders circulation, especially of abd, viscera, causes congestion of liver and of lower extremities.

Paradoxical Resp. Diapg. goes up with insp.

High diapg may be due to big meal.

HIGH DIAPHRAGM ASSOCIATED WITH HIGH BLOOD PRESSURE (Juergensen Schreider, Hirsh, Holly)

High diapg on one side may be due to gas, lying on side or subphrenic abscess, renal tumor, enlarg. spleen or to shrinking of the lung.

In high diapg. convex part of diapg. moves less than the normal 2-7 cm.

WILLIAMS' PHENOMENON.

In T. B. the lung moves much less on affected side and may be delayed.

Occurs in 1/3 incipient cases.

Probably due to effort of nature to give parts rest.

Only noticed in deep insp.

Response of diaphragm to farradic current much less on affected side.

Heart dullness increased by high diaphragm

High diapg. usual in chlorosis, also in bronchiectasis

High diapg may be due to lack of tone, usual on side of lung recently subj. to inflam.

## LOW DIAPHRAGM.

May be due to (a) loss of lung elasticity, (b) Anything preventing collapse (c) Fluid in chest ( (d) Relaxed abd walls and visceroptosis)

__Effects:__ Diminished tidal air, diminished movement of diaphragm, dyspnea, increase of residual air.

Lower chest is widened

Diapg low after hard work from fatigue of abd muscles.

Always low in emphysema

In asthma, diaphragm is low and contracts less and less during attack and at height of attack may cease. Adrenalin causes movements to begin.

(Here is a good argument for vacuum breathing).

__Low diapg.__ causes congested liver, poor abd. circulation.

__Pneumothorax__ may cause low diapg on one side

Fluid in lung cavity (pleurisy) may cause low diapg.

Movable kidney due to low diapg.

In enteroptosis, diapg and abd muscles have a paradox (?)

Upper chest becomes broader, lower becomes narrower on insp.

The diapg. is pulled up.

(Abd. supporter needed in all cases).

In low diapg. heart is dragged down, apex nearer median line "Tropfen" heart.

Every contraction heart has to pull itself up.

Larynx at same time is pulled down.

Cervical veins enlarge during insp. because by pulling down of heart the circulation is hindered.

__Hiccough__ due to rhythmic spasm of the diaphragm.

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MEMO.

# CHATS ABOUT EXERCISE FOR INVALIDS.

Interviews with the following classes of persons:--

A lean dyspeptic

A fat dyspeptic

Hyperpepsia

Hypopepsia

Bilious headaches

Enteroptosis

~~Bright's disease~~

Nervous dyspeptic

Fat diabetic

Bright's disease

Lean diabetic

Young diabetic

Obese

Rheumatic

Consumptive

Neurasthenic

Sedentary man

Ataxia

Asthma

Pleurisy

Adhesions

Weak lungs

Heart disease

Normal man

Lazy man

Healthy persons

Boy }
} School
Girl }

Young man-- sports

Young woman-- swimming

Adult man

Adult woman

Old man

Old woman

Babies

Bed ridden

Convalescents

Apoplectic

Flat chested

Weak waisted

Posterior curvatures

Lateral curvatures

Weak legs

Weak arms

Swaying gait

Flat footed

Toeing in

Self-resistive

Swedish movements

Medical Swedish

Delsarte

Heavy Dumb-bells

Light dumb-bells

Club swining

Free hand movements

Home gymnasium

Mc Fadden's

Whiteley exercise

Dr. Kellogg's weight & spring

Rubber bands *

Domestic work

Sawing and chopping

Spading & hoeing

Walking

Running

Swimming

Horseback riding

Rowing

Bicycle

Singing

Horn playing

Mountain climbing

Games

Skating

Eating for strength

Bathing

Cold bath-- when

Warm bath-- when

Hot bath-- when

Drinking) Cold
) Hot
) Alcoholic
) Fruit juices

Overeating

Fatigue fever

Sleep

Rest

~~Sxxxxxxxxxg~~

Over-exercise

Secondary fatigue

Sprains

Clothing

Massage (brief description)

Correct breathing

Feminine respiration

Breathing exercises

Should create thirst for --- Air

Second wind

Breathing muscles must be set to strengthen the otherwise little worth, unless exercise very vigorous, causing forced breathing.

Series of exercises-- days orders for different classes of cases, illustrating each exercise by small figures showing the movement, putting the figures in the if the prescription figures opposite figures 1/2 long.

CUTS.

Undeveloped boy

Well developed boy

Undeveloped man

Well developed man

Pigeon breasted boy

Sedentary young woman

Well developed young woman

Typical old man

Typical old woman

Different types of walking

Different types of sitting, right and wrong

Evil effects of dress

Pneymographic tracings

Swedish gymnastics (typical positions)

Medical Swedish movements

Series of self resistive movements

613-- 7-- Exercise

613-- 71-- Gymnast.

616-- 33-- The Stom.

See r. s. s.

CHARTS

Normal man & woman

Weak

Table of coefficients

Table of measurements

Table of symmetry in man or woman

Explanations of charts, man or woman.

Coefficients, etc.

Summary of physiological effects of exercise.

Relation of ex. to grown

Proper rate of growth

Development in boys and girls

Table of exercises to strengthen different groups of muscles

Table of muscular groups

Anatomical cuts showing different groups of muscles

Rest for acute disease

Exercise for chronic disease.

Please return to
Dr. Kellogg's Residence

# T A B L E  E X E R C I S E S .

Table may be used in three positions:

First position--level,

Second position--head low,

Third position--head high.

The head in **low** position may be full position
or half position.

**Breathing Exercises**

With level table.

In each of the following exercises the chest should be expanded as fully as possible, then the chest should be held high while breathing out, the purpose being to force the air out by contracting the abdominal muscles. The air should be inhaled and exhaled slowly at the rate of about ten breaths a minute. Each exercise should be repeated eight times.

1. Hold the chest high. Grasp the sides of the table tightly and breathe deep. The upper part of the chest should remain stationery during the exercise. Repeat.
2. Hold chest high. Take a deep breath. Pull on strap during exhalation. Repeat.
3. Place hands under the hips. Take a deep breath, lift against hips with the hands while breathing out. Repeat.
4. With the hands placed at the back of the neck and the arms resting upon the table, breathe deeply, pressing against the neck with the fingers while breathing out.

Repeat the same exercises in the head low and head half low.

## T A B L E   E X E R C I S E S .

(Continued)

Replacement Exercises.

Table position:-Head low. Feet engaged in loops at the foot of the table to prevent body sliding down. Hold the chest high continually during the exercise.

1. Breathe deeply while percussing and beating the abdomen vigorously.
2. Deep breathing, hands grasping sides of the table, pull with hands while breathing out.
3. Deep breathing, hands clasped over lower abdomen, pressing firmly during both inspiration and expiration.
4. Deep breathing with hands clasped, make pressure with the little finger side of the hands, starting just above the pubes and working slowly upward an inch or two at each breath. The pressure should be continuous during expiration and inspiration. Repeat six or eight times.

# T A B L E   E X E R C I S E S .

(Continued)

Leg Exercises.

Position:-Head low. Patient lying on back, legs fully extended, arms extended at sides.

Flexing and Extending the Legs.

At first let the feet slide on the table. Later as the muscles become stronger, lift the feet off the table. Extend the legs quickly so when the feet are lifted, the extended legs will be lifted free from the table.

Leg Raising.

1. With one leg flexed, the other leg extended.
2. With both legs extended.
3. Legs raised to perpendicular, abduction and adduction.
4. Legs swaying, first legs flexed, thighs perpendicular, swaying from side to side, second, legs extended vertically, swaying.

These exercises should be taken with head low. Persons who have a tendency to cerebral congestion or are embarrassed by the low position may use a level table, or head half low.

# T A B L E  E X E R C I S E S.

(Continued)

Head and Trunk Exercises

1. Head raising:--(a) With strap
   (b) Without strap.

2. Trunk raising:--(a) With strap
   (b) Without strap.

3. Head backward bending.

4. Head and trunk backward bending.

These exercises may be graduated for feeble patients, by beginning with head high, then level table, finally with head low.

# TABLE EXERCISES.

(Continued)

Combined Exercises

1. Increase the abdominal work by placing the hands in the neck firm position.

2. Combine head-raising with leg movements.

# T A B L E   E X E R C I S E S .

(Continued)

<u>Miscellaneous Movements</u>

With level table.

Arm Exercises:--<u>Lying on back</u>.

1. Finger flexion and extension;

2. Arms flexion and extension;

3. Arms rotating;

4. Arms raising, (a) Sidewise
   (b) Forward

5. Fingers engaged pulling;

6. Arms sidewise fling: (a) Alternating
   (b) Together

7. Hands twirling;

8. Chest beating.

Position, Lying on face:

1. Prone breathing, hands grasping side of table and pulling downward during expiration;

2. Body twisting, first one side, then the other;

3. Trunk raising, arms extending and flexing;

4. Swimming.

# T A B L E   E X E R C I S E S .

(Continued)

Spine Exercises

Four Series:

1st:--For flat chest, round shoulders, straight back;

2nd:--For lateral curvature, right and left, and double;

3rd:--Lateral curvature with rotation right;

4th?--Lateral curvature with rotation left.

Exercises on side, lying (concave side). Arm on concave side upward stretch. Hand of convex side on hip. Trunk sidewise raising. With feeble patients, graduate the exercises by employing three positions:

1st:--Head of the table raised;

2nd:--Level table;

3rd:--Head low;

4th:--Trunk extended beyond on table.

(Have provision made for attaching strap in the middle of the table so as to provide for exercises with the trunk projecting beyond the end of the table.)

Exercise,-face lying, trunk backward raising.

Head high; 2. Level table; 3. Head low, feet fastened in loops.

For rotation of spine.

Face lying, head low, body twisting, trunk twisting, always toward concave side.

## TABLE EXERCISES.

(Continued)

Trunk Raising

Table 1: Head high; 2: level; 3: head low positions.

1. Hands assisting

2. Hands at sides

3. Hands on hips

4. Hands at back of neck.

Leg Exercises

1. Flex and extend feet

2. Rotate legs

3. Reaching

4. Flex and extend

Knees flexed

1. Knees separating

2. Hips raising

3. Knees separating, hips raising

4. Hips rolling, knees extending and flexing.

# T A B L E   E X E R C I S E S .

(Continued)

Leg Raising

Head low.

1. One knee flexed, one leg raise
2. Two legs raise, and alternate
3. Head raise, legs raised
4. Hands neck, legs raise.

Legs flexed

1. Flex. Extend
2. Knees separating
3. Hips rolling (feet free from table)
4. Hips rolling, legs flex and extend.

Legs Extended upward

1. Abduction
2. One leg circumduction
3. Hips rolling
4. Two legs circumduction.

# T A B L E   E X E R C I S E S .

(Continued)

Stretching.

1. Yawning. Neck stretching
2. Arms side, stretch
3. Back stretch
4. Arms and legs alternate stretch.

EXERCISES FOR HOME.

Relief for Flat Chest.

1. Lying, breathing, chest lifting.
2. rest standing, backward bending.
3. Swimming.
4. Rest standing, twisting, side bending.
5. Arm upward reaching, extending until they touch the floor.
6. Lying, head backward raising.
7. Lying on face, leg backward raising.
8. Arm side raising.
9. Lying on face, climbing ladder with ~~xxxx~~.hands.
10. Lying on face, climbing latter with feet.
11. Side rest standing, nearly bending, with arms raising, and breathing.
12. Sitting, arms alternate upward stretched, seat grasped, downward pull, with opposite hands.

For File

EXERCISE.

EXERCISE IN LYING POSITION;--

1. Deep breathing.
2. Hand raising.
3. Leg raising.
4. Hips raising.
5. Hips raising, knees seppaating.
6. Rolling.
7. Face lying, head backward raising .
8. Elbow rest, head backward bending.
9. Toe elbow lying, hips raising.
10. Side lying, leg raising, under leg flexed.

BREATHING EXERCISE;--

1. Chest lifting, arm raising.
2. Chest lifting, arm raising, head bending.

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# EXERCISE.

Wall Position.

1. Arm raising, head bending, lean standing.
2. Arm raising, trunk forward bending, foot forward placing.
3. Trunk downward bending.
4. Arm circumduction, breathing, chest lifting.
5. Head bending, breathing.
6. Chair lifting.
7. Knee bending, jumping.

Chair Exericse.

Sitting position.

Arm raisings.

1. Arm circumduction, chest lifting.
2. One arm raising, one arm holding seat.
3. Arm raising and breathing.
4. Arm swinging, right, left, both.
5. Arm swinging with alternate head turning.

Head Movements.

Leg Movements.

1. Half sitting, one arm support, one leg extended forward and backward.

Trunk Bendings.

1. Arm swinging, right, left, both, with trunk bending.
2. Arm swaying, sidewise.
3. Trunk backward leaning.

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## CORRECTIVE EXERCISES.

### Series 1. Correct Sitting.

Setting up exercises especially adapted to the correction of posterior curvatures.

1. Forward-sitting, chair-holding, chest-lifting.

2. Forward-sitting, hands on hips, head backward bending, thumbs pressing.

3. Forward-sitting, hands on hips, head backward bending, and trunk forward bending at hips, thumbs pressing hard.

4. Forward-sitting, feet-support, backward bending to touch chair.

(The above movements to be taken with hands at hips, hands at neck, hands at top of head, and hands upward stretched.)

### Series 11.

Especially adapted to the correction of lateral Curvatures.

1. Forward-sitting, chair-holding, one-hand stretch.

2. Forward-sitting, one hand at hip, one hand at neck (Low shoulder side), trunk-bending toward side of curvature.

3. Forward-bend~~ing~~-sitting, trunk raising with resistance (to be taken with hands at hipe, hands at neck, hands at vertex, and with one hand at hip, the other at neck, or stretch, low shoulder side. Resistance is made on convexity of curve.)

4. Forward-sitting, one-hand-holding-chair (high shoulder side), the other hand down-pulling with resistance, neck back-ward-bending.

Series 111.

Repeat Series 1 while resting the weight of the body on the higher hip (side opposite curvature.

CHEST EXPANDING EXERCISES, OR BREATH GYMNASTICS.

Series1

The position should be that of correct sitting.

Preliminary movement: Chest-beating to expand lungs and create a demand for air; may add also foot movements.

1. Full-breathing, head-backward-bending.

2. Chest-expanding with hands clasped over abdomen and pressing.

3. Full-breathing while holding the chest high (setting chest).

4. Chest-lifting.

(Each of the above exercises should be taken with the hands at the hips, the hands at the neck, hands at the vertex, and stretched above head.)

Series 11.

Repeat the four exercises of Series 1 with following arm movements:

A. Arms-raising from sides to stretch position.

B. Arms-separating sidewise.

C. Arms-circumduction.

D. Swimming.

Series 111.

Repeat Series L at the same time making a musical tone. Eash of the following may be used:

A. Ah-ah-ah-ah-ah-ah- continuous during thirty seconds if possible.

B. Ha!.ha ! ha! ha! strongly explosive.

C. Ah ! ah! ah! rising uniformily through the scale or a portion of the scale, making tone continuous and smooth.

D. Ha! ha! ha! ha! strongly explosive, ascending and descending the scale or portions of it. Other vowels and syllables may be used to vary the exercises.

WAIST DEVELOPING.

Position: Sitting forward on chair, trunk erect, chest well out.

1. Knees-raising together, graduated to legs raising.

2. Deep back-bending.

3. Trunk-twisting, without and with with resistance.

4. Trunk-raising, without and with raising.

(Each one of the above exercises should be taken with the hands at hips, hands at neck, hands at vertex, and in stretched position.)

RESISTING AND STRETCHING EXERCISES.

STRETCHING EXERCISES.

1. Arms sidewise reaching horizontally.

2. Arms stretched vertically, one at side, the other over head.

3. One hand holding head, the other stretching horizontal. Alternate.

4. One arm holding chair seat, the other stretching over head. Alternate.

5. Bending forward to touch toes, or the floor.

6. Toe-support, bending backward over chair to touch floor if possible.

7. Holding chair seat with hands straightened, stretching both legs.

8. Sitting on corner of chair, stretch one leg back as far as possible. Reverse.

RESISTIVE EXERCISES. Seriesl. Arms.

1. Alternate flexion and extension of fingers, wrist, forearm, arm. Combination.

2. Flex fingers, wrist, forearm, arm, bringing hand to opposite shoulder; and extend arm, forearm, wrist, and fingers.

3. Repeat 1 bringing hands to axilla.

4. Repeat 1 with arms in vertical position, ending with hand in axilla.

5. Repeat 2, ending with hand in axills.

(Execute all the above movements first with one arm, then with both arms together.)

Series 11. Legs.

1. Flex toes, leg, thigh; extend thigh, leg, toes.

2. Rotate leg, first outward, then inward.

3. Abduct and adduct legs.

4. Placing heels together, raise heels as high as possible.

(Execute movements 1,2 and 3 first with one limb, then with both together.)

Series 111. Head.

1. Nodding.

2. Wagging.

3. Rolling.

4. Star-gazing.

This series of simple gymnastics consists of the following: 1. Corrective exercises. 2. Chest expanding exercises. 3. Waist developing exercises. 4. Work exercises which include resistive and stretching exercises, walking and other ordinary forms of exercise.

The various forms of exercises are included under the following heads:

Floor Exercises.

Chair Exercises.

Wall Exercises.

Free Exercises.

Under these various classes it is not intended to include all possible exercises or variations of exercises, but a few typical movements which will accomplish the result desired in the most direct and efficient manner.

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.J.H.Kellogg, Health School, 5th Floor Parlor, December 29, 9 P.M.

Lateral Curvature: Suppose the left shoulder is lowered. That means the curvature tends to the right . Want we want to do is to get this shoulder up and that one down. You see the shoulder muscles are connected with the upper part of the spine. This comes over too far, and in order to straighten it up, we must pull this over this way, and that over that way. The two ends must be drawn toward the right and the center toward the left. We will have him take hold of the seat hard. We want to pull hard back on the right side, and the way to do that is toconnect the upper end with the lower end, and they are connected with the arm. To facilitate that we have him raise this arm too. When we tell him to push this up as high as possible, what are we doing? We are thrusting the arm up. What muscles are used to do that? The delvoid--that is contracting to raise the arm; now what one pushes it up that way? The trapezias, that is attached to the chromium process and the scapula. All of these muscles of the neck are attached to the head and are pulling on the shoulder. Here is the *Latissimus dorsi* which is attached to the arm and is also attached to the ribs here this side. As the arms are pushed up, that pulls over the center part of the curve. Now the muscles of the neck pull the shoulder up, and the muscles attached here pull the center of the curve to the left, while the right arm which is pulling down pulls the top of the spine over toward the right and we then have the curvature straightened. That is more efficient than any kind of gymnastic apparatus that you can set in operation, because it is done by the muscles of the patient himself.

The patients' own muscles do it. Any curvature that is curable can be greatly improved by that method, and even cured. It is only now and then that you come across extreme cases. Boys 12 or 14 can be helped, but in the case of people 18 or 19 or above 20, you cannot do so much for them.

Suppose that we have a curvature toward the left side The right shoulder is low. We simply reverse that. Grasp the seat with the left hand and raise the right arm up as high as possible. Say to the patient, "Graps the seat of the chair with the left hand. Reach the right hand way up above your head. Pull hard with the left hand, reach high with the right hand--high--higher if possible." Take hold a assist a little bit if necessary until the patient's arm is straight. If, after you have gotten him in that position, you feel that you have not accomplished all you want to, take the patient and bend him over to one side. Placing the arm on the shoulder, bend the patient over toward the high shoulder side, completely correcting the curvature. Tell the patient to reach as high as he can, and to hold himself in that position if possible. If the patients succeeds in holding himself in such a position, the curve is obliterated, and you will be sure of curing the patient.

In School of Health work, you will find that one fourth of your audience have spinal curvature, especially the women folks. In a collgee near I recently examined the girls, and found that 70 out of 73 had spinal curvature. That is due to weak muscles of the waist and trunk. It is the weight of the head and shoulders, and the weakness of the muscles of the trunk. High seats may have something to do with it. It is very likely to be caused by the habit of standing on one foot. I know of one case of a girl who got a very bad spinal curvature through standing on one foot while writing at the blackboard.

Question: Would carrying a child always on one arm have anything to do with it. Well, it would be a good plan to change arms now and again, but that does not matter much. The weakness of the trunk and waist muscles is the whole thing. The carpenter always hammers with the right hand, but he does not have spinal curvature. The blacksmith always hammers with his right arm, but he has no serious spinal curvature, and I am bound to say to you that these lateral curvatures are comparatively harmless. You may scare people with them, but you must not infringe too much on your consciences. You can tell them that they have a spinal curvature, but the thing of significance to you is the weakness of the muscles and waist indicated.

Spinal curvatures are not to be recognized by the shape of the spine, but by the shape of the body. Pay no attention to the spine. Often in a bad curvature you can see nothing at all in the spine. When the right shoulder is down and the hip is larger, observe that the hip on one side seems to be altogether obliterated, while the other hip is more prominent. When you have single lateral curvature, the hip seems to be higher and larger on one side. In such cases you might not be able to see any deviation at all in the spine.

Everybody that is flat-chested has a posterior curvature. The doctors are all the time talking about the chest, but the trouble is not in the chest, it is in the back. Here is a bow. When the bow is relaxed the string is relaxed also, but just make the bow taut, and the string is all right right away. When the head and the pelvis are in the same line, that is posterior curvature of the second degree.

Now the first exercise is sitting in a chair , holding with one hand, and reaching the other arm high above the head. Forward sitting, chair holding, one arm stretched.

2. Forward sitting, one hand on hip, one hand on neck, and trunk bending toward side of curvature.

Now suppose here we have the shoulder lower on the right side, that is curvature toward the left. Put the hand on the hip on the right shoulder side. Why? Because we want on this side to bring the muscles of the upper part of the spine into play, and we do that by pushing the fingers in hard. So we pull this end over. We pull this up here, and by doing that we pull the center of the curvature over to the right. Then, after we get that position, we will ask the patiant to bend toward the left. You see when he bends toward the left, that bends the concave center of the curvature over and makes it convex where it was before concave. That corrects the curvature, and it does it immediately. If the patient cannot do that perfectly himself, you just the right arm as a lever to pull it over. And while he is in that position, tell him to take a very deep breath. Repeat this several times. Both of these are efficient movements.

3. Forward bend sitting; trunk raising with resistance.

Forward bend sitting. First, have the patient put his hand on the high side, right shoulder down--got curvature of right shoulder all the time. Put the hand on hip of high shoulder side because you want to bring the action of the muscles of the back of the spine into play in such a way as to fix that end, ~~which~~ the

Latissimus dorsi
muscles of the which are attached to the center of the dorsal re-ion are pulled by the hand raised to the back of the neck. You must lift the hand up high. While in this position, bend forward. That is bending sitting. Now here is the curvature on the left here, the convex curve on the right side. As the patient comes up, I put my hand here, and tell the patient to rise, and I push as hard as I can as he comes up so as to resist the curvature, particularly in cases where there is a rotation. But we must see how we know there is a rotation. We know it because when the patient bends over this way, we see one side stick out. Once in a while there is double rotation. So we find that there is rotation to the left here. You put your hand on that prominent part, no matter where it is, and hold it firmly there while the patient comes up. And I want to say that h undreds of times when I have been holding my hand there, I have felt the vertebrae slip into place.

If you string some vertrebrae on a steel spring, you can when you bend it see them turn around, because of the articulation of the articulating processes of the vertebrae.. You see you make a tension on the left side that it has to slip by in order to relieve the tension on the concave side. If you take a series of wooden rings, say 30 or 40, on a stick, and press in one side, now make that side concave and it will rotate toward the concave side and will bring a bulge out on the other side. Well, as the patient comes up you keep your hand pushing on that, and it will push it into place. And when you have done that once or twice, the patient will be able to do it himself. I find that by putting the patients thumbs back in there, I can get the patient to do it himself nine times out of ten. That is the advantage of that movement.

4. Trunk raising with resistance. One hand must be on the hip of the high side, and the other hand must be on the hip for a time. Why? To fix the one end of the spine, so there will be a tension on the Latissimus dorsi to pull the center over. Put this hand at the back of the neck or on the top of the head, or we can reach it clear up high above the head. The further up we reach, the more pull we get on the spine. Now use the arm as a lever to turn over the left side and straighten up the spine.

5. Forward sitting, one hand holding chair high shoulder side, pulling joint with resistance, and neck backward bend. To do that you will have to stabd up beside the patient. Suppose we have the left shoulder down now. Which hand will be put on the hip? The right hand. Put the left arm up just as high as you can. Now take hold of my hand. Now pull on my hand hard. Pull down hard with the left hand and pull up with the right hand. Now this will pull the concave side over while you are forcing the convex side in. Repeat that a number of times. Pull, 1--2--3--now take a breath. Breathe out, now pull--1--2--3-- Repeat that six times. These are the four best things I know of for lateral curvature of the spine

There is one thing that is more important than anything I have told you with reference to this lateral curvature. That is a thing the patient will do all the time. It is very important to get this. Put the patient into position here with the left shoulder down. You see, if a person is going to teach gymnastics, he must know all about spinal curvatures. That is one of the most important things you meet with. You tell them to hang and swing and all that, but it does not do anything. You never saw a patient cured that way.

Here is what I want you to see. I want to show you how you can straighten that shoulder without having him take any kind of gymnastic movements, and without touching him. I want you to just set your weight over on the left side. That is all in the world you have to do. All you have to do is to tell him to practise sitting on the opposite hip--the hip of the low shoulder. That forces the spine into a curvature on the opposite side. It may be that he got the curvature by sitting with his legs crossed, one knee over the other. The natural effect of sitting with one leg crossed over the other would be to produce a rotation of the spine. Now just bring the weight on the other hip, and that will operate on the lower end of the spine. All the exercises we have been operating so far have been on the upper end. Now we operate on the other end. That is just as easy. It is easy to acquire the habit of sitting on hip of the low side. The patient may have a little cushion to put under one side. Take care to keep the shoulders even. That is worth more than all the gymnastics he can take because it is operating all the time. You can take all those exercises we had this morning, and repeat them with the patient in this position. Why do we do this? Because by long continuance in this situation the intervertebral cartilages are thick on one side. By this method we can squeeze the thick side, and work it to an even thickness al over again. When a person has had a curvature for a long time, the muscles have become concave on one side. The ligaments which connect the processes of the vertebrae have become shortened on one side and stretched on the other. That can be gradually overcome by this method. The muscles contract on the concave side. On the convex side they are sometimes completely paralyzed. As a matter of fact, in these cases of lateral curvature, there is not very much difference in the muscels on the two sides. It is a general weakness. The moment you lay such people down, you can pull them out straight. Sometimes these curvatures are changeable. Now, although he is sitting up on one side, we are keeping the shoulders square , you see. This is the reverse of the real curvature. We reversed it by putting the cushion under him. Take hold of the seat, push the lower part of the chest forward, now push the chest out and pull hard. Now that approximates the two ends. Hold him that way while you count 10. Now ralax and take a deep breath, and hold him taut while you count 8. By this means the patient will stretch the muscles and the ligaments and accomplish all that can be done. The patient can do it all himself, and any curvature that can be cured at all can be cured by that means. Of course, in cases of tubercular diseases of the spine, it is another thing.

Question: In School of Health work might it not be a good plan to uncover the body and show this?

Answer: Oh yes. You could do that all right, and no State Board could trouble you at all. That is simply gymnastics. It does not do much good to merely go through the country talking to people, but if you leave behind something that the people can keep on doing themselves, that is some good.

Question: In case of a single curvature would you not be in danger of producing an opposite effect--that is, another curve.

Answer: Oh, no, you would have to work a long time.

Question: Can you not even the shoulders without correcting the curvature

Answer: You are doing this simply to contract the muscles and to compress the ridge shaped cartilages. Curvatures are hard to cure. The patient must work on that for months and months, probably a year or two before he can be cured.

Now let me show you another thing about it. You have a bad case in which it does not go easy. Grasp hold of the seat with the right hand. Now transfer the weight to the left side. Now, you see, you can pull it over. Then slowly bring the shoulders up to the level. I give that same exercise to patients in bed by saying, "Reach down with your left foot as far as you can. Put your hands on your side and reach your right foot down as far as you can. What muscles are you contracting? The muscles of the opposite side. It is done by the side muscles. You put your hands on your sides, and you can feel the muscles contract, first one side, then the other. When you are over this side, the muscles on the opposite side contract. That is a splendid exercise for the muscles. Get over on the low side, and remain there, with the weight of the body on the high hip side opposite the curvature.

Now, just a few words about breathing. We used to hear a great deal about abdominal breathing. In some of Sister White's writings you will find a great deal about it. But abdominal breathing 30 years ago did not mean what it does now. 30 years ago there were only two kinds of breathing--chest breathing and full breathing, and full breathing was abdominal breathing. Now we have a third kind of breathing--that is, expansion of the whole chest. It has been clearly demonstrated that only such portions of the lung expand as are in contact with the moving chest wall. That part near the diaphragm necessarily expands. The part about the waist may not expand at all. Dr. Adams has shown by X.ray sciagraphs that a large part of the lungs we do not use. You will observe that runners cannot breathe freely until they get what they call their "second breath." The second breath is when the whole chest cavits is expanded. Proper breathing consists of a complete inhalation. The trunk is divided by a flexible ,movable curtain, the diaphragm, which moves to and fro. When you take air into any part of the trunk, the whole must expand--the whole cavity is larger. In order that respiartion be carried on in a physiological way, breathing should be conducted in such a manner that the entire cavity will be enlarged. The chest is constructed in such a way as to facilitate this sort of normal breathing. Here we have the pelvis which supports the form. And we have at the top the collar bones, the shoulder blades, and the ribs and breast bone, and the vertebrae behind to make a support for the upper part of the trunk. In the center portion of the trunk we have the floating ribs. There is great flexibility and great opportunity for movement. So it is apparent that the greatest movement should be in the center part just as when you are inflating a rubber bag. Unfortunately, women so adjust their clothing that it is impossible for the center to expand, and whatever expansion there is must be in the upper or lower part.

Some years ago I fixed up a little device by which I could determine the movement of the uterus in breathing. I have observed in some cases, that the uterus was depressed nearly an inch. One woman had a plaster cast from her hips to her shoulders. In this woman, the moved up and down from 1/2 an inch to an inch, showing the fact that the lower part of the trunk must necessarily expand with the upper part. This movement of the viscera is necessary for the health of the viscera. Then every time a strain is brought on them, the viscera are stretched. So normal breathing is the means of rythmically compressing and relaxing the viscera, and so pumping the blood from the large veins of the abdomen. At the same time with each breath the diaphragm comes down and squeezes the viscera as one might squeezewater out of a sponge. The diaphragm is a pump. It pumps air on one side and blood the other side.

We must impress on the people ~~xx~~ the importance of breathing in relation to the circulation. I sometimes tell the patients to stand up, take a deep breath, and see how many of them can feel the breath in the tips of their fingers. That is the diaphragm pumping the blood out of the fingers. It pumps the blood our of the liver in the same way, only much more vigorously. The blood in the portal circulation has to go through two sets of capillaries before it gets into the general circulation and that is really a most wonderful arrangement.

It is an interesting fact that four women have gall stones for every one man. Recently I took out from one woman 25 gall stones. Now I have her gall bladder washed out with hot and cold every day, and she is getting better.. Four women have gall stones where one man does--that is because of the compression of the waist, and the diaphragm cannot act, so the bile stagnates in the liver, because the same movement which pumps the blood through the liver also pumps the bile through the liver, because it sends the bile out through the bile ducts and discharges it into the intestines. So the diaphragm is not only an air and blood pump, but a bile pump. It also acts on the lymphatics and forces the lymph out of the lacteals and the large lymphatics of the abdomen into the thoracic duct. So the diaphragm is at once an air pump, blood pump, bile pump, and lymph pump. So by emptying the blood vessels of the portal circulation, you prepare the way for the foods' absorbption, and food is actually pumped out of the stomach and into the intestines. So it is not only an air pump, a blood pump, a bile pump and a lymph pump, but it is also a stomach pump. You can test that very quickly. So this process of deep-breathing is very useful for more than one thing. In the process of digestion a kneading movement is required. The kneading movement of the diaphragm upon the stomach and small intestines is one of the most important movements. So there, you see, are six uses for breathing. There are five more functions for breathing besides the one of respiration that we all know about. It is an air pump, blood pump, bile pump, lymph pump, stomach pump, and kneading machine and mixer. The people do not know there is so much to breathing. When they do, they begin to see some importance in breathing exercises. Then they are prepared to take an interest in the movements you are going to give them. Now, put the chest up, put your hands on your chest and notice how you breathe. Now place the hands over the stomach. You will observe x some of you, perhaps, that your hands go in instead of out. Take pains to push the hands out. Nearly every woman, when you ask her to take a deep breath, draws her abdominal wall in, so take pains to see that it is pushed out when breathing in. Now, fill the whole body with air. Imagine you are birds. You know a bird has hollow bones, and they connect with the lungs. So when a bird breathes, it breathes clear down to its toes. Now breathe down clear to the end of your toes. I find this a very good plan. Let us see if we can completely empty the chest. When we ordinarily breathe in, we take in only about one pint of air. But if you breathe fully, you can take in half a gallon more. So if we empty our lungs completely and then breathe in, we can get about a gallon instead of a pint of air. Now let us take a deep breath. Put one hand on the stomach, and one on the chest. Breathe in, and out. Breathe in, 1--2--3--4, out,1--2--3--4. That is full breathing.

There is one thing we have omitted. We have now found out how to breathe. But to make sure that we do it right, we must prepare the lungs. We must do just what the runner does--takes a little run before he starts. When a horse is going to run a race, the drivers have him out and run him around three of four times before he starts the race. They do that to get the second wind. We will get our second wind by simply tapping the chest. That causes the lungs to expand and get thirsty for air. As we cannot drink unless we are thirsty for water, and cannot eat unless we are hungry for food, so we cannot breathe unless we are hungry for air. So we must percuss all the body. You will notice in these breathing exercises that the average woman cannot expand her waist one fourth of an inch. Sometimes it actually gets smaller. These that we have gone over are all chair exercises. A very good exercise is to put the hands on the hips, then begin go pat on the floor with the feet Start with heel raising, then pat on the floor, gradually increasing the speed. Then take a deep breath.

The next movement is first, full breath, head backward bend, hands on hips, take a deep breath and throw the head back at the same time. The hands on the hips holds the shoulders down, you see. Now take a deep breath, throwing the head upward, 1--2--3--4.

The next is chest expanding with hands clasped over the abdomen and pressing.

Take a full,deep breath, lifting the chest up as high as you can. Breathe in, 1--2--3--4-- out,1--2--3--4--. That makes a pull on the diaphragm. The diaphragm is a tremendously strong muscle. A man's diaphragm will lift up another 200 lb.man standing on a board on him. Do not relax the pressure on the abdomen while breathing out, but continue it all the while.

The third movement is full breathing while holding the chest high. Almost the same movement as the last. Get the chest up high and hold it there, and let the breath go out. You must press hard with your thumbs to do it. Draw the chin down. It will amuse people very much to see that they cannot let their chests down while they clasp their hands tight/ It has almost the same effect if you shut the teeth tight.

The fourth movement is chest lifting. This chest lifting is this: Let the breath all out. Now, shut the throatand pull the chest way up, breath out, then open it for a few seconds and let the air in. Then raise the chest again. See me do that. When you have emptied your lungs completely and the chest is empty, shut your throat and raise the chest to make a suction,that creates a vacum in the chest. You are then all the time pulling the blood out of the liver. So wait while I count five or even ten if you can. 1-2-3-4--5---all that time the blood was being pumped out of the liver.

The one thing that the average invalid needs more than any other is to improve his breathing, because that will get the blood out of the liver where the blood cells are being eaten up. The blood must be in circulation before it can heal. It must be in circulation to do business. These breathing exercises are more important than any other one thing.

These four movements are easy to remember , and they are to be taken with the hands on the hips, with the hands on the back of the neck, with the hands on the top of the head, and with the hands stretched up way over the head. That makes 16. Take these same movements that we have had here with four arm movements. Sidewise raise the arms as far as you can; arm circumspection--throw the arms around in a circle; the next is swimming movements. These 64 movements should all be taken with the chest raise--keeping the chest up all the time.

Then there is chest raising. Instead of arm circumspection hace this one: Put the backs of the hands together, and keep them together as far up as possible. The idea is to have all the squeeze of the inspiratory movement concentrated on the viscera. The next is to repeat this exercise at the same time making a musical tone. Then do that again with a sort of explosive sound: ah--ah--ah--jer k it out. That is a splendid exercise, because it compresses the diaphragm each time.

The next going up the scale in the same jerky way. Then the smooth sound all up the scale. Innall these exercises, remember that the chest must be constantly kept up and out. That keeps the diaphragm at work, the liver empty, the stomach relieved, and all the heaviness, and so forth, that people complain of will disappear.

CHIROPRACTIC.

The chiropractic method is a one side and incomplete method, It has a few points of merit. In general, it cannot be regarded as a scientific system. Sometimes it does harm because of the deficient knowledge and lack of experience of practitioners.

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For Good Health

Jasper Douthit's Story.

This is an inspiring book by an inspiring man. The name of Jasper Douthit stands in every community where he has lived as an emblem of the highest ideals and the nblest endeavor. There are few men of the writer's acquaintance whose lives have been more unselfish and devoted to the betterment of their fellows than that of Jasper Douthit. For more than a score of years during which we have enjoyed his acquaintance, we have noted a steady and insistent movement forward in the many different lines of philanthropic effort. His brilliant pen through his journal, "Our Best Words", is always championing the cause of the oppressed, the poor and the needy, and the suffering and always speaks out fearlessly in behalf of every righteous cause regardless of any question of popularity or personal interest.

Rev. Douthit was one of the pioneers of the Chautauqua movement in the West. Through his efforts a very successful Chautauqua has been organized at Lithia Springs, Ill., where thousands gather together every year to an intellectual feast such as is offered at few such gatherings in the United States.

This interesting man has recently been induced to write a story of his life. The volume constitutes a book of 225 pages printed in clear type on excellent paper, well bound, and is filled from cover to cover with inspiring sentiments, lofty conceptions, interesting reminiscenses and anecdote and will doubtless be a beacon light to many a young man who possesses an ambition to make himself of the greatest use in the world and who is willing to pay the price of success by following truth.

We highly ~~xx~~commend this work as most profitable reading for all. Copies may be obtained by addressing The American Unitarian Ass'n, 25 Beacon St., Boston, Mass.

Daily output of energy.
The sources of energy,
Internal work,
External work,
Relation of size to strength,
Relation of size and surface to heat loss,
Energy expended in different kinds of work,
$CO_2$ production.
Lying, sitting, standing, walking, running.
How to estimate work done.

WORK EXERCISES.
Walking,
Climbing,
Lifting,
Heel-raising,
Digging,
Chopping,
Pitching hay,
Raising the body,
Chest weights,

BODILY SYMMETRY.
Normal proportions,
Height, chest, weight, arms, legs, etc.
Total strength,
Strength of different parts of the body.
Comparative strength of men and women.

DEFORMITIES due to weakness of different muscular groups.
Flat chest, (weak backmuscles),
Enteroptosis (weak abdominal muscles),
Swaying or waddling gait (weak side muscles).

Relation of ~~xxxxx~~ muscles to bones and blood-making organs.

EXERCISES.
For general development,
To correct deformities,
For infants,
For children,
For adults,
For old people.

MEDICAL GYMNASTICS.
Special exercises for enteroptosis, obesity, rheumatism, locomotor ataxia.

V GENERAL HYGIENE.

Causes of disease. Consider different maladies.
Germs and bacteriology.
Chemistry of food, air, and water.
Hygiene of infancy, adult age, old age.
ACCIDENTS AND EMERGENCIES.
T
TREATMENT OF SIMPLE MALADIES.

RETURN TO NATURE PHILOSOPHY. ------------ -----

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VII TREATMENT OF SIMPLE MALADIES.

VIII RETURN TO NATURE PHILOSOPHY. ------------ -----

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FOR MANUAL SWEDISH MOVEMENT DEPARTMENT.

Manual Swedish Movements.

Breathing Exercises.

Series I, Lying; Series II, Sitting; Series III, Standing.

The following exercises are to be taken in each of the positions, lying, sitting, and standing. The patients who are to take these exercises should be instructed to practice breathing lying upon the face for at least fifteen minutes, three times a day and to adopt the practice of sleeping in the prone position, (on the face).

Series I.

1. Full Breathing. Take slow, deep inspiration through the nose, expanding the whole trunk; complete the prolonged expiration through compressed lips.(20).

2. Abdominal Breathing. Chest high, hands on hips, thumbs to rear. Contract abdominal muscles with strong expiratory effort; press hard with thumbs upon the lower back to hold chest up during expiration. (10).

3. Assisted Abdominal Breathing. Chest high, hands holding abdomen, deep abdominal breathing (2). (10).

4. Chest Lifting. After complete expiration, close throat and lift chest high as possible followed by full breathing. (1). (2-5).

5. Chest Lifting, Arms Raising. Chest high, deep abdominal breathing (2), arms raising above head. (10).

EXERCISES FOR [illegible].

Relief for Flat Feet.

1. Lying, breathing, chest lifting.

2. rest standing, backward bending.

3. Swimming.

4. Rest standing, twisting, side bending.

5. Arm upward reaching, extending until they touch the floor.

6. Lying, head backward raising.

7. Lying on face, leg backward raising.

8. Arm side raising.

9. Lying on face, climbing ladder with ~~xxxx~~ hands.

10. Lying on face, climbing ladder with feet.

11. Side rest standing, nearly bending, with arm raising, and breathing.

12. Sitting, arms alternate upward stretched, seat grasped, downward pull, with opposite hands.

Exercises for Home.

EXERCISES WITHOUT APPARATUS.

Of the Arm and Hand.

1. Fingers abduction and adduction.

2. Fingers ~~extension~~ flexion and extension.

3. Wrist flexion and extension.

4. Combine the above, beginning with abduction.

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5. Forearm rotation.

6. Forearm flexion and extension.

7. Forearm pronation, flexion, and extension.

8. Forearm flexion and extension, with fingers abduction, adduction, flexion, and extension, and wrist flexion and extension.

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9. Arms flexion across chest, with extension outward and backward.

10. Arms upward raising, arms sidewise raising, upward reaching, sinking, downward reaching.

~~11. Arms rotation.~~

12. Arms rotation, shoulder joint.

13. Circumduction.

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~~Leg exercises~~

Note A. Finger and wrist exercises may be repeated, with arms in the following positions.

Note B. In taking the following exercises the movement should be voluntarily controlled; that is, in using the flexor muscles, resistance should be made by the extensors, and vice versa. By this means each set of muscles may be able to do as much work as is required for its healthy

development, and a perfect balance will be maintained between the antagonising muscles, and so symmetrical development will be secured. It should be remembered, however, that in order to ~~xxxx~~ secure results from this method of exercise, it is necessary that the acting muscles shall be thoroughly energized,-- that is, the highest possible degree of tension should be maintained during the muscular movement, and the movement should be executed very slowly.

The movements should begin with the joints most removed from the trunk, and each group of muscles should be exercised in succession, until the trunk is reached. Care must be taken to bring the will to bear upon individual groups of muscles. The effect of this is not only to develop the muscle~~s~~, but to bring it under perfect control of the will.

(1.) Downward reaching.

(2.) Elbows at sides, forearm half flexed, extending outward.

(3.) Forearm half flexed, extending forward.

(4.) Arms forward reach.

(5) Arms outward reach.

(6.) Arms upward reach.

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Exercises Feet and Legs.

1. Abduction and adduction of toes. Flexion & Extension

2. Extension of ankle, with flexion of toes.

3. Flexion of ankle, with extension of toes.

4. Flexion and extension of leg ~~from~~ upon the thigh.

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5. Abduction and adduction of leg.

6. Flexion and extension of thigh from the trunk.

7. Rotation of leg at the hip joint.
8. Circumduction of leg at the joint.

Exercises for the Head.

1. Flexion and extension forward and backward.

2. Flexion and extension right and left.

3. Rotation to right and left.

4. Rotation right and left, with marked flexion.

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Exercises for the Trunk.

1. Arms upward reach, standing, backward and forward bending.

2. Wing standing, to right and left bending.

3. Think standing, right and left twisting.

4. Rest standing, to right and left twisting, with side bending.

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5. Lying on back, head forward raising.

6. Back lying, legs raising, singly, in alternation, and with head.

7. On face lying, head backward raising.

8. Legs backward raising, singly, and with head.

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Breathing Exercises.

1. On back lying, breathe deeply, expanding sides and abdomen.

2. Deep breathing, expanding the chest and trunk fully and breathing out. Hold chest in position for complete expansion, ~~xxxxxxx~~ drawing the abdominal muscles as vigorously as possible.

3. Empty the lungs, close the throat, and execute the movement of inspiration or breathing in with the chest, raising chest as high as possible. The effect of this is to draw the stomach and other abdominal organs upward.

4. Fill the lungs full as possible, lightly percuss the chest at the sides, breathe out with firm pressure of sides, so as to completely empty the chest. The purpose of this movement is to overcome rigidity, by increasing the elasticity of the cartilages.

cease action long enough so as to extinguish life. So you can not make the heart go faster or slower by simply thinking.

The same ~~thing~~ is true of nearly all ~~of~~ the organs of the body. All the great internal organs, the heart, the liver, the stomach, the lungs and all the other internal organs act independently of the human will. So there are two wills at work within the body.

This power that keeps the heart beating is known as the pace-maker. The physiologist recognizes this power that sends instruction to the heart every time it ought to beat. If you listen to the heart you can hear it. Lub tup, lub tup, that is the song of the heart. It goes on singing this song forever, but behind the heart there is a power, a will, a personality that tells it when to beat and how hard to beat. Physiologists now recognize this fact, and have a means by which they can make that message visible. We have an instrument called the electrocardiograph, and if you take the two electrodes in ~~the two~~ your hands, one in the right and the other in the left, it will write down on a strip of ~~passes~~ paper that passes in front of a little opening, the message that is being sent, and you can see it.

This record is made by the electrical current which is produced by the message that travels down over the heart. By reading the electric record, we can tell just what is happening.

So we know that there is a personality directing ~~talking to~~ the heart, instructing it, and telling it just what to do; and the same personality presides over the stomach and every other organ in the body.

We can readily see, then, that there are two personalities at work in the body because we find two classes of organs, the voluntary and the involuntary. All of the voluntary organs are under the control of the human will; but the involuntary organs, the heart, the lungs, the stomach, the liver and parts of the nervous system, these are all under the control of another will, and the proof of it is the fact that when the human will retires, in sleep, for example, so that we are unconscious, still the heart goes on beating right along. That shows that there are two personalities at work.

The involuntary functions are not under the control of the human will; they are controlled by the creative will, the personality that takes care of the heart and regulates it. The same power that created the heart takes care of it and keeps it going. It is like a marvelous machine made by an engineer, so delicate that after it is made, he has to stay right by to keep it running. Nobody else knows how to make it go. That is true of the body. The same power that made it has to stay with it and take care of it.

We have the proof of this in what we know of the development of a human being. Starting with one little cell smaller than the head of a pin, this cell divides and develops into an adult human being. It is not possible that the cell itself should accomplish this. There is a building process going on, and if you watch it through a microscope, you can see movements in the cells and parts within the cells. They are moving back and forth with the precision of a body of soldiers. They move in one direction, then another, by and by separate, then gather together in groups; and it is all done with the order of a body of men in a military parade.

We see an example of creative work in the blood. In our bodies there are 25 million million red blood cells. It is the red blood that makes the cheeks rosy and the lips red. It absorbs oxygen from the lungs and carries it everywhere throughout the body. It is the same power at work that keeps the heart going continually, as Oliver Wendell Holmes said in his lovely little poem about the heart,

> "No rest that throbbing slave may ask,
> Forever quivering o'er his task,"

It goes on forever, so long as life lasts. This is because the power that made it stands right by it, giving it orders.

Of the 25 million million red blood cells in the body, a million million die every day because each cell only lives 25 or 30 days. Every month the entire mass of blood within the body ( about one-fourteenth the total weight of the body) dies and is created anew every day. This means that eight million blood cells die every second of our lives and eight million new blood cells are created to take their places. This is not a supposition, my friends, it is an actual scientific fact. Every physiologist knows that the blood is being continually created, and that the same thing is going on with other cells all throughout the body, though less rapidly. It takes, in other words, the same power to keep us alive that it took to make the first man and to make us. It is this that makes it possible for a sick man to get well. Getting well is a process of re-creation. The old sick body has to be torn down, carried away and thrown out, and a new body built in its place. This creates the demand for food. We eat our own weight every month. So this re-creating process that goes on continually requires the presence within us of an infinite personality.

It is not unreasonable to conceive of an infinite personality. We believe in an infinite space. We cannot picture it, but we recognize it to be a fact that space is infinite.

The same ~~thing~~ is true of time. We know time to be infinite. We can not imagine such a thing as the beginning or ending of time.

It is of course impossible to comprehend infinite things. They are beyond us. And of course this is true of the infinite personality. We can form no conception of its shape or its size, or any physical limitations of any sort, because it is infinite. But we can form definite concepts of its character, its wisdom, its power, its many attributes, although we can not measure them. If we have difficulty in accepting this idea, it is because we do not have a clear idea of personality. We think of personality as connected with some special form or shape, preferably human, perhaps. This is an error, as I learned from an experiment many years ago, of which I will tell you.

I was taking post-graduate studies in a physiologic laboratory. One day the Professor gave me a large pair of shears. "Now," he said, "you must take these shears and cut off this frog's head, which I very reluctantly did. Then the Professor said, "Lay the frog on the table." So I laid it on the table and, to my surprise, this headless frog turned over and sat up, as though it were alive. The Professor then said, "Strike the table." This I did, and the frog leaped high out into the middle of the room, and fell upon the floor on its back. It immediately turned over and sat up as before. It apparently did not raise its head. Then the Professor said, "Stamp upon the floor," which I did, and the frog leaped straight ahead. The Professor said, "Stamp again," which I did, and the frog leaped again and continued leaping as I stamped, until it reached the side of the room. Then the Professor said, "Bring the frog back to the table," which I did, and laid it on its back. "Now," said the Professor, "Rub a little acid on its stomach," handing me a bottle of acetic acid. I did as ordered, and immediately the frog brought up its hind feet and began rubbing its stomach as hard as it could to wipe the acid off. Then the Professor said, "Now hold down the right leg." Well, I wondered what this frog woulc do when I held the leg down. I expected to see it struggle to get away, but instead, to my great amazement, it twisted up its left leg and rubbed its left thigh with the tip of the toes of its left foot. Think of a headless frog performing an act like that.

The mystery of this experiment puzzled me for many years. How could such a thing happen, a frog with its head off and without a brain, performing such ingenious acts? Many years later, I found the explanation in a very learned German work on general physiology by Professor Verworn. Referring to the experiment I have just described, he said, "This experiment proves that the frog has personality in its spinal cord."

Here was a new conception of personality. Personality does not necessarily imply a human being. It means the possession to will and to do, to execute, to plan.

It is evident that the essence of personality is not form or shape. It is the expression of will, of design, of a plan. ~~Go into the woods and~~ If you find a nest in the woods, you know that behind that nest there was a personality. The nest would not be there if there had not been a builder to plan and make it.

So when we see a human body, we know that behind it there is a personality, and this personality is working in harmony with the human personality. We are dual beings. Our bodies are controlled by a human personality and a creative personality working together.

We believe in infinite space and in infinite time. Why should we not believe in an infinite personality as well? We have the same proof for one as we have for the other. We know space exists because we can measure a portion of it. We are in contact with it and we have evidence of its existence. We know time exists, infinite though it is, and beyond our comprehension, and we believe in time. This is equally true of the Infinite Personality. We know that it exists because we see the evidence of its work in every flower, in every tree, in every cloud. In every sunset we see evidence of the existence of the Infinite Personality with an infinite power to work, with an infinite sense of beauty and of artistic taste. We see ~~all of~~ this exhibited in nature all about us.

I think it is important that we should be fully convinced that there is a personality, not simply a law, or a mechanism, but an Intelligence, a Mind, that works not only for our moral welfare, but for our physical welfare as well. We have infinite evidence of its power and its beneficence in every living thing, animal or vegetable. In all the inanimate world about us we have proof of the existence of this Infinite Creative Power continually at work. Dr. Millikan tells us that the cosmic rays are proof that even matter is being created continually.

The important question to the average man who thinks about spiritual things and the here and the hereafter in a serious way is, Does this great Personality pay any attention to me personally? If I am in trouble, is there a place where I can go for help? Perhaps you have been so brought up you never have any doubt on this point. If so, you are fortunate, but there are millions of people in the world who have no faith. Atheism is spreading throughout the world. I feel sure that the number of people who are in the habit of praying to-day is much smaller than when I was a boy. In my boyhood, there were family prayers every morning and every evening in almost every home. Today I fear that family prayer is rare in homes, and that the number of people who believe in the efficicacy of prayer at the present time is comparatively small.

I asked a lady the other day if she was a church member. "Yes," she said, "I belong to the Episcopal Church." The next question was, "Do you pray regularly?" "No," she replied, "I don't pray at all. I gave up praying a long time ago." "Why did you give up praying?" "Because I found it did not do any good. I did not get any answers to my prayers."

That is a very great mistake and the thing I want to show you tonight is that every one of who prays has very definite and very positive answers to prayer, and that there is a source to which you can go and be sure of getting an answer if there is an answer.

An incident that occurred several years ago: I was sitting in my study at work, alone. It was late twilight. Suddenly a very shrill sound came through the open windows. Then another, and another. Evidently some creature was in trouble. An assistant seized a staff and ran out and found a large black snake swallowing a frog. It had one of the frog's legs in its mouth. The little frog had whirled about and seized the snake's head and was hanging on and shouting with all its might for help. It was astonishing how loud a noise so small a creature could make. My assistant put the staff upon the snake's neck. The snake opened its mouth and the little frog hopped off three or four inches and remained quiet, resting for several minutes, showing no fear, evidently recognizing the fact that help had come. Soon it hopped off in the grass and disappeared. It prayed and its prayer was answered.

<u>That little frog was praying</u>. That cry of distress was

a prayer just as much as any prayer ever uttered. Every cry of distress is a prayer, an appeal for help. Do you say that the frog was calling other frogs to come and help it? Did you ever ~~see~~ hear a frog ~~help~~ call to another frog for help? Frogs don't know enough to help one another when they are in trouble. Did you ever see a frog hopping off to help another frog? The frog was calling to its Maker for help. It was not calling to me for help. It did not know that I and my helper were near. It had never heard of us. It was simply obeying an inherent instinct. ¶ Every creature that has a voice calls for help when it is in trouble. Did you ever think of that? The more you think of it, the more you will be sure it is a fact. Every creature with a voice, when in trouble, utters a cry of distress. You recognize the cry when it comes. The appeal for help is characteristic. If you hear a dog barking, you know by the character of its bark whether it is <u>in</u> trouble or <u>making</u> trouble. If it is <u>making</u> trouble, it has one voice; if it is <u>in</u> trouble, it has another voice altogether.

When you hear a baby cry, you know whether it is sick and suffering or whether it is having a tantrum. It is an entirely different sound. And so the voice of real prayer, the instinctive appeal for help, is characteristic. It is not simply a call to some other creature for help. Of course a man or some other intelligent creature might make such a call, but if there is no human being about and a man or a dog is in pain and distress, he cries out instinctively.

I will illustrate this principle by a circumstance which occurred in the London Zoo a few months ago. A little chimpanzee became a mother. When she saw the little baby chimpanzee lying on the floor, she was terribly frightened, and fled to the remotest corner of her cage, jittering with fear. By and by the little one whimpered. Down came the mother with a great bound and placed the little one to her breast, and mothered it is real human fashion. To whom was that baby crying when it whimpered? To whom was it appealing? It was obeying an implanted instinct, appealing to its Maker. When the mother heard that cry, the mother instinct within her was awakened and she instantly responded. That feeble cry was to the mother an imperative command to go to the relief of her offspring. It was an effectual prayer.

You will perhaps remember the story of Hagar of old, who took her little son and went out into the desert because Sarah was jealous of her and Abraham cast her out. The little boy was crying with hunger and thirst, and she could not bear to hear him cry, and so laid him down behind a bush. She went hunting for water. The text says, "And God heard the voice of the lad." Hagar found a spring of water and the lad was saved and became the father of a great nation. Never a blade of grass grows anywhere unless there is water, a spring, or water from some source. So when Hagar saw the bush, she knew there was water. She came to the bush, but could not find the well. She knew there was a well there somewhere, but she could not find it. Why? Because the wells in the desert are dug down, some of them, not finished.

When one cries out for help, he is obeying a God-implanted instinct. Every creature in trouble calls for help. My friends, that instinct is within us. Whether a man believes in God or does not, when he is in trouble, he cries out; he prays. And if there is help for him, he will get it. Every groan, every cry of distress, is a prayer, an appeal to our Maker.

There is within our bodies a special mechanism through which prayers are heard and answered. As I have shown you, there are within us two personalities, the human personality, which presides over all voluntary acts, and the creative personality, which keeps the heart beating, renews the blood every month, and keeps us alive by incessant creative activity.

Now I will raise a question. What is the origin of the new ideas and concepts that come leaping like meteors into our minds? I once asked this question of a professor of psychology, from a great eastern university. He replied, "We make them, of course."

"Well, now," I said, "Professor, I am very short of ideas to-day, and it would be of great assistance to me if you would make a couple of good ones for me. I would appreciate it very much." "All right," he said, and he very amiably at once set to work to make some ideas for me. He looked about the room and all around, and by and by passed ~~his~~ one hand over his face, and then both hands. Soon great drops of perspiration appeared on his brow, and his face was very red with emotion, but he did not produce a single idea. Finally, I said, "Professor, you can not make ideas. Ideas are new creations and you can not make an idea any more than you can make a flower."

Ideas come into our consciousness already made. Don't you sometimes say, "An idea struck me?" Don't you say, "An idea popped into my head?" I have heard people use that expression. Haven't you heard people say when asked, "Where did you get that idea?" "It came out of the blue." What does that remark mean? It means that the idea came from somewhere outside of the consciousness.

I think every one must recognize the fact that ideas originate outside of the consciousness, but not outside of us. Ideas originate in a part of the brain known as the subconscious, which is known to be located in the hypothalamus, a ganglia found at the base of the brain. The back part of the brain is called the sensorium. That is where sensations, sight pictures and sound pictures, memories of experiences all are stored. These subconscious centers send little threads of nerve fiber into all parts of the sensorium and are thus in touch with everything that is stored there. This is the seat of the subconscious.

There two kinds of thinking done in the brain. There is the ordinary mental activity, which takes ideas, combines them into sentences, plans, etc. That is the conscious thinking. Then there is the unconscious thinking, the creative thinking that is carried on in the subconscious. You have often had an experience that demonstrated this. You were thinking of something at night, some problem perhaps when you were a student in school. You worked hard on the problem until you were so weary you could not keep your eyes open longer and went to bed. In the morning when you awoke, you found the problem which troubled you the night before was solved. The subconscious, the creative mind, had been working while you slept, and solved the problem. You have had that experience, I am sure, every one of you. You have had social problems and moral problems you could not answer at night, but in the morning they were all clear.

These morning thoughts are most important. I always have a tablet with me when I go to bed and every morning when I waken, if I have had a refreshing sleep, I get a star shower of ideas and write them down as fast as I can, so they will not get away. I have practiced this for many years. The best ideas I ever get come in the morning.

Now, what have we to do with the subconscious? I have told you one way in which you can make it work. When you go to bed at night, think of the thing that you are interested in. Concentrate your mind upon it before you go to sleep. That concentration is real prayer. Prayer is not the words you say. Prayer, as the poet says, "is the heart's sincere desire." That is what prayer is, "the heart's sincere desire," whether you express it or not. The sense of real need is prayer. That is what the creative personality recognizes, real need. You may ask for something you do not need.

That is the way it is with prayer. We call for a thing we think we need. The thing that the creative personality takes recognition of and sends as the answer is the thing that we really need.

You say, "How are we going to make use of the subconscious?" In just one way. Concentrate your mind on the thing that is troubling you at night. Concentration of the mind on something you need is real prayer. We do a great deal more praying than we appreciate.

When you say, "How I wonder what I ought to do about that. What is right to do?" of whom are you asking that question? You are not asking it of yourself because you know you do not know. You are conscious of the fact that you do not know and that it is why you raise the question. One does not go for information to one who he knows does not possess the information sought. In raising such questions, perhaps unconsciously, though none the less effectually, seeking help from the great source of wisdom. By and by the answer comes and it comes from the subconscious, where the creative thinking is done; and that thinking is done by the power that made us, by the power which the Christian calls God, and the agnostic calls the unknowable.

Now, let me raise this question, How can we get help from this source? It is by concentration. By concentrating the mind, we open the door into the subconscious, and we put a problem up to it, seeking for a solution.

When we say, What shall I do about this? What is the right thing for me to do, and think intently about it, we set the subconscious to work and by and by the answer will come back.

When we pray, we simply concentrate in the most effective manner. When we are in trouble and call out for help, that is real praying. Ceremonial praying is another thing. It is wholesome, but it is not the kind of prayer I am talking about. It is not the effectual prayer that gets answers. The earnest appeal that one makes when he finds himself at the end of his rope and cries out for help, that is real prayer, the sort that brings an answer when there is one. Whether we make the appeal in a formal way or simply cry out for help, the results are the same because it is the need that is the real prayer. The Master Mind, the Creative Intelligence is interested in us. If you ask, "How do you know that?" I answer, "Every act of life, even the very simplest, ~~are~~ is wholly dependent upon the intervention of infinite creative power. The Apostle Paul knew this. He said, "in whom we live, and move, and have our being."
Every mouthful of food swallowed is an appeal to the Creator for help, for without the miraculous transfiguration which changes

food into living, sentient, thinking human beings, there could be no digestion and no assimilation, and the food swallowed would lie inert in the stomach. And here is a mystery. Why doesn't the stomach digest itself? The stomach digests the things put into it, even things we never ought to put into it, such as an oyster's stomach and everything else the oyster possesses. Then why doesn't the stomach digest itself? The only possible answer is that the power that made the stomach stands by it and takes care of it.

Now about praying. Praying is just as natural and just as physiologic as breathing. Everything that has a voice prays when it is in trouble. We do a great deal of real praying which we do not recognize as such. Whenever we raise the question, "What ought I to do?" that is a prayer. We are asking the question not of ourselves, because we do not know, but we are asking the question of the power that made us. The answer comes through the subconscious, where creative thinking is done. When we concentrate upon a subject, we set the subconscious at work. In prayer we have the most intense concentration, because when we are in trouble, we are at the end of our rope, so-to-speak, and we do not know what to do. The stage of consciousness is vacant; we have ceased voluntary thinking and planning. We have asked for help and are waiting for an answer. If there is an answer, if there is help for us, that is the way to get it.

I am not going to say that everything we ask for, we shall get, because it may be impossible. If we ask for something that is inconsistent, unreasonable, and impossible, or likely to do us harm, we will not get it, of course.

But prayer is not simply intense concentration. It is much more. The more faith we have, the more intense will be the concentration, and the more certain we will be of getting results.

You say, "This is a new philosophy. It do not know whether it is sound or not." I am going to give you simple proof of is which I think you will recognize. If there had never been any food, would there be any hunger? Evidently, there would not be. If there were no water and never had been any water, would there be any thirst? Certainly not. Now, my friends, if there were not such a great source of help to which we can appeal when in trouble, would there be a universal instinct to cry out, to call for help when we are in trouble? I am sure you can see, my friends, every one of you, that it is impossible there should be such a universal, innate instinct leading every creature with a voice to call for help when in trouble if there were no great Helper on whom to call. So the fact that this universal instinct exists, that every creature calls out with a voice of distress and appeal when it is in trouble, is absolute proof that there is a Helper and help when our destiny calls for it. We are not simply driftwood, mere creatures of chance.

Now, my friends, won't you apply this to yourselves? Concentrate your mind upon the thought oof help. You can help yourselves, and this is the real mind cure, if you please. This is the real faith cure. The real cure comes in concentrating the mind upon the things that are likely to help us. Appeal for help. Call upon your Maker foe help. You may say, "I do not believe in your kind of a God." It does not make any difference at all about that. It does not make any difference whether you believe in an Episcopal God, a Methodist God, or a Baptist God. The different conceptions of God are the real basis of differences in theology. That is what theologians quarrel about. It does not make any difference what kind of being you believe in. The fact remains the same that there is an infinite power that is ready and able to help. As Dr. Joseph Cook said, "A power not of ourselves that works for righteousness," that works for healing bodies, that works for comforting worried souls, and that power we can all appeal to, and we can be sure to get the help there is for us,— ~~and~~ not through any arbitrary or mystical means, but through a normal and cooperative functioning of the human mind and the Creative Mind working naturally, consistently and harmoniously.

So you see there is sound sense and consistency in the exhortation of the apostle, "Pray without ceasing," for we have constant and very pressing reason for calling for help. Every decision we are called upon to make, every problem we have to solve, dawns upon the consciousness of an idea, or perhaps a group of a procession of ideas, the products not of our human thinking, the action of the Infinite Intelligence upon the subconscious. When one really realizes this great fact, it makes every moment sacred and one sees actual fact rather than sublime imagery in such expressions as "Thou art my Refuge," "a shelter in the time of storm," "the shadow of the Almighty," "a Voice behind you, saying 'this is the way, walk ye in it,'" "a very present Help," "a shade upon thy Thy right hand," "Lay your burdens on the Lord." The Presence is not an evanescent thing that comes and vanishes, but a constant, inseparable reality so long as life still animates us.

Here is a very practical suggestion that will lead you into a most delightful experience: When you pray at bedtime, just before closing your eyes to sleep, make a note of things upon which your mind concentrates, the help for which your heart most earnestly yearns. The next morning note the ideas that come bounding into your mind when you first awaken from sleep, expecially after a good and refreshing night's rest. You will probably be surprised to find how many answers for bedtime prayers you receive. The trouble is we pray for things and then forget that we prayed, and so do not recognize the answer. The answer may come months or even years later. Prayer is the divinely appointed means of keeping in touch with Heaven and the beneficent Guiding Hand that made us and keeps us ~~in life~~ alive. We may well obey the exhortation of the apostle to "pray without ceasing."

The improvement made in methods of posture in the last eighteen months at the Naval Academy, have been extraordinary. Good posture is for health, for beauty and for efficiency, and applies as well to sitting down as to standing in ranks. I have no hesitation in saying that the U. S. Naval Academy is run on the soundest system in the world and is more advanced than any other institution.

When I first put the testing machine in the gymnasium, I called attention to the various systems used by athletes at most institutions, which systems merely select the best trained individuals for physical tests. I insisted that no midshipman should be allowed to perform his stunt at exhibitions and that he should be discouraged from over-development in his speciality, to the end that if all midshipmen were developed all-round, there would be such a wealth of athletci material that star performers would develop unconsciously. In other words, I put into the gymnasium, the spirit which is now going so strong, which is, that every bit of development of the individual which is designed for his special benefit, will in future give better results than going in for the stunt system. I called attention to the fact that the Naval Academy Gymnasium Team has won every contest for a period of eleven years, because it opposed the "stunt" system, which system only allows you to do the thing you can do best, which leads to over-development in a certain line; whereas the sound principle is to develop everybody according to individual needs, and in general athletes will prosper.

For years past, I have allowed the various Medical and Line officers connected with the gymnasium to take all the credit for the spendid system of training now in force, but the institution really owes everything, along the lines of which I have spoken, to Dr. Kellogg, whose ideas I have followed since 1893. I have absorbed his ideas by spending an occasional month at his institution at various intervals since 1893, and the money I have spent to acquire the information has been repaid me many-fold personally, while, at the same time, I have passed on everything I have learnt to those in charge of the physical training of midshipmen.

I am coming to America early in 1930 and will hope to still find you holding down the job.

Mrs. Noblack joins in cordaial regards to you and Mrs. Robison.

Very truly yours,

A. P. Niblack

Duplicate



There are bed exercises for patients who are unable to sit up; chair exercises for those who can ~~xxx~~ sit but can not stand upon their feet or walk; wheel chair exercises for those who are a little stronger and able to go about; dumbbell exercises, club swinging, light calesthenics, apparatus work, and a great variety of exercises for physical culture classes which are conducted almost hourly during the day, by trained directors.

Special attention is given to swimming, for which there is abundant opportunity in the two large, indoor swimming pools, one for men, the other for women, and in the still larger outdoor swimming pool which is open during six months of the year.

Outdoor tramps up and down the river, over the hills, through the woods or about the shady walks of the town are a part of every day's program. Scores of walks about the Sanitarium have been carefully surveyed to determine distances, so that the exact amount of work accomplished in walking a given distance over any of the prescribed routes is easily determined by a well known formula for use in connection with the individual's weight, the work accomplished being expressed in foot pounds. By these various means the exercise of the patient is reduced to a scientific system and is not left to guess work or desultory management. (In connection with this chapter there should be cuts illustrating walks at different seasons of the year, a fair idea of the exercises for building up the system, manual swedish movements and a number of gymnasium views showing apparatus work, wheel chair exercises and also some bed exercises)

Each patient receives his prescription for exercise, giving full directions as to just what kind of exercise and how much he should take. The exercise is applied after a graduated method which increases the vigor of the exercises from day to day. The Swedish System as modified for use in the Battle Creek Sanitarium especially lends itsèlf to this graduated method. There are various series of movements especially adapted to different classes of exercise. Each series consists of ten or more days orders, each of which consists of a number of movements which are adapted to one another as well as to the special conditions for which they are applied. Among the series in common use for special movements are the following, which combine the movements which have been found most effective in accomplishing the several purposes indicated.

**Electrical Appliances and Methods.**

Since the days of Volta and Galvanni electricity has been constantly growing in favor as a natural curative agent. Unfortunately, however, until recent years its use was almost entirely in the hands of amperes; the methods were crude and unreliable and the results equally unsatisfactory, but within the last generation the various forms of electrical energy have been studied and their application reduced to a scientific method. The experiments and researches carried on in the Battle Creek Sanitarium have contributed in some degree at least to the accomplishment of this result. Certainly there is no place in the world where the various useful electrical currents are applied with greater thoroughness or efficiency nor with more beneficial results than here. Electricity as a curative agent has often been brought into disrepute because of its isolated employment. Used alone it often fails of success. When in combination with a proper regulation of the diet and especially with applications of ~~water~~ complete success might have been attained. There are, indeed, comparatively few cases in which electricity alone is capable of meeting all requirements. On the other hand there are indeed few chronic cases in which this powerful agent in some form may not render useful service. At the Sanitarium electricity is used in the various well known forms--galvanic, faradic and static currents, but the largest place is perhaps given to that special form known as the sinusoidal current. This current was first made use of in this institution nearly twenty years ago, although it was described and named some years later by the renowned French Physicist Professor d'Arsonval. . The sinusoidal current of d'Arsonval was a high frequency current, while that first employed here was a low frequency current. Its great advantages over other currents were from the first apparent. Its power tonic effects and its great versatility and adaptability especially give it the advantage over the better known currents. This current is administered through water in the bath as a tonic and also as a means of exercise when it is desired to burn up residual tissue, as in removing flesh. There are also various local and general applications whereby the various nerves and nerve centers ~~xxxxxx~~ and muscular groups may be brought under its curative influence. One of the special features of this current is its painlessness. It is both interesting and agreeable to see the muscles of a patient under its influence contracting with as much vigor as though he were chopping or sawing wood or climbing a hill, although the patient lies quietly on a lounge experiencing no other sensation whatever than that of motion. This current is found useful in internal as well as external application and is an excellent means of increasing motility or muscular activity of the stomach and the colon.

Our static electrical department is provided with the largest static electrical machine ever constructed. It produces currents of such volume that an electric bath may be administered to a whole room full of people at once. Exceedingly valuable effects are obtained from this powerful machine in cases in which it is especially indicated. Galvanic electricity is on tap in every room in the house and is utilized not only for various resolvents, soothing and pain relieving effects but as a means of heating warming pads, the electric thermaphore and in making prolonged, if necessary all night, applications of feeble electric currents when this is deemed advisable.

The X-ray apparatus, of which the institution employs a number of excellent outfits, renders great practical advantage both in diagnosis and in treatment. The discovery of the X-ray marked one of the most important epochs in modern medical discovery. The ability to determine the form and location of such internal organs as the stomach, heart and other important viscera, and especially the ability to locate small groups of tubercular deposits in the lungs, places in the hands of the physician the most important aid, while the influence of the rays upon the tissues often renders feasible the cure of internal maladies which are incurable by any other known means. The accompanying cuts illustrate some of the uses of the X-ray in diagnosis and treatment. (make some further description of the phototherapy department and also describe in greater detail the outdoor gymnasium and the outdoor sleeping, showing tent colonies, roof and porch sleeping arrangements)

DAILY PROGRAM

For Week Beginning

Name ______________________________

MEALS Breakfast 7:30 - 8:00 - 8:30
Dinner 1:00 - 1:30 - 2:00
Supper 6:00 - 6:30 - 7:00
Special ____________________

EXERCISE 9:00 A.M. - Lung Gymnastics

2:30 P.M. - Posture Drill

Walking ____________________

Health Walker ________A.M. ___ P.M.

SPORTS

Horse Shoe
Badminton
Shuffle Board
Volley Badminton
Swimming

Deck Tennis
Cycling
Riding
Surf Bathing

CORRECTIVE EXERCISES BY APPOINTMENT

REPEAT TESTS

BLOOD - Red
White
Hemoglobin
Sugar
N.P.N.
Differential

Blood Pressure
Metabolism
Acidosis
Urine

Stool
Colon Motility
Gastric Motiligy
Weight
Strength
Vital Capacity
Shadowgraph
____________________

____________________

____________________

# PHYSIOTHERAPY

| | Sun | Mon | Tues | Wed | Ths | Fri | Sat |
|---|---|---|---|---|---|---|---|
| **PHOTOTHERAPY** | | | | | | | |
| Sun Bath | | | | | | | |
| Skyshine | | | | | | | |
| Sunshine Bath | | | | | | | |
| Cabinet Light Bath | | | | | | | |
| ½ Cabinet Light Bath | | | | | | | |
| Photophore | | | | | | | |
| Infra-Red | | | | | | | |
| **ELECTROTHERAPY** | | | | | | | |
| Diathermy | | | | | | | |
| Automatic Exercise | | | | | | | |
| Sinusoidal Bath | | | | | | | |
| **HYDROTHERAPY** | | | | | | | |
| Rain | | | | | | | |
| Jet Douche - Temp: | | | | | | | |
| Spray Douche-Temp: | | | | | | | |
| Percussion "-Temp: | | | | | | | |
| Hot Vapor "-Temp: | | | | | | | |
| Scotch Douche | | | | | | | |
| Dry Hand Rub | | | | | | | |
| (Cold Wet Hand Rub | | | | | | | |
| (Dry Towel Rub | | | | | | | |
| Cold Mitten Rub | | | | | | | |
| Cold Towel Rub | | | | | | | |
| Fomentation | | | | | | | |
| Moist Abdom. Bndg. | | | | | | | |
| Heating Compress | | | | | | | |
| Cold Compress | | | | | | | |
| Arm,Forearm,Hand Bath | | | | | | | |
| Sitz, Leg, Foot Bath | | | | | | | |
| Bubble Bath | | | | | | | |
| Salt Glow | | | | | | | |
| Oil Rub | | | | | | | |
| Soap Shampoo | | | | | | | |
| Neutral Bath | | | | | | | |
| **MASSAGE** | | | | | | | |
| General | | | | | | | |
| Local | | | | | | | |
| Swedish Movements | | | | | | | |
| **MECHANOTHERAPY** | | | | | | | |
| Oscillator | | | | | | | |
| Vibratory Chair | | | | | | | |
| Kneading | | | | | | | |
| Horse | | | | | | | |
| **SPECIAL** | | | | | | | |

613.7 full head a 158



EXERC~~IXE~~ISE. Exercise is one of the most important means ~~for the~~ of main- taining the ~~tenance~~ of health. It quickens all the vital ~~activities~~ functions of the body; it increases the activity of the heart and lungs, and thereby brings to every tissue the ~~needed~~ amount of pure air and pure blood necessary to ~~for~~ maintain~~ing~~ healthful action. During vigorous exercise the ~~amount~~ quantity of air received by the lungs is seven times greater than that used during sleep, or when lying quiet in a horizontal position. The ~~important~~ significance of this fact will be appreciated when ~~we~~ it is remembered that oxygen is the element by which the worn-out muscles of the body are consumed, and the blood and tissues purified. The degree of vital activity depends directly upon the amount of oxygen received, just as the rate of combustion in a stove ~~[illegible]~~ or furnace is in proportion to ~~depends upon~~ the ~~amount of~~ air admitted through the drafts. The greater activity of the life of a bird, as compared ~~to~~ with that of a frog or a turtle, is in ~~directly connected with~~ proportion to the ~~enormous~~ large ~~amount~~ quantity of air passed out and in of the ~~capacious~~ vigorous lungs of ~~a~~ the bird as ~~compared with~~ related to the small ~~quantity~~ amount of air swallowed by a frog or a turtle into its little air-sacks.

Exercise aids digestion ~~by~~ by improving both the quantity and quality of the digestive fluids formed. The ~~improved~~ ~~exercise~~ sharpened appetite resulting from active exercise~~,~~ ~~is an~~ is indication ~~of~~ an increased ability to digest. A sedentary man is certain to be a dyspeptic sooner or later; and following in the wake of dyspepsia come~~s~~ Bright's disease, consumption, sleepnessness, nervousness, and a great variety of other distressing and often fatal ailments. There is no means by which old age can be held at bay so effectively as by regular systematic exercise. Centenarians have al~~ways~~ most invariably been active in their physical habits. Gladstone, the great~~est~~ Englishman, now hale and hearty at the advanced age of eighty, has always been noted for his devot~~e~~ion to exercise as a means of preserving his health. Caesar was one of the ~~most noted~~ best athletes of his time, as was also Lonardo de Vinci, the famous Italian painter. ~~was one of the most athletic men of his age.~~

The body is constantly receiving new material in the form of food and passing it out in the form of excretions through the lungs, the skin, the kidneys, and the bowels. The active muscular body is like ~~the~~ a rapid running stream, the motion of which keeps it pure, sweet, and sparkling, while ~~the~~ the body of an inactive, sedentary person is like the water of ~~the~~ a stagnant ppol, teeming with filth, and breeding disease.

Exercise to be of real benefit must be carefully adapted to the age and condition of the ~~individual~~ person. Our limited space gives us opportunity for but a few brief hints concerning the exercise appropriate for different classes of individuals.

**Exercise for Children.**— Children and young persons ~~possess~~ should have a variety of exercises. They possess great aptitude for acquiring new exercises requiring ~~a great degree of~~ skill and dexterity, but they have little endurance; their soft, bony structures and imperfectly developed muscles and tendons render prolonged exercises of the same sort injurious and likely to produce deformities. On this account, various exercises which will secure an all-round development, with careful avoidance of violent exercises and the continuance of ~~exercise~~ those of the same ~~sort~~ kind for too long a time, are matters of great importance. Children's games, bicycle riding, and swimming are especially to be commended as excellent exercises for children, ~~remembering always~~ the precautions mentioned being always kept in mind. ~~Every child should learn to swim.~~ Special attention should ~~be~~ given to the development of lung power, and to the cultivation of a good physique and a correct carriage of the body in walking and sitting.

—John Wesley declared that he owed his good health while a student to the fact that he had scrupulously obeyed the instructions of his father, who, on the occasion of his son's leaving home to enter school in London, requested him to run three times around Charter House Square every morning. ~~an injunction which young Wesley obeyed to the letter.~~

**Exercise for Girls.**— Below the age of puberty, girls possess the same aptitudes for physical ~~abilities~~ exercise as boys. In fact, ~~from the ages of twelve to fourteen years,~~ from twelve to fourteen years of age girls are somewhat ahead of boys in ~~development~~ some respects, the average girl being ~~actually~~ taller and better developed than the average boy of that age, both physically and mentally. After puberty, however, the special development in girls must be considered in their exercises. ~~The endurance of~~ Young women ~~is~~ are less adapted to exercises which require the support of the body by the arms than are young men, for the reason that, as compared with boys, their arms are much weaker in proportion to their body, ~~as compared with boys,~~ than are their legs or the muscles of other parts of the body. It is especially important that exercise for young women who have not been brought up to vigorous muscular pursuits should be carefully regulated, as the weakness of the internal structures in undeveloped young women is likely to lead to serious displacements as the result of engaging in vigorous muscular exercise requiring a straining effort. It is only by a long and carefully conducted course of training that ~~such young women~~ can be developed to a condition in which vigorous gymnasium exercises can be ~~engaged in~~ without injury.

ordinary

**Exercise for Adults.**— The average healthy adult man can engage without injury in muscular exercises of all sorts, and ~~may exercise~~ as vigorously as he feels disposed to, within reasonable limits of course. ~~short of great exhaustion~~. No ~~injury~~ harm results from becoming tired, or even exhausted, to a moderate extent. ~~Nature's sweet restorer,~~ Sleep, and sufficient rest will not only restore the ~~tired or exhausted individual~~, but make him stronger than before, unless, of course, the exhaustion has been extreme in degree. Invalid ~~adults~~ s must have such specific directions respecting exercise as are particularly applicable to their individual cases.

practiced

person to his normal condition.

too

**Exercise for Aged Persons.**— In old age both the aptitude for exercise and the ability to execute muscular movements are to a very considerable degree diminished. The capacity and activity of the heart and lungs are lessened, also the ability to recuperate from exhaustion. There is, moreover, a marked tendency to consecutive or secondary fatigue, a form of exhaustion which is not experienced at the time of exercise, but is felt to a marked degree a day or two subsequently. An old person feels the fatigue of an effort ~~less at the time than~~ more twenty-four or forty-eight hours ~~later~~ ; consequently he is likely to go beyond the proper limit in the expenditure of muscular energy before he is aware of the fact that he has done so. Elderly persons should always bear this in mind when engaging in physical exercise, especially those who have not all their lives been accustomed to active muscular pursuits.

afterward

than he does at the time

**Exercise for Obese Persons.**— Very fleshy persons need all the exercise they can take, and more. Exercise is necessary to burn up the surplus fat; ~~Exercise,~~ in fact, it affords the only means by which permanent relief from obesity can be obtained. It ~~must~~ should be remembered, however, that ~~the~~ exercise ~~must~~ be taken daily and systematically, ~~and must be made a regular habit of life~~ and ~~continued~~ kept up so long as the tendency to accumulate flesh continues. In case of extreme obesity, the exercise ~~at~~ first ~~taken~~ must be very gentle, and ~~must~~ be gradually increased as the patient's strength increases and as the amount of adipose tissue diminishes. Walking, wood-chopping, Swedish gymnastics, bicycle riding, in cases in which obesity is not too great, carefully graduated mountain climbing, the tread-mill, gymnasium exercises of various sorts, and rowing are all important and valuable means of exercise for ~~obese~~ persons.

at

fleshy

Exercise must be carried to the extent of fatigue to be of benefit in reducing flesh. ~~Exercise before breakfast~~ It is more effective than at any other time of the day.

taken before breakfast

**Exercise for Dyspeptics.**— In dyspepsia, exercise must be regulated according to the strength, the age, the sex ~~of the individual~~, and the form of indigestion present. Before undertaking a course of exercise, it is important to recall the fact that in quite a large proportion of dyspeptics there is displacement of the stomach or colon, or both of these organs, and perhaps other of the abdominal viscera, and it is important both for comfort and as a measure ~~to insure~~ for success in the employment of exercise, that these organs should be restored to their normal position and supported in place by a properly adjusted abdominal supporter ~~(see page [illegible])~~ before the exercise is undertaken ; otherwise injury rather than good may result. Many dyspeptics complain of coldness of the hands and feet, and observe that exercise tends to increase this unpleasabdominal

~~a~~ symptom. The reason is that the pendant condition of the ~~abdominal viscera~~, causes a strain upon the sympathetic nerve and a disturbance of the vasomotor system, whereby there is a contraction of the blood-vessels of the extremities. The ~~Natural~~ Abdominal Supporter, properly adjusted, prevents this inconvenience.

of the abdomen

The dyspeptic who has small digestive capacity must of course avoid expending too much energy in muscular work, as he may be weakened thereby instead of strengthened ; hence he should keep a careful watch of his bodily weight while taking exercise, and if there is a marked diminution in weight, he should lessen the amount of exercise accordingly. In some instances it is necessary to begin, as with other classes of feeble invalids, with a course of rest-cure for two ~~or~~ to four weeks, whereby a store of tissue is laid up in the form of fat and blood to be drawn upon as a means of supporting the muscular work to be subsequently undertaken.

Breathing exercises are especially valuable for dyspeptics. ~~We have~~ The author has dwelt upon this subject at greater length in another work especially devoted to the disorders of digestion, entitled, "The Stomach: Its Disorders and ~~Their Rational Treatment~~," published by the Modern Medicine Publishing Company, Battle Creek, Mich.

Walking, horseback riding, bicycle riding, and especially the ~~different~~ various forms of Swedish gymnastics, manual and mechanical, are of great value in the different forms of indigestion. Exercises involving the trunk are especially helpful in the majority of cases. The following general suggestions with reference to the application of exercise to different classes of dyspeptics, will be found helpful : —

How to combine them,

1. Hyperpeptics must avoid vigorous exercise of any ~~sort~~ kind soon after eating, for the reason that such exercise ~~has~~ the effect to increase the secretion of gastric juice, which is already excessive in this class of patients.

2. Hypopeptics may exercise with moderate vigor after eating, with advantage, as increase of secretion is required in these cases. The same is true of patients suffering from apepsia.

3. In simple dyspepsia, moderate exercise is allowable after eating, and is especially advantageous in those cases in which there is a tendency to drowsiness after eating. This should be resolutely combated, as the habit of sleeping immediately after eating is highly injurious. The drowsiness is generally easily dispelled by vigorous breathing movements or gentle exercise.

4. In ulcer of the stomach, absolute rest is usually necessary.

5. In cases in which there in much soreness in the abdominal region, and especially ~~in cases in which~~ where there is a dragging sensation in the lower abdomen or in the back, also in most cases in which spinal irritation exists, only very moderate exercise should be taken until these symptoms disappear, unless they ~~symptom~~ can at once be relieved by the application of the ~~Natural~~ Abdominal Supporter, which is ~~generally~~ often the case. (See page ~~1000~~.)

6. The best time to ~~for~~ exercise for most dyspeptics is about two or three hours after eating. Exercise before breakfast is advantageous only for ~~in case of~~ robust and very fleshy persons.

**Exercise in Diabetes.** — Exercise is one of the most important means by which the surplus sugar in the blood of a diabetic patient may be disposed of. It is the best of all means for stimulating vital combustion. Next to regulation of the diet, it is the most important of all means in the treatment of diabetes. It is important, however, that the exercises should be carefully regulated. ~~In cases of diabetics in which~~ When there is loss of appetite and great weakness, rest in bed, instead of exercise, is the proper measure. Exercise should always be avoided in cases of diabetes in which there is a rapid loss of flesh, while it is especially indicated in cases ~~of diabetes~~ accompanied by obesity, — a not uncommon combination, — in which there is a good appetite, a considerable degree of vigor, and no material loss of flesh. In such cases exercise should be carried to the extent of fatigue, as otherwise it is of little value. All kinds of exercise are beneficial, at least such as are adapted to the age and general strength of the patient; but difficult exercises are of greater value than others, for the reason that they are more effective in inducing fatigue.

**Exercise for Rheumatism.**— The rheumatic patient ~~most of all~~, more than any other, finds difficulty in taking exercise, for often even the slightest movement causes pain, and hence exercise seems to be ~~counter~~ contra indicated, whereas, in the majority of chronic cases, it is the only means by which a cure can be effected. Exercise must, of course, be prohibited in all rheumatic conditions in which there is inflammation, as indicated by heat, swelling, or great tenderness of the affected joints, and by a general rise of temperature. Under such conditions, rest with sedative massage, and sometimes very gentle exercise, ~~are~~ is indicated. For persons suffering from chronic rheumatism or ~~the~~ rheumatic diatheses, exercise is, however, next to an antiseptic and non-flesh diet, the most important of all measures of treatment. Exercise must at first be gentle, and stop short of great fatigue or severe pain. Rheumatics are very subject to ~~consecutive~~ secondary fatigue, especially those who are advanced in life. This fact must be borne in mind when determining the amount of exercise which can be discreetly taken. Manual and mechanical Swedish movements are especially adapted to this class of patients, particularly at the beginning of a course of treatment. Walking, rowing, bicycle riding, and all forms of active exercise are useful.

**Exercise for Consumptives.**— ~~In consumption,~~ Exercise affords one of the most important of all measures looking toward recovery in consumption. It must be constantly borne in mind, however, that exercise may be damaging as well as helpful in ~~consumption~~ this, as in many other maladies. All consumptives are subject to exacerbations of their disease, in which there is a marked rise of temperature and great weakness and prostration. Under such conditions, rest in bed or in a reclining position is a measure ~~which is~~ imperatively demanded, as even gentle exercise will often greatly increase the rise of temperature ~~under such conditions~~ at these periods. A patient in such a state needs rest as ~~much~~ as does the patient suffering from typhoid or any other infective fever. Attacks of this sort usually last but a short time, — from one to six weeks, — after which time the temperature sinks to a lower level, the thermometer generally showing a sub-normal temperature in the morning and a rise of one to three degrees at night. When this condition is ~~found~~ reached, and in the interim between the attacks referred to, exercise should be taken daily, being carefully graduated to the patient's strength. All violent exercises must be avoided. Anything which causes a ~~very~~ considerable degree of pulmonary congestion, as indicated by violent coughing, must also be avoided, as ~~such exercises tend~~ creating a tendency to ~~bring on~~ pneumonic attacks, and thus encouraging the extension of the disease in the lungs. Special attention must be given to respiratory exercises. Pneumatic apparatus of various sorts, and the ~~author's~~ Ex-i—1 designed by the author

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halation Tube (see page ), are efficient means of lung development. Carefully graduated mountain climbing is one of the best of all means of exercise for consumptives.

Consumptives who visit an elevated region for climatic advantages, must rest for some days, and in the majority of cases for a few weeks, before beginning exercise. The purpose of this is to give the lungs an opportunity to expand and the respiratory muscles to ~~acquire~~ develop ~~[illegible]~~ to give the increased breathing capacity necessary for exercise in a rare atmosphere. Many invalids have brought upon themselves severe attacks of pneumonia, with a great aggravation of their maladies, and thus sacrificed their chances for life, by neglecting this precaution.

sufficiently

**Exercise for Women.**— In addition to what has been said above with reference to exercise for girls, which applies, of course, also to women, ~~we wish to call attention to the fact~~ that nearly all civilized women are suffering from weakness of the muscles of the trunk as the result of a mode of dress which prevents proper development ~~and exercise~~ of the muscles of this region of the body; hence special attention should be given to the ~~development~~ of these muscles as the surest means of securing permanent recovery from many of the maladies to which women are especially subject. In the great majority of cases, the backache from which ~~women~~ suffer is due not to displacement of the pelvic organs, but to strain upon the abdominal sympathetic nerves resulting from general displacement of all the abdominal viscera. The author has shown by extensive researches, the results of which have been published at various times in medical papers, that displacement of the organs of the pelvis is almost invariably accompanied by displacement of the stomach, bowels, or other organs. This condition ~~is~~ can not ~~to~~ be remedied by the employment of pessaries to support the uterus, or by operations upon this or other pelvic organs, but requires the replacement and support of all the abdominal viscera. Replacement of the viscera must be accomplished by massage. The method of doing this is minutely described in the work by the author devoted to the subject ("The Art of Massage," Modern Medicine Pub. Co., Battle Creek, Mich.). The organs must be daily replaced by a person skilled in this procedure, and must be held in place by an abdominal supporter capable of accomplishing this purpose without interfering with the action of the abdominal muscles or any other muscles of the trunk. The ordinary abdominal bandage interferes with muscular movement by constriction of the body, and hence defeats the purpose for which it is applied. In addition to these mechanical means of relief, it is necessary, also, to employ such exercises as will secure a proper development of the abdominal muscles. Swedish gymnastics, bicycle riding, rowing, ~~and special ex-~~

it may be stated as a fact

exercise

the

they so commonly

radically

all constitute excellent exercises for this purpose.

Exercise for Sedentary People. —

~~The~~ most important point to be gained by exercise for sedentary persons is the development of the lungs. Anything which will bring the lungs into vigorous activity is good exercise for persons of sedentary occupations, such as editors, teachers, physicians, lawyers, or other professional men, and students. Hopping up and down in a corner may bring the lungs into vigorous activity, if one can find no more convenient or agreeable form of exercise.

Breathing Exercises. —

Beneficial results may be obtained by a voluntary expansion of the lungs, or what is known as deep breathing. These expansive movements of the lungs may be greatly facilitated by such simple exercise as raising the arms at full length to a horizontal, and then to a vertical, position. The muscles attached to the arms pull at the sides of the chest, and draw them outward, thus increasing the size of the chest cavity. But voluntary respiration is tiresome, and one finds himself much fatigued after practising deep breathing for three or four minutes. The muscles of the chest become weary, and it seems very irksome to continue the exercise. The case is very different, however, when the deep breathing is induced by the demand for an increased supply of air as the result of active muscular exercise, such as jumping, running, swimming, bicycle riding, or vigorous gymnastic exercises of any sort.

One does not find it hard work to breathe deeply when engaged in exercise of sufficient vigor to demand deep breathing. It is rare indeed that the muscles of respiration become weary when there is a real necessity for their use. The arms and legs quickly tire, but the lungs and heart are ready for work so long as their activity is a necessity. The reason of this is that the operation of breathing, although under control of the will, is ordinarily automatic. The usual movements of respiration are executed under the influence of impulses received from the respiratory center or centers in the medulla oblongata. In involuntary respiration, the inspiratory movement is induced by an impulse from the higher nerve centers, as is the case with involuntary movements of all sorts; hence such movements quickly give rise to fatigue. For these reasons, hopping up and down in a corner, though the most monotonous form of exercise, is preferable, as a respiratory exercise, to the best devised forms of so-called breathing exercises. But it is far better, as before intimated, to engage in some form of exercise which will be agreeable, as well as efficient in developing respiratory activity.

Swimming. —

The writer considers swimming as one of the most useful of all forms of physical exercise, for the reason that it brings into activity ~~the~~ muscles which are not ordinarily employed, is an excellent means of exercising the lungs, and also of correcting the results of improper sitting attitudes. Man seems to be the least adapted to progression in the water of any animal. Other animals, the dog, for example, is so naturally formed for swimming that he does not have to learn to swim. The horizontal attitude of body and the natural elevation of the head above the line of the spinal column, together with the small size of the head compared with the remainder of the body, and the favorable position of the nose, which is lifted free from the water, while leaving almost the entire remaining portion of the body submerged, renders it very easy for an animal to keep afloat. The movement of the limbs of a dog in swimming are precisely the same as in walking; he simply walks in the water, holding his nose high, and does not have to trouble himself with the modifying of his movements to suit the element in which he is moving, whether in the air or in the water. With man, this is different. In the water he must move his limbs in a way in which he has no occasion to move them when on the land. The consequence is that when he makes his first attempt to swim, he finds the muscles which he must necessarily use, weak and easily exhausted; therefore, learning to swim requires much practise and considerable time.

The great health advantage in swimming is in the fact that the head must be carried well backward, and the arms must be used in a way which will develop the shoulder retractors, or the muscles which draw the shoulders backward; hence it is one of the finest of all means for developing the chest, and overcoming the tendency which exists among all sedentary persons to become round-shouldered.

Swimming thus constitutes a most healthful form of recreation. It is refreshing, promotes appetite, and is one of the most valuable of all accomplishments. The majority of deaths from drowning are due to the lack of knowledge of this useful art. A few practical hints about how to learn to swim may be found of value, in connection with the accompanying cuts. The old method of teaching a boy to swim was to throw him into water deep enough to drown him, making it, with him, a case of "sink or swim." The modern method, however, is more humane. The following is the one commonly employed in teaching swimming in the modern swimming-schools: —

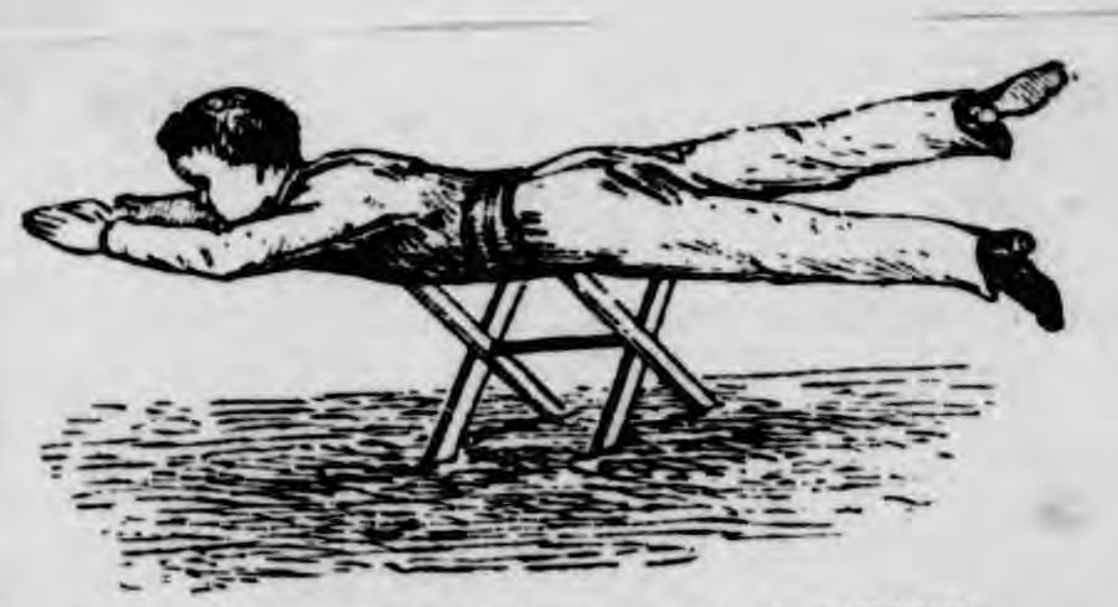

Fig. 1.—First Position in Swimming.

*The Movements.*—There are three movements for the arms and two for the legs, the movements for the arms starting with the position for the arms shown in Fig. 1.

At the first movement the arms are carried out-

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ward at the sides to the position shown in Fig. 2, the palms facing backward.

At the second movement, the arms are brought from the position shown in Fig. 2, to that shown in Fig. 3.

At the third movement, the arms are thrust directly forward to the position shown in Fig. 4.

The time occupied in movements 2 and 3 together is the same as that of movement 1 alone.

The two movements of the legs are as follows: During the first movement of the arms, the legs remain straight out, as in Fig. 4. During the second movement of the arms, by which they are brought to the position shown in Fig. 3, the knees are flexed, and the legs drawn up. For strong swimming, the knees are drawn well up under the body, a position which cannot be assumed except in the water, or with the body suspended by a belt. The second movement of the legs is executed with the third movement of the arms, the legs being thrust downward and outward, assuming at the end of the movement the position shown in Fig. 1.

Fig. 2.—Second Position.

Fig. 3.—Third Position.

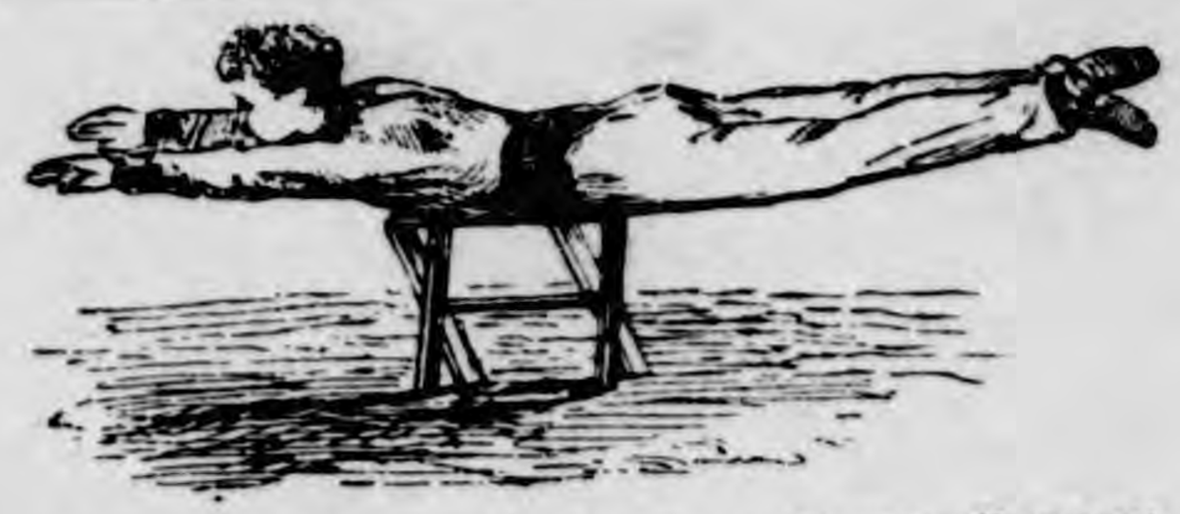


Fig. 4.—Changing from First to Second Position.

By the aid of a teacher, these movements may be easily acquired by the following method: The pupil being placed in water not higher than his shoulders, seizes one end of a stick, the other end of which is held by the teacher, who stands in a boat or upon a pier. The first thing the pupil should do is to acquire the ability to balance himself in the water. A firm hold upon the stick enables him to maintain his position, and by degrees he learns to flex the back in such a manner as to keep the head above water and the heels near the surface.

Having acquired his balance in the water, and gotten the idea of the position to be assumed, the pupil takes his first lesson in leg movements. In swimming, the arm movements and leg movements are executed together, with the exception that the first arm movement is made without simultaneous movements of the legs, the two movements of the legs being executed only with the second and third arm movements. In order to establish the proper rhythmical movement, the teacher counts for these combined movements, "One — two — three, one — two — three, one — two — three," the time given to "two" and "three" being each one half that given to "one." In counting for the leg movements, only "two" and "three" are counted, a pause of equal time being substituted for "one."

160.

After practising the leg movements for a few minutes, the pupil is supported in the water by means of a belt passed around his body in such a position as to balance him in the water. The belt is attached to a rope supported at the end of a stout pole, one end of which is grasped by the teacher, who thus supports the pupil in the water very much as he might a large fish attached by his back to a hook and line suspended at the end of a long pole. The pupil is now made to execute the arm movements, keeping time to the count, "One — two — three, one — two — three," the movements being made in the order above described. After practising the arm movements for a time, the arm and leg movements should be combined, remembering that the leg movements are made only with the second and third arm movements, the legs resting in the position shown in Fig. 4 during the first movements of the arms.

After the pupil has acquired a little confidence, and has learned to combine the movements fairly well, he is provided with a swimming-belt and cast loose into the water to navigate himself. In a short time, if he has given good attention to his instruction, he will be able to move about in the water with ease and confidence. Then the floating power of the belt may be gradually decreased, either by lessening the number of corks; or if an inflated rubber belt is used, by letting out, from time to time, a little air.

It is well for pupils to practise the above-described movements by resting the center of the body upon a small raised platform or a camp-chair, as shown in the accompanying cut. By this means the muscles employed in swimming may be developed, and the ability to co-ordinate the proper movements may be increased, so that much more rapid progress will be made while the pupil is in the water.

1. Effervescent saline bath three times a week, to be administered as follows:- Add to the usual quantity of water in a full bath two pounds of salt, 1/2 pound bi.carb.soda, temperature of water 92°. Add to the bath thus prepared 1/2 pound of Hcl. thus — place the acid ina glass stoppered bottle with the stopper in; first turn the bottle up side down and place the mouth of it just below the surface of the water, keeping the mouth of the bottle under water, pull out the stopper, then while the acid is running out, and the water is running in to take its place, move the bottle around over the surface of the tub so as to distribute an even layer of acid over the whole surface. It will have to be done rather rapidly. This will produce rapid effervescence. At the end of five minutes place the patient in the bath and keep patient there from three to ten minutes, increasing the length of time as patient becomes accustomed to the bath. The first difficulty, or rather effect, will be to produce slight difficulty in breathing; this will quickly pass off, pulse will become slower, breathing slower, force of the heart beat increased.

2. On the alternate days, give the patient

(a) Salt glow and massage.

(b) Shampoo and massage.

(c) Gf. and massage.

3. Massage of the heart as directed in H. H. B. twice daily.

4. Give the patient dry, aseptic diet, well disintegrated, and a sufficient amount of proteids and fats and nut preparation, especially nut cream and bromose.

before beginning treatment.

In cases of emphysema, asthma and in obstruction of the aortic orifice great care must be taken, especially with the arm raising movement, to avoid producing syncope on account of the obstruction of the pulmonary circulation.

The same rule applies to any condition in which the respiratory area is diminished as in pleurisy, with effusion, consolidation of the lungs, dropsy of the chest, pyo, or pneumothorax.

9. In these cases the movements must be executed very slowly so as to give time for the distribution of the blood. It may have to be taken with the patient lying down.

The right side of the heart being overloaded in these cases, the arm movement should not, at first, extend above the level of the shoulders, unless the patient is lying down, as the extension of the right heart would be increased by giving the blood the down grate in the arteries.

10. Special attention should be given also to the patients regimen and diet in enforcing an aseptic dietary. Exercise should be graduated.

Exercise such as graduated mountain climbing is too severe for patients requiring this treatment. It is only adapted to cases which have been improved by this method.

The object of the method is not to strengthen the muscles, but to regulate the circulation.

11. The patient may, to some extent, administer the exercise himself by executing the various movements, inducing the resistance by hardening of the muscles.

:::::::::::::::

Dup -

## Exercise.

1. Full set of manual Swedish
2. Inclined table exercises
3. Massage
4 Vibration
5. Chair exercises
6. Trunk
7. Mechanical Horse

   Automatic

Massage

Neck
- Pulling & twisting
- Opposition kneading
- Stretching
  - Ant.
  - Post
  - Lateral R & L

Shoulders 2.
- Opposition-kneading
  - Ant
  - Middle
  - Post
- Posterior- both

Legs
- Ankle
  - Opp &
  - Rotation
- Knee — Thumb & side of hand
- Lower leg
  - Inside with one hand or foot rotating
  - Outside do
- Upper leg using kneed & rotate reaching nerves.

Back

Massage

Blood heals

Relaxation { Sandbags / Support of feet - head

Efficient manipulation

Relation of vessels to bones

Deep Kneading { [illegible] / Pulling / Elbow & forearm

Resistive Kneading

Forearm
arm
Shoulder
Trunk
Chest
Back
Shoulder - [illegible]

Neck { front / back / twisting / stretching

feet
leg
thigh
Stretching

{ Back / Buttocks / Chest / abdomen

Book on Exercise

Summary of Phys. Effects of Exercise + massage

Posture

Gait

Breathing

Faults of development
disproportion etc.

Muscle work
automatic Ex.
static work

Diet + work

metabolism
+ special Exercises
& drills

Summary of digestion ?

Fatigue { Cause
poison
Constipation
Nerve lesions consuming energy

Diet + Endurance

muscle work,
~~Phys. Chart~~ graphic
strength

comparative studies

Special muscle groups,
abdominal
Chest,
Back
diaphragm
Expression

Diseases

Obesity
diabetes
arrested development
neurasthenia
dispituitarism
constipation
Corrective $\begin{cases}\text{spinal curv.}\\ \text{weak trunk}\\ \text{weak legs}\end{cases}$

# Health by Exercise

1. Why exercise is necessary for health. Muscle work and blood making.

2. How much work does a man need to take daily

3. The mechanical Equivalent of muscle work.

4. Bad postures - how to correct

5. How to develop Healthy Lungs.

6. How to correct bad posture "Slumping," flat chest, round shoulders, Setting up drills

7. occupation deformities how to correct.

8. Exercises to strengthen abdominal muscles.

9. Occupation Exercises

10. Walking - Walking Exercises

11. Exercises for Children

12. Exercises for aged persons.

Exercise Book

Growth in Height & Weight
G. Stanley Hall
Book (Adolescence)
612.6

photos of table Ex.
moving pictures of table
Exercises.

---

Legs flexing, Knees separated
1-2, 1-2.
Knees flexed, legs extension, abduction
flexion, ~~adduction~~ position
1, 2, 3, 4

Knees flex, feet raised, extension, abduction
flexion, position
1, 2, 3, 4

Knees flexed, legs sideways extension
1. alternate 1-2, 1-2,
2. together

1 Knees flexed, ~~leg~~ ~~Ex~~ – hips + leg raising.
alternate
1, 2, 3, 4

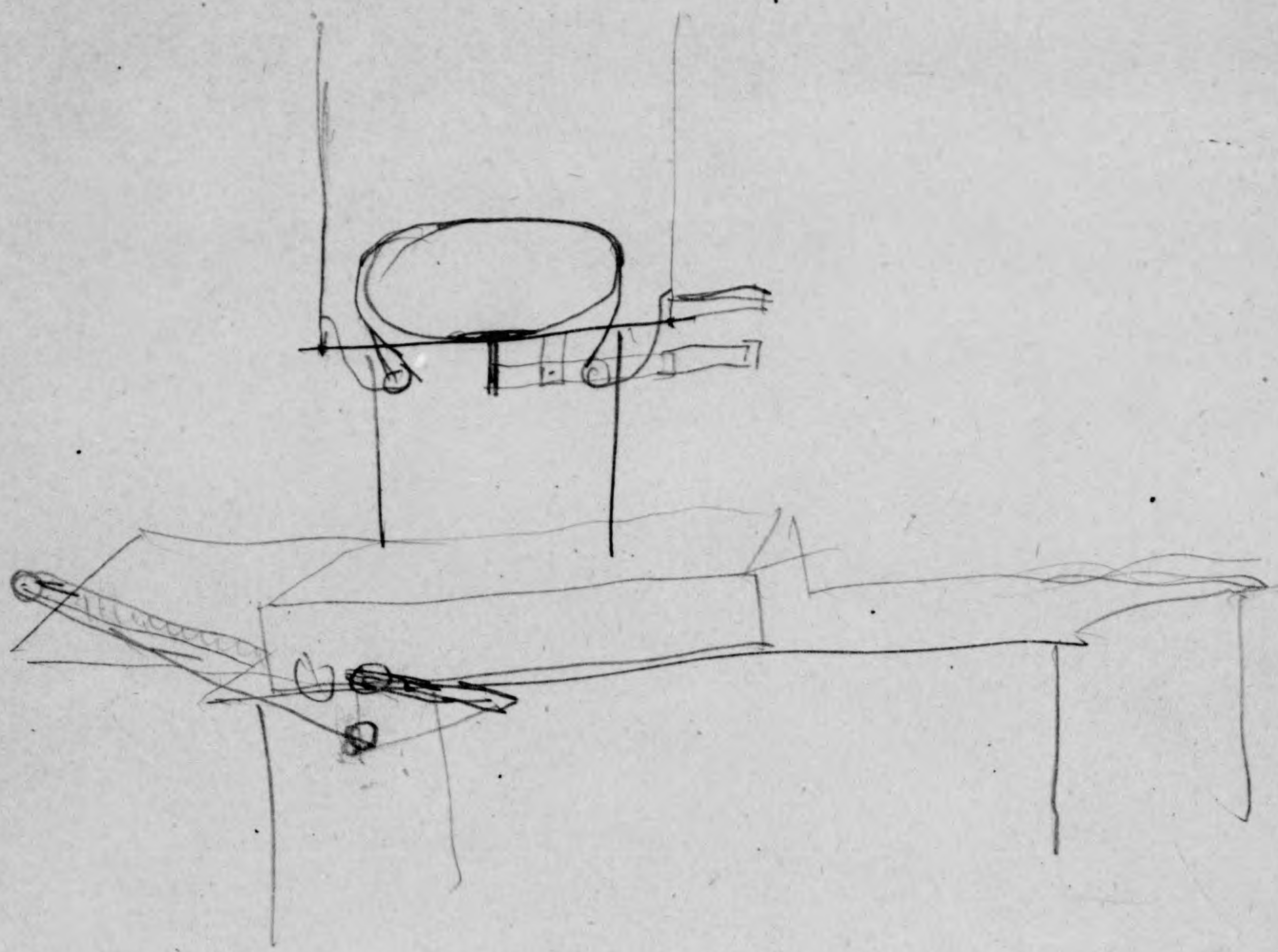
1 knee flexed, 1 leg circumduction
alternate 1, 2, 3, 4

F Knees flexed, 1 leg Extension,
with trunk ~~twisting~~
abduction, flexion, position
alternate 1, 2, 3, 4

Knees flexed, feet raised
bicycle

~~arm exercises - feet in strap~~

Left hand holding handle, right arm
extended ~~hand~~ swing to left and
~~twist trunk.~~



## Schedule III

I. The habitual, or daily use of any of the articles mentioned calls for II counts; the occasional use, 5. Only total abstinence merits zero.

2. Habitual use, 12; used on very rare occasions, 5; total abstinence zero.

3. Habitual use in any form, II; a social glass on rare occasions, 4; total abstinence, zero.

4. Regular and daily use of meat in any form, fish, flesh or fowl, II; occasionalluse, 5; if never used, O.

5. The free, practically every-day use of candy, II; occasional, 5; rarely and small quantities at meal time, O.

6. Habitual use, II; occasional, 5; if never used, O.

7. Habitual eating to such excess as to cause a marked fullness or discomfort, or eating less than needed, II; occasional indulgence to excess, 5.

8. The habitual use of any drug, II; frequent use, 5 or more, according to the degree or frequency.

9. Worry, morbid fear, frequent fits of anger require II; if occasional occurrences, lessen the counts according to frequency.

Dup

Memo

Add to this little book description of inclined Table Exercises (See book,"Neurasthenia)
" G.H. articles some years ago

Whole series of outlines in J.H.K's "Influence of Dress"

Complete series of outlines for exercises used now for patients.

Automatic exercise machine (Cuts)

Machine for testing endurance

Chapter on estimating amount of work done by exercise of different kinds.

## Special Exercises for Different Diseases

For Bedridden Cases

Convalescents

Wheelchair

Rheumatics

Obesity

Diabetes

High Blood Pressure

Arteriosclerosis

Locomotorataxia

Paralysis Agitans

Measured Work

Ergostat

Chest Weight

2 papers on the Dynamometer

Swedish Movements

Day's Orders

(Look at material in "Man the Masterpiece", also "Ladies' Guide"

The best time to exercise is before breakfast after a cold bath.

Memo (continued)

Outdoor gymnasium

Exercises for children

Describe a few good games

(They teach 100 at the N.S.P.E.)

(Ask Gertrude about this)

Exercises for Bright's Disease

" " Expectant Mothers

" " Girls

" " Women

Household Exercises

Backyard Exercises

Spading

Raking

Running the Lawn Mower.

Hoeing

Sawing Wood

Splitting Wood

Farmers do everything by Machinery

Explain the Rationale of Walking

# Memo for Exercise Book

## Corrective Exercises

For Weak Heart-Nauheim Exercises

Tuberculosis

Insomnia

Neurasthenia

Consipation

Pneumonia

Chlorosis

Sterility

Amenorrhoea

Dysmenorrhoea

Epilepsy

Hysteria

Weak Chest

Round Shoulders

Pot-Belly

Memo

Le Grange's "Physiology of Exercise"

All articles on the subject of Exercise written for G.H.

some years ago.

Crampton's articles for G.H.

Memo

The automatic exercise machine applied to the abdomen, lifting a weight of 75 pounds half an inch at each contraction, four contractions per second, in thirty minutes would cause the expenditure of 90 calories of energy.

"Prolonged warm or hot applications lessen the excitability and energy of voluntary muscles. It is thus that heat becomes of service in relieving muscular cramp. Cold produces the opposite effect.

"Very hot applications—104° to 130° F. (40° to 54.5° C.)—increase the excitability of smooth or involuntary muscles.

Effects of Heat Upon the Nervous System

"Very short hot applications excite the brain, nerves, and nerve-centers through the impressions made upon the skin.

"Prolonged general hot applications may give rise to pronounced exhaustion of the brain and spinal cord. Warm and hot applications lessen general nervous sensibility to a remarkable degree. This is especially true of very hot applications. The effect may be due in part to the absorption of moisture by the terminal nerve filaments in the skin; or it may be brought about by the stimulation of the temperature nerves. It is well known that the skin is much more sensitive to thermic impressions than to any other form of stimulus that it is capable of recognizing.

"Applications of heat to the skin generally produce an agreeable sense of comfort and well-being. If the application is continued too long, languor, lassitude, and depression result.

"Very hot applications of short duration, like brief cold applications, have both a direct and a reflex excitant effect.

# Rest, Recreation and Sleep.

Plants & animals grow during night.

Body repairs itself during sleep
sick people recover during sleep.

What is sleep. Neutral bath

Dreams

How much sleep needed.

Insomnia { causes
how to cure

Why rest is needed — Hurry habit

Every organ needs rest
Even heart rests
(look up, - ½ time?)

Muscles of respiration work all the time
(calculate rest time of these)

Recreation - dissipations not rest

7. Skin Hygiene

Structure of skin
Healthy skin
Brown spots
Wrinkles
Dry skin & hair
Care of skin – lanolin
Sweating baths
Bright baths
Soap – hard water
Cold bath
Exercise bath
Air bath
Surf bathing
Grass walk
~~Hookworm and bare feet.~~
Daily change of under clothes, stockings & shoes

Cleanliness
avoid unclean contacts
Finger nails,
Feet
nose

Clothing
Bed clothing
Temp. under clothing
Color of clothing
Footwear

8. Avoid Poisons

Tea, coffee, alcohol
chocolate - coca
Tobacco
Condiments
Poison foods
Poisoned air
Mineral waters
Sodafountain drinks
Coca Cola

Patent medicines
what they contain
Tonics & other drugs

9. Avoid infections

Colds
How not to catch
immunity

All infectious diseases
- unclean contacts

Pus infections
Care of anal & genital regions

Protection of eyes, nose, care of mouth, teeth,

disinfect foods

Vaccination { small-pox
typhoid
Tuberculosis

Metchnikoff's murlatte

Immunization

Infection in milk & meat, germs, parasites.

Acne - etc

(failure of examinations preventives)

Flies

Venereal

Musquitoes

infections

Hookworm feet - shoes

Fleas

drinking cup

Body lice

Fountain

Bedbugs

Hold lips closed for moment to scatter germs or better, hold fingers over

Picking nose
sucking fingers

Care of bowels & genitals

Finger nails, Feet.

Look up article in insects

10. Mental + moral Hygiene.

Brain fag.
Worry,
Anger - envy, etc.
Exhausting emotions
Sex hygiene
Morbid literature

Occupation
Self-centering
Take self in hand
Habits
synapses.

1st [illegible] article on Toothless Race


# GOODHEALTH

J. H. KELLOGG, M. D., Editor; HORACE FLETCHER, A. M., Contributing Edito

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## The Coming Toothless Race

THE American people are losing their teeth. The same process of dental decay is going on among all civilized nations. The investigator of the future who may happen to compare the skulls in the burial places of the ancient mound-builders with those exhumed from present-day cemeteries will be greatly impressed by the contrast. The mound-builder's skull has massive and symmetrical jaws, for the reason that each jaw contains sixteen teeth, well developed and well worn by much usage, but intact, free from decay and held in place by strong roots. The present-day skull rarely, if ever, contains thirty-two teeth, or if it does, it is but a short time that the thirty-two teeth are present. The latest comers—the so-called wisdom teeth—of which there are four, one at each end of the arch of each jaw, remain but a short time, owing to the fact that they begin to decay before they have emerged from the jaw. It is very rare indeed that a person is found who possesses thirty-two sound teeth. The wisdom teeth are almost always defective and a source of much trouble. The roots are not properly developed and there is often not room enough for them in the jaw. In a few instances, nearly all the teeth are found to be defectively organized, misshapen and misplaced.

¶ These dental defects are not simply inconveniences. They have a most profound relation to individual and racial health. Defective teeth mean, of course, defective power to masticate, and this necessarily means impaired digestion and impaired nutrition. But the theory generally held that indigestion is a result of defective teeth is true in only rare instances. As a rule, dental decay is the result of indigestion, intestinal autointoxication, or general vital depreciation from other causes may be present. An unhealthy state of the mouth has of course an injurious effect upon the general health, but it is itself simply a part of a general vital depreciation. Decay of the teeth is generally accompanied by coated tongue and other evidences of presence in the mouth of great numbers of bacteria. A condition of the mouth which permits the growth of bacteria upon the tongue also permits the growth upon the teeth of bacteria capable of producing ulcerations.

¶ The general decay especially noticeable among civilized nations, and particularly among those who have reached what is supposed to be the highest level of civilization, is unquestionably the result of three causes: first, the general vital deterioration, which is manifestly increasing with great rapidity among all civilized peoples; second, neglect to make proper use of the teeth in the thorough mastication of hard, dry food substances; third, the special deterioration of the hard structures of the body caused by lime starvation. The evidences of general race deterioration are exceedingly numerous and are becoming more and more evident every year. Decay of the hard structures of the body is recognized by biologists as one of the most certain evidences of race deterioration in any species of animals. Neglect of mastication is a widespread evil among civilized people, especially of recent times, because of the introduction of soft mushes or so-called breakfast cereals of various sorts in place of the hard rye bread of our ancestors, such as is still being used by the peasantry of Germany and Sweden. Professor Sherman has shown that lime starvation is a necessary consequence of the large use of flesh foods and cane sugar which has increased so greatly in modern times.

¶ The above facts are presented as evidence that the modern civilized man must begin to give attention to his teeth and give them extreme care or he will lose them. The savage man and the wild beast of the forest have no use for a tooth brush or for dentrifices. The primitive man masticates his food instinctively. He does not have to be told to fletcherize any more than does the orang-outang, or the chimpanzee. But the modern civilized man has so long neglected his teeth and has cultivated degeneracy to such a degree that the utmost care must be given them to prevent their total loss.

¶ The mouth and teeth should be thoroughly cleansed before and after each meal. At least twice a day the teeth and gums should be thoroughly freed from adhering materials by rubbing with a proper brush. The brush should not be so sharp and stiff as to cut the gums. The use of chemicals for cleansing the teeth is wholly unnecessary and may be seriously harmful. Many different dentrifices are now obtainable. All are prepared from practically the same formula, no matter what are the special claims which are made for them. The principal difference is in the flavoring. A little plain precipitated French chalk is as good as anything, and for a mouth antiseptic there is nothing better than ordinary cinnamon water. One who lives upon a thoroughly natural diet, discarding high protein foods, such as meat and eggs, and making a meal consisting largely of fruits and cereals and some hard well-dried toast, or other similar food which requires vigorous use of the teeth, will seldom require the use of dentrifices of any sort, or mouth antiseptics. Rinsing the mouth and brushing the teeth with pure cold water will be found quite sufficient to keep the teeth in a clean and wholesome state.

¶ The teeth should be also well polished, and glistening. When rough or slimy, deterioration is taking place. The most important thing to be done for the protection of the teeth is to adopt such a dietary as will secure a clean tongue. As long as the tongue is coated and the mouth is swarming with destructive bacteria which are capable of producing dental decay, the alimentary canal and the whole body are exposed to infection. Every portion of the food or drink which passes through the mouth carries into the stomach with it millions of these disease-producing bacteria, which, finding their way into the intestine, reproduce themselves in prodigious numbers, giving rise to intestinal autointoxication wtih all the mischief which grows out of this condition. The proper toilet of the mouth is far more important than that of the hands and face or any exterior portions of the body. Children should be taught the proper care of the mouth from early childhood.

The skin is a wonderful structure. It has many marvellous functions which are essential to life. First of all it protects the body as the walls of a citadel protect the garrison within.

Heat loss — (cold + heat)

Heat enhance Sweating

Germs. Changes by contracting & relaxing, like change of clothes

Elim poisons

12 miles of sewers

2,000,000 glands

Oil glands

Epithelial scales.

Effects of light on skin

Effects of heat & cold

Temp. under clothes

Neutral temp. air & water reaction.

6

# ~~Rest, Sleep,~~ recreation

Rest. Why needed
Energy granules stored
Repair of cells + tissues
Carells Experiment
Every organ needs rest. how much?
Chest rests ? Heart rests
Stomach rest.
Nodes

Sleep. - dreams.
Effect of noise
How much sleep needed { Wellington, Napoleon, Edison
~~Insomnia~~ { causes, cures { neutral bath, walking, tab, no supper, wet girdle, ~~wet~~ socks, pack, sand bags, head high, head low, out-of-door, Empty colon, Cold bag - feet, Bed clothes porous, not too heavy, " warm.

Recreation
Change of work
Compensatory Ex
Forget work + cares
Useful work best
Play ~~Most~~ modern play is dissipation, more harmful than work.
avoid hurry.

# Skin.

Structure + ~~sized~~

Sweat glands, 3,000,000

12 miles

amt of sweat

one gland makes 1/3 oz 60 yrs.

3 ones to make 1 day

~~work complimentary to kidney~~

Fat glands - full of germs.

Derivatives

Hair.

External kidney

Bloodvessels hold 2/3 blood

controlled by thyroid

Health indications of skin

color, flexibility, thickness

wrinkles, glazed.

energy, spots

acne. ~~skin troubles~~

Dryness.

Hot. rough. dead

Effect of sun on skin.

tanning. fomentations

Cold + heat

7. (2)

Bathing { cleansing - warm 2x w. - winter, daily summer
cold bath { water
air
soap
hard water
Ex. bath - surf
sea bathing
grass walk
Going barefoot
Sun bath - light bath
Grooming skin, rubbing,
oil - lanolin,
Le Cream no. 1,

8

Clothing { light, white, porous -
underclothes - change often
shoes - flat
temp. under 86° F
Bed clothes -

8

# Poisons ~~Habits~~

Poison foods
- condiments
- meplant
- vinegar
- pickles
- condiments
- alcohol - beer - wine
- Tea - coffee - Coca - Chocolate
- maté - Koko - Kola

mineral waters & other soda fountain poisons

Poisonous gases
- Sewer gas
- Putrefaction poisons
- smoke
- chemical works.

- Tobacco
  - nicotine & other poisons
  - Heart poison
  - Lowers resistance
  - T. B.
  - Scholarship
  - development

Patent meds.
- Tonics
- narcotics
- Sleep producing
- Headache

9

# Avoid Infections

High resistance by biologic life
High resistance of savage

Personal cleanliness - germs on skin & in nasal & oral cavities & colon.
ears
Care of mouth, teeth, nose, eyes, anal & genital regions
Biting nails, picking nose
sucking fingers babies blowing nose
care of handkerchiefs coughing
Drinking cup - fountains authors taken by druggists

Avoid unclean contacts
do not touch with bare hands any putrid or infectious object

T.B.
~~syphilis~~ venereal disease
all infections
flies, lice, bedbugs, fleas, etc.

milk, meat
green vegs & fruit - $H_2O_2$

What do you know
about "the joy of life"
Living dynamo
Zest and snap
& vim

Not aim to stand as
much abuse as possible
but save a surplus, the
secret of success and
ability to meet emergencies
to endure more than other men

10

Mental & moral Hygiene

Avoid worry and all depressing and exhausting emotions.

Effects of emotions { depressing { hate envy &c. / cheerful

self-centering

exhausting emotions - day dreaming (sex stimulation / morbid literature

occupation necessary

~~He~~ habits - Synapses.

Taking self in hand

Exercise.

General effects of exercise.

A trained man.

A " dog.

" rabbit.

Dislocated shoulder.

Takis arm.

Joints and bones.

Lung, chest arm.

Muscles.

Specific gravity

Law of Archimedes

Spinal cord.

Fatigue:- Relative & Absolute.
Cause of local fatigue.
Fatigue of brain and nerve centers before muscles in neurasthenia and depression
animal fatigue.
Hunted animals:-
Exercise most fatiguing which employ brain and nerves most.
Overwork.-
Flesh of overworked animals.
Sunstroke and overwork
~~Autointoxication~~
Rapid overwork and over-exhaustion. - one poisoned and the other eats himself.
Training

8 Tabetic
9 Congestion Passive
11 Eye strain
12 Ocular
13 Nasal
14 Aural Referred
dyspepsia

Reflex { cough
paralysis
etc — book

~~Training~~

Headache - Uterine

Uterine

1 Migraine
depress Cause
indigestion
nerve strain
fatigue.
menses.

~~Vertical~~
2 ~~Neural~~ Uterine
10 Nervous

3 Renal headache

4 Anemia
nail Clavus hysterica

~~Cachexia~~

5 Rheumatic Syphilitic

6 Toxic

7 Dyspeptic

Recent experiments by Professor A. V. Hill, an eminent English physiologist, have shown that the direct cause of the fatigue resulting from muscular effort is lactic acid. Every muscular movement is accompanied by the production of lactic acid. Lactic acid is a muscle poison, the accumulation of which in excessive quantity may cause death of the muscle. The source of the lactic acid is glycogen, or animal starch, the form in which carbohydrates are stored in the body. Professor Hill found that the amount of acid produced was exactly in proportion to the amount of heat resulting from the muscular work done. With each dram of lactic acid formed one and one-half calories of heat were produced. Many of Dr. Hill's experiments were made with the living muscles of frogs. He found that a single twitch of a frog's muscle raised the temperature about one-eightieth of a degree Fahrenheit. A man in running at full speed produces three-quarters of a dram of lactic acid per minute. Part of this lactic acid is during rest turned back into glycogen, but a portion of it is absorbed by the blood.

In a state of rest the blood ordinarily contains only about .02 per cent. of lactic acid, but after severe exercise it ~~may~~ rises ~~as high as~~ to .20 per cent. a ten-fold increase and has been known to rise as high as .35 per cent. This means that the blood of a man of average size when at rest contains only 14 grains of lactic ~~exercise~~ acid, but in violent exercise this may be increased to 280 grains, or more than half an ounce, or even in extreme cases to 490 grains, or more than an ounce.

This accumulation of lactic acid in the blood is due to the fact that there is not enough oxygen to consume the acid to this condition is termed by the physiologist the "oxygen debt," ~~because in this condition there is~~

The need of oxygen is shown by panting and a great desire for air. During a state of rest the body stores up oxygen. This is a capital which is drawn upon when vigorous exercise begins. The exercise may be continued as long as the oxygen capital lasts, but when it is consumed so that the lactic acid, which requires oxygen to burn it up or change it back into glycogen, is left to accumulate because of the oxygen lack, the blood becomes abnormally acid, the muscles become stiff, cease to respond to the commands of the will, and the athlete is compelled to rest. This is fatigue.

A point of great importance to which athletes have not heretofore given attention is the necessity for maintaining a high degree of alkalinity of the blood whereby the lactic acid may be neutralized, thus economizing the oxygen capital. By the free use of such highly acid foods as meat and eggs, the body becomes surcharged with acids and the alkali margin of the blood will be small and as a result fatigue will be easily induced. The concentration ~~of acid in the blood would naturally depend upon the degree of activity of the muscles. The accumulation~~ of acid is in direct proportion to the degree of activity for the reason that the rate at which the acid is destroyed increases with the square of the degree of concentration, so that when the production of acid is doubled the removal and destruction is increased four times. So that when ordinary walking increases the production of acid to four times the amount produced in a state of rest and hard exercise sixteen times as much, the concentration of lactic acid is in the first case only twice that in a state of rest and in the second case four times. It is only through the operation of this law that prolonged severe exercise becomes possible.

In order to supply to the tissues the oxygen required to free the tissues from lactic acid an enormous movement of blood is required. Dr. Hill found that in vigorous exercise the heart pumps not less than twelve and one-half gallons, or two-fifths of a barrel, of blood every minute. This is more than four times the rate at which water ordinarily issues from a lavatory water faucet.

The practical lesson to be drawn from Dr. Hill's experiments is the fact that for physical efficiency and endurance it is necessary to maintain a high degree of blood alkalinity. This can only be accomplished by adhering closely to a non-flesh dietary and even avoiding an excess of cereals.

The Zuni Indians have learned the necessity for avoiding acid-forming foodstuffs by long experience and before beginning a race refuse ~~all food but the thin corn wafers which the Indian women are so skillful in preparing.~~ to eat meats of any sort or even eggs

Influence of Ex. on tissues

Muscles.— training makes work easy by changes in body

Hard of tone — wolf — stall fed ox,

Elastic — resists blows.

Idle man against strain & overstretch

stiff back of old man.

Bones — larger, weigh more, rougher

Joints.— new joint may be formed,

old joint unused, disappears

unused joint becomes stiff

Lungs. Expanded upper chest.

increased mobility & size of chest

increased automatic power of respiratory muscles.

inf. on abdominal muscles.

Heart. larger, more vigorous, increase life. blood is life,

$$\frac{\begin{matrix}25\\40\end{matrix}}{1000}$$

Blood vessels.

Fat — specific gravity of man.

Th. weight coefficient

Spe gr of man
add lead or iron to man
Sink in water & weigh him

~~Theory of Fatigue~~

Rest Removal of waste &
Repair of tissue ~~&~~ with kind of work
Time required varies
Respiratory fatigues cured in a few
minutes
Fatigue from long work . 12 to 24 hrs
or more
Long hours exhaust more than hard work
& lead to loss of flesh

Rest repair actually renews organs.

Sleep lowered pressure slowed
lowered temp. ~~lowered~~ heart
beat. Slow combustion. 1/2 amt $CO_2$

A series
# Breathing Movements.

to cause thirst for air,

Rapid leg movements, heel raising, feet placing, running in place, walking, skipping, running.

1. Place hands on abdomen, at sides, at top of chest & breathe in such a way as to force them outward.

2. Wing-standing ~~or~~ sitting, fill chest, hold in position while exhaling slowly through nose by contracting abdominal muscles. Place hands at lower abdomen and lift upward. May utter on different notes syllable ah.

3. Same as (2), but hold breath for 10" to 30" while alternately dropping & raising chest to fullest extent possible.

6. Arm sideways raising, breathing
7. Swimming movements
8. Arms circumduction

9. Arm sideways raising, heel raising, knee bending, breathing

4. Standing against wall (heels, hips, shoulders and head against the wall) Raise heels and roll ~~while pushing~~ head backward against wall, the chest will rise forward while the head rolls backward. Inhale while rising, exhale while returning to position. Arms at side, thumbs out — forward bend — sideways stretched — rest — upward stretch (ones)

B ~~Breathing~~ Spine Ex. – Sitting position

Sit erect on chair or stool, feet separated and pushed a little forward; back free from chair. Rapid flex & arm movements

Ex same as (A 1, 2, 3)

4. Wing sitting, head backbending, breathing.
5. Wing sitting – head forward, eyes to ceiling, exhaling,
   neck backward raise, bending backward, inhaling.

6, 7, 8, Same as (A 6, 7, 8)

9. Sit forward on chair, knees separated, heels forced against chair legs, grasp chair seat at sides, far back as possible, bend head back, raise chest far as possible & inhale, & exhale, pushing chest high as possible at each inhalation

10. Drop on knees in front of chair, knees separated, place hands on hips far back as possible & bend backward, inhaling, return to position with exhalation.

11. Kneel between two chairs & in front of them place one hand on each chair with arms extended & bend forward, let chest sink between chairs bending head back & inspiring while sinking exhale when rising to chair level.

(over)

Series C. Breathing Ex - Supine Position

~~Preparatory Ex. leg raising & rolling over in bed till respiration is quickened.~~

Ex 1, 2, 3. Same as A Series - Positions

Shoulders out, wing, ~~bend~~, sideways stretch, upward raising, ~~[illegible]~~, Mend, breathing half bend outward rotating breathing, rest breathing, arms sideways stretch half flexing breathing. Keep Elbows touching floor during flexions.

Ex. 4. Slowly bend head back, raising chest high as possible ~~breathing~~, inhale with backward movement, exhale while returning. Position ~~same as~~ as in 1 2 3.

5. with support under shoulders, letting head drop back, repeat 1. 2, 3.

---

Accessory movements.

Touching different parts of chest especially apices & sides

Percussion when filled.

Compression when emptying

Diaphragm Exercises, as laughing

Stretching Movements
Standing or Sitting

Arms

1 Downward
2 Sideways
3 Forward
4 Upward
5 ½ up ½ down 6 ½ forward upw. ½ backward downward
7 arms circumduction
8 Quick standing move hands back & forth far as possible
9 " " " " " sideways
10 Standing against wall - reach both hands ~~high~~ up to touch highest point as possible.
1[illegible] Sitting hold seat with one hand, reach other arm up high as possible.

# A series Breathing Movements.

Rapid leg movements, to cause thirst for air, heel-raising, feet placing, running in place, walking, skipping, running.

1. Place hands on abdomen, at sides, at top of chest & breathe in such a ways as to force them outward.

2. Wing-standing ~~or~~ sitting, fill chest, hold in position while exhaling slowly through nose by contracting abdominal muscles. Place hands at lower abdomen and lift upward. May utter syllable on different notes ah.

3. Same as (2), but hold breath for 10" to 30" while alternately dropping & raising chest to fullest extent possible.

6. Arm sideways raising, breathing
7. Swimming movements
8. Arms circumduction

9. Arm sideways raising, heel raising, knee bending, walking

4. Standing against wall (heels, hips, shoulders and head against the wall) Raise heels and roll ~~while rolling~~ head backward against wall, the chest will rise forward while the head rolls backward. Inhale while rising, exhale while returning to position. Arms at side, thumbs out — forward bend — sideways stretched — rest — upward stretch (once)

Standing against the wall (heels hips shoulders head against the wall)
5. Roll head backward far as possible, pushing chest forward and upward & inhaling at same time, keeping hips, heels & head in contact with the wall

10. Respiratory walking, ~~running~~ skipping, changing step.
a - walk 8 steps, then breath during 8 counts, (nos. 3, 6, 7, 8, 9)
b. ditto - toe walking.
c Skipping 8 steps, breathe same ~~time~~ no. counts (nos. 3, 6, 7, 8, 9)
d Skipping, heel raising, breathing, in wing or rest ~~stand~~ positions
e Walking, changing feet, arm raising breathing
f. Walking, running, breathing.
g. Wing position, jump, breathe (3, 6, 7, 8, 9).

15 ~~Breathing~~ series

Breathing Ex. – Sitting position

Sit erect on chair or stool, feet separated and pushed a ~~little~~ forward, back free from chair, Rapid ~~flex~~ & arm movements

~~Ex~~ Same as (A 1, 2, 3)

4. Wing sitting, head backbending, breathing.
5. Wing sitting – bend forward, eyes to ceiling, exhaling, neck backward raise, bending backward, inhaling.

6, 7, 8, Same as (A 6,7,8)

9. Sit forward on chair, knees separated, heels braced against chair legs, Grasp chair seat at sides, far back as possible, Bend head back, raise chest far as possible & inhale, & exhale, pushing chest high as possible at each inhalation

10. Drop on knees in front of chair, knees separated, place hands on hips far back as possible & bend backward, inhaling, return to position with exhalation.

11. Kneel between two chairs & in front of them place one hand on each chair, with arms extended & bend forward, let chest sink between chairs bending head back & inspiring while sinking, exhale when rising to chair level.

(over)

12. Sitting astride of chair facing back, place front of chair against side of bed or high end of sofa. Brace heels against chair legs, bend backward inhaling, exhale when rising. - Position wing, rest. arms upward ~~stretched~~.

Series C. Breathing Ex. - Supine Position
Preparatory Ex. leg raising & rolling over in bed till respiration is quickened.
Ex 1, 2, 3. Same as A series - Positions
Thumbs out, wring, ~~band~~, sideways stretch, upward raising, ~~rotation~~ head, bend, by alternate half bending outward rotating breathing, rest, breathing, arms sideways stretch, half flexing, breathing. Keep Elbows touching floor during flexings.

Ex. 4. Slowly bend head back, raising chest high as possible ~~breathing~~, inhale with backward movement, exhale while returning. Position ~~same as~~ as in 1 2 3.
5. with support under shoulders, letting head drop back. repeat 1, 2, 3.

Accessory movements.
Touching different parts of chest especially apices & sides
Percussion when filled.
Compression when emptying.
Diaphragm exercises, as laughing

~~Stretching Movements~~
Standing or Sitting

Arms

1 Downward
2 Sideways
3 Forward
4 Upward
5 ½ up ½ down 6 ½ forward upw. ½ backward downward
7 arms circumduction
8 Trunk standing move ~~hands~~ back & forth far as possible
9 " " " " " Sideways "

10 Standing against wall - reach up both hands ~~high~~ to touch highest point as possible.

10 Sitting hold seat with one hand, reach other arm up high as possible.

~~Stretching~~ ^& other movements^ ~~movements~~

Trunk - Standing against wall

1. ~~Standing~~, breathing

2. Arm movements,

arms forward raise, sideways move.

# Objects of Ex. for Invalids.

1. To increase metabolism
   Ex. a regulator of nutrition { regulates heart slowing & oxidation i.e. distribution and consumption
   Bouchard Ralentissement de nutrition

2. To improve respiration, relation to liver, stomach, all viscera.

3. To consume $CO_2$

4. To oxidize & remove uric acid etc

5. Cure of deformities. (muscular / typical faults)

   a of physique - small chest legs or arms small, big belly
   b of pose; wrong standing, & sitting, positions
   c of movement, - gait.
   d of form - deformities

      External - Spine, { antero-post { 2
                          lateral { simple 3
                          rotatory double
      ~~Internal~~ Chest { Round
                         flat or hollow
                         pigeon breast

      Internal visceral displacements { colon
                                      stomach
                                      kidneys
                                      liver
                                      spleen
                                      uterus
                                      ovaries
                                      hernia { inguinal
                                               femoral
                                               ventral,

# Positions

## On back lying

1 " " " (1) feet 60° (1)
2 " " " (2) " close
3 " " " (3) Knees half flexed (3)
4 " " " (4) Knees fully flexed, (4)

(5) arms flexed

"

(6) " sideways stretched

(7) " forward "

(8) " upward "

(9) Hands at forehead

(10) " " top of head

(11) " " top of shoulder

(12) " back of neck

(13) ~~Hips raised~~ Knees flexed - shoulder & heels support

(14) ~~" " "~~ hands " "

(15) ~~Hands & heels~~ support

(16) Head & heels support

# On Face Lying.

1. Feet 60°
2. " close
3. Knees ½ flexed
4. " fully flexed
5. Arms outward rotated
6. " sideways stretched
7. " ~~sd~~ top of head
8. " back of neck
9. Elbow ~~chin~~ rest
10. ") ~~Knee~~ Knees stand
11. " toe stand
12. Hands toe stand
13. 1 hand & ~~opposite~~ 2 toe stand (alternate)
14. 2 " & ~~op~~ 1 " " "
15. 1 " & opposite " " "
16. ~~Knee chest to [illegible]~~

On Side Lying.

Elbow support ½ wing

" " ½ rest

" " 1 arm sideways ~~outward~~ stretch

" " 1 " upward stretch

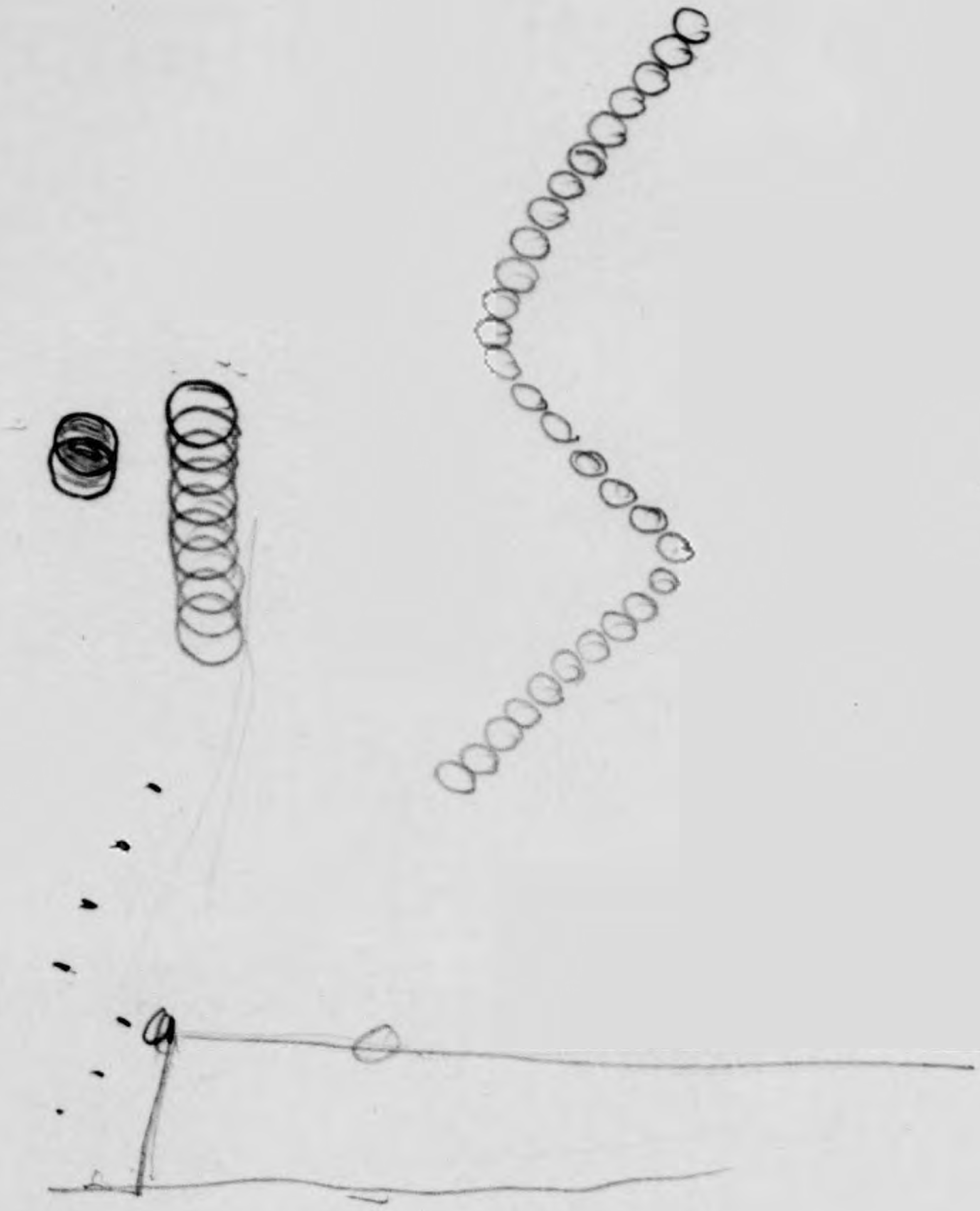
Elbow " foot support { each arm position

Hand " " " { each arm position

Reverse to other side

# Floor Exercises.

~~Knees flexing~~ - legs raising raising
Knees flexing separating
Knees flexed - abduction
Legs extended - abduction
Legs rotation
" rotation - Knees flexing
Rolling to one side & the other
Feet flexing & extending,
Arms rotating
" flexing
" extending sideways
" " upward,
" extended - flexing
" " raising
Swimming.
Positions on back lying
" " " Knees flexed



370
850
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2310. 53

Wall Ex.

1 Feet close standing

2 " close "

3 Stride "

4 Toe "

5 Wing Standing

6 Arms bend "

7 Cross A

8 arms: sideways

9 arms: upwards

10 Thrust standing

11 Shelter "

12 Rest "

Breathing Movements

Exercise

Influence of Ex. on Functions;

Trained muscles contract with great force under ~~effort~~ Electricity
Compare with degenerated muscle
difference in patients

Lungs act better & breath is deeper
Ex. Young soldiers at Joinville France
Claude Bernard found increase of % by Ex. use of upper chest

Heart. ~~(rabbit at rest absorbs as much O as given off or while active more CO₂ given off than O absorbed)~~
Stronger, steadier less excitable.

Blood pressure. ~~test with tonometer~~

Blood - increased blood count
more CO₂ given off than O absorbed

Stomach

Brain - Motor areas
Will
Courage
~~aptitude~~ - skill
(Inhibition
~~Danger~~ of accumulation of reserve in brain
Brechard.

Ex. of speed. - $CO_2$ increase than for ~~air~~ as well
~~Sooner than~~ More of strength
that are better because they do not interfere with respiration

~~Definition~~

Ex of Strength

Strain – lungs – Eyes; cant smile

Ex of endurance (uric acid
~~cant get air inhaled~~

lying – 1
Sitting 1.1/6
Standing 1 1/3
Walking 2 miles an hour 2.8
Running 6 " " – 7.

Children speed.
Young Adults – Strength
Old age. endurance.

Gentle Ex – neither fatigue nor breathlessness
Mod. – breathlessness – not fatigue
Violent – both fatigue & breathlessness

deformities
of occupations
of gymnasts.

NOTES on Massage. Zabludowski. Massage Clinic, 3 Luisenstr. Berlin.

Two classes of movements, interrupted and continuous. The interrupted movements require no lubricant. With continuous movements white Virginia vaseline should be used, only the very finest. Sticky vaseline must not be used. The vaseline must be kept aseptic, not left open in the room, as it accumulates germs, and in rubbing the germs are rubbed into the skin.

Care must be taken that the skin is clean. If the patient is dirty when he first comes, give only interrupted movements and tell him to take a bath before he comes again(or if necessary the parts may be for the time being lubricated with yellow soap and water). When precaution is taken to keep the skin clean and to use fine vaseline, boils will never be produced.

Rubbing should be in only one direction. Make long strokes. In rubbing the back, always rub up in women and in men who have no hair. Rub down when there is very much hair. The movements should be made with a slight zigzag motion so as to lessen the strain upon the skin.

Methods.

1. Friction.
2. Interrupted, grasping or pressing.
3. Percussion movements.
    - (a) Beating with the fist, the pressure coming chiefly upon the little finger which should be held a little loose.
    - (b) Percussion with the palm of the hand.
    - (c) Hacking.

4. (a) Massage with friction. The ankle is grasped with the two hands. Interrupted pressing movements are made with the right hand while with the left hand friction alone as the hands are moved up toward the body.

(b) Vibratory movements.

Description of Movements applied to Different Parts of the Body.

1. Abdomen. Patient lying on the back. Legs supported by pillow and knee drawn up. Head raised a little. Clothing removed. Transverse kneading movements with the right hand, then with the left with a sort of one, two, three rhythm. The hand moves over at one, moves back at two and three. Move both hands in alternation, then both hands together in the same direction.

Repeat the same movements, holding the knees parallel with the body, one hand on the right side and the other hand on the left side of the umbilicus.

Semi-circular movements. First one hand, then the other hand, then both hands; finally with one hand pressing the other hand, make circular movements around the umbilicus with light, firm pressure, first in one direction, then the other. Repeat these same movements with the patient lying on the right side. Repeat the movements with the patient lying on the left side.

Massage of the abdomen stimulates peristalsis and breaks up fecal matters. If fecal masses are present, special pressure should be made at those points and kneading movements to break up the masses. Kneading will not move the fecal matter along in the intestine. This must be done by peristalsis. If there has been exudate left behind by local inflammation as in appendicitis special manipulations should be made of similar character.

At the end of the treatment the patient is made to breathe deeply, firm pressure being made with both hands upon the abdominal wall as the patient breathes out, and resistance as the patient breathes in. Strong pressure is made with the expiration in an upward direction, lifting the abdominal contents upward.

Strong vibrations may be made over the lower part of the chest, directing the vibrations toward the heart. Kneading of the chest muscles may also be employed.

Zabludowski gives most attention to the large, fleshy masses and joints. Massage of the fingers and toes is practiced by catching the finger or toe between the fingers, rubbing transversely. Massage of the joints by vigorous to and fro movements with the hands grasping firmly is employed.

In massage of the back after friction,vibratory movements are made on either side at each vertebra, first by the thumb and fore finger held firmly together and pressing upon the tissues; second, by the back of the fore finger firmly pressed with the thumb pressing upon the palm to support it.

## MUSCULAR MOVEMENTS:

Association of movement--whole body works, when single group contract

A fixed point required for muscle movement.

General musclar action required to preserve body balance.

Arm and leg movements associated as in striking.

Men without any legs cannot strike.

Men without arms run with difficulty.

Experiment: Running with hands in pockets or tied behind.

Extensors act with flexors.

Illustration: Two men wheeling a barrow down hill, one pulling the other holding back.

Training the muscles

Walking, writing, balancing movements.

Training of the muscles on one side; trains the muscles of the opposite side.

Use of the muscular sense in training, in co-ordination.

Illustrate with touching fingers overhead; touching different parts of the body with the eyes closed.

Muscle sense destroyed in locomotor ataxia; highly educated in jugglers.

Static and dymanic muscular contraction.

Static is contracture, greater expenditure of energy according to

to Beclard

Contracture or stiffness fault of beginners in muscular movements - young piano players; learning to walk; learning to write.

Muscular movements must be learned.

New association of muscles must be learned.

Exercises become easier and require less expenditure of energy by practice.

Walking a tight rope and railroad irons very laborious at first always causes more effort than ordinary walking.

Well trained muscles like a trained army.

Relation of exercises to breathing.

Strain - illustrate - cracking a nut; pulling on shoes or boots

Interruption of breathing in strain.

The effect on the system - compression of lung, heart and other vessels in the chest.

Influence on the abdominal viscera.

General effects of exercise.

Increase activity.

Illustrated by cerebal excitement, arising from exercise.

Meniacal excitement of Dancing Dervishes;

Indians in war dance

Ancient gauls in battle

Children at play

Protruding of the eyes

Flushing of the cheek

Animated conversation

Addenda: resistive movements

Abstract of paper entitled,

PHYSICAL DETERIORATION CAUSED BY SCHOOL LIFE.

By Dr. J.H. Kellogg, Battle Creek, Mich.

The writer claims that the difference between city boys and girls, young men and women, and those who are country-born, is largely due to the deteriorating influences of school life. The claim is made that there is annually turned out of our public schools thousands of crippled ~~young~~ and deformed young men and women ~~xxx xxx~~ whose constitutions have been weakened for life by the unhygienic conditions to which they have been exposed during the fifteen to twenty years which they have spent in the schoolroom.

Chief among the bad and unhygienic conditions which surround the child during his school life are mentioned the following: bad air, lack of active muscular exercise, and bad positions in sitting. Bad positions result in numerous internal deformities of a grave character, such as prolapse of the stomach and bowels, floating kidney, narrow chest, and a variety of diseases and weaknesses.

A series of outlines of the human figure in health and disease graphically illustrate the relation between internal weaknesses and external deformities. The paper insists that physical work should hold a very prominent place in the exercises of the schoolroom; every teacher should be cognizant of the principles of physical training; that it is the duty of the teacher to have an oversight over the physical health of the student as well as his moral training, that every public school should be regularly visited by a physician for inspection in relation to its sanitary condition; and that the health of the student should be inquired into regularly by a physician competent to make inquiries of this sort. The remedy proposed to combat the evils spoken of is to introduce the health work as an essential feature of our educational system for all grades.

# DIRECTIONS FOR TAKING MEASUREMENTS OF THE BODY.

(These measurements are somewhat modified from those recommended by the American Association for the Advancement of Physical Education in the year 1885.)

DATE .--Record the year, month, day and hour, as : Jan., '86, 12, 9 A. M. Where perfect accuracy is desired, note should be made of the time that has escaped since eating, the occupation of previous hours, and of the temperature of the room.

Age.--Record years and months, as : 21, 9, i. e., 21 years and 9 months.

Weight.--The weight of the body should be taken without clothes . Where this is impracticable the weight of the clothes should be deducted .

Height.--The height should be taken without the shoes and with the head uncovered. The head and figure should be easily held erect, and the heels together . This position is best secured by bringing the heels, the buttocks, the spine between the shoulders and the back of the head, in contact with the measuring rod or wall.

Height of Knee.--The subject should place one foot on a box or chair of such a height that the knee is bent at the right angle. A box 12 inches high is suitable for adults .

¶. Measure from the box to the upper end of the fibula.

Height sitting .--Let the subject sit on a hard, flat surface about 12 inches high, such as afforded by a box or chair, with the head and figure easily erect, so that the measuring rod will touch the body at the buttocks, between the shoulders, and at the back of the head. Measure the distance from the box to the vertex.

Distance from navel to upper end of sternum .--~~Have~~ With the patient standing in his ordinary position : measure from the notch between the collar bones to the center of the navel.

Height of pubes.--With the subject standing easily erect on a box or floor, measure up to the lower edge of the pubic bone.

Height of crotch.---With the subject standing easily erect on the box or floor facing the vertical rod, press a ruler firmly against the perineum (crotch) and measure the height of the top of the ruler.

Height of navel.--With the figure and head of the subject erect, measure the height of the centre of the cicatrix .

Height of sternum .-- With the figure and head of the subject erect, measure the height of the interclavicular notch .

Girths .--All girths should be made on the skin itself at right angles to the axis of the body or limb at the point of measurement . No oblique measurements are taken.

Girth of Head .--This measurement should be taken around the head with the tape at the upper edge of the eye brow, over the supra orbital and occipital prominences .

Girth of neck.-- With the head of the subject erect, pass the tape around the neck half way between the head and body, or just below the "Adam's Apple".

Girth of Chest .--Pass a tape line around the chest below the lower angles of the shoulder blades, so that the upper edge of the tape line shall be two inches below the nipples. ~~pectoral line.~~ Take the measurement after an ordinary inspiration.

Girth of Chest after Expiration :--Have the patient empty the lungs as completely as possible. Take measurements in same place as before.

Girth of Chest after Inspiration .--Have the patient fill the lungs as completely as possible, breathing in his usual manner. Measurement taken at same point~~s~~.

Girth of Waist .--The waist should be measured at the smallest part after a natural expiration.

Girth of Hips .--The subject should stand erect with feet together. Pass the tape around the hips above the pubes over the trochanters and the glutei muscles.

Girth of Thighs.--With the feet of the subject about six inches apart, the muscles set just enough to sustain the equilibrium of the body and the weight distributed equally to each ~~leg,~~

leg, in gluteal fold measure around the thigh just below the nates.

Girth of Calf .--With the heels down and the weight of the body supported equally on both feet, the tape should be placed around the largest part of the calf.

Girth of Upper Arm.--With the arm of subject bent at elbow, firmly contracting the biceps and held away from the body in a horizontal position, pass the tape around the greatest prominence. If desirable to find the girth of the upper arm when the biceps is contracted, the arm should be held in a horizontal position and measured around the most prominent part.

Girth of Forearm .--Taken around the largest part. The fist should be firmly clenched and the palm of the hand turned upward.

Breadth of Shoulders .--With the subject standing in a natural position, elbows at the sides, shoulders neither dropped forward nor braced backward, measure the broadest part two inches below the acromion processes.

Breadth of Chest .--Apply the measuring instrument to the sides of the chest below the axilla on a level with the nipples pectoral ~~line~~ .

Breadth of Waist .-- Taken at the narrowest part .

Breadth of Hips .--Measure the widest part over the trochanters, while the subject stands with feet together, the weight resting equally on both legs ..

Depth of Chest .--Taken after ~~xxxx~~ a natural inspirarion. Place one foot on the calipers of the sternum midway between the nipples, and the other foot on the spine at such a point that the line of measurement is at right angles with the axis of the spinal column. When it is desirable to ascertain the extent of the antefo-posterior movement of the chest, measurements may be taken from the same points after the fullest inspiration and after the fullest expiration.

Depth of Abdomen.--Place one foot of the calipers immediately above the nipple, the other on the spine at such a point that the line of measurement is at right angles with the axis of the spinal column.

Capacity of Lungs :--The subject after loosening the clothes about the chest and taking a full inspiration, filling the lungs to their utmost capacity, should blow slowly into the spirometer. Two or three trials may be allowed.

Expiratory Strength .--As before, the subject after loosening the clothing about the chest and filling the lungs completely, should blow with one blast into the manometer . Care should be taken that no air is allowed to escape at the sides of the mouth, and that in expelling the air all the muscles of expiration are brought into play.

B. Care must also be taken that the glottis is not closed and the air expelled by the force of the cheek muscles.

Exercises for developing the abdominal muscles should be taken in the horizontal position. The exercises should begin with breathing movements in whihh the lungs should be freely inflated. In breathing out the abdominal muscles should be well drawn in. One to three deep breaths should be taken after each movemat befroe the next is made. In the following tables the exercises are made progressive.

Patient. Patient lying on back, hands grasping support above head

1. Leg flexing. (a) Each leg, 2 to 8 times.
   (b) In alternation.
   (c) Both together.

Remark: At the beginning of this exercise the feet should be drawn up as close to the thighs as possible. When the patient becomes stronger the knees may be drawn still nearer to the chest the feet being raised from the cough.

2. Leg flexing, knee extension. (a) Singly
   (b) In alternation
   (c) Together.

Remark: The movement is executed in four counts:

(1) Legs flexed till thighs are at right angles.

(2) Leg extended till as straight as possible.

(3) Knee flexion.

(4) Leg extension.

3. Knee half-flexing, leg extension.
   (a) Singly
   (b) In alternation
   (c) Together.

Remark: Legs are drawn to half-flexing position, that is, an angle of 45°. Knees extended and allowed to sink to the table while extended whithout flexion of knee.

ABSTRACT OF DR. EASTMAN'S PAPER.

"My paper will deal principally with fatigue, resulting from the drive of individuals and national ambition and the relation of this fatigue will deal with national fatigue and decadence. The remedy, of course, is not far to seek. It lies in bodily, social, religious and political tranquility or rest. Generally speaking, I wish to make the point that humanity is tired and hasn't sense enough to sit down. I shall speak on cancer, goiter, and other high tension diseases."

Dr. Van den Berg of Grand Rapids wrote and asked Dr. H. to lead in discussion at Mt. Clemens,

Dr. R. A. Morter, Kalamazoo State Hospital
Dr. Perry V. Wagley, Pontiac State Hospital
Dr. P. Phillips Sheets, Traverse City State Hospital
Dr. E. H. Campbell, Newberry State Hospital
Dr. Perry C. Robertson, Ionia State Hospital
Dr. O. R. Yoder, Ypsilanti State Hospital
Dr. R. L. Dixon, Caro State Hospital for Epileptics (located near Caro)

Lapeer State Home and Training School (for feeble minded)
Mt. Pleasant State Home and Training School (for feeble minded)
Coldwater State Home and Training School (for feeble minded)

(March 27'72. re-copied.)

MEMORANDA. Exercise:

The fat man may carry 100 lbs. dead weight; it goes with him everywhere; a heavy load even for a strong man to carry continuously.

Besides the load, the fat interferes with the action of the muscles, with breathing, and with heart-action.

The thick blanket of fat contains heat, so that exercise cause him to be easily overheated.

The heat, and exercise, with improper oxidation, produces a great quantity of poisons and imperfectly oxidized wastes which cause breathlessness and quick fatigue.

For a fat man, any movement of ascension is violent exercise; also, all rapid movements.

There are three causes of breathlessness in obesity; 1st, difficulty of lung-movements; 2nd, fatty degeneration, 3d fatty overloading the heart with an excessive quantity of incompletely oxidized fats.

onsecutive fatigue common in obese persons; the tissues being always crowded with waste matters; the increase of these by exercise produces a condition of exhaustion not apparent immediately after exercise, but subsequently; a few hours later,--say the next day.

Changes due to accumulation of waste products; auto-intoxication.

Moderate exercise often increase fat by improving the digestion and general nutrition; must be carried to fatigue, since fatigue is necessary to loss of fat.

Fatigue is better produced by difficult exercises than by a great amount of work in accustomed exercises, since difficult or unaccustomed exercise induces fatigue of nerve-centers as well as muscles, and do not induce breathlessness

Fatigue depends upon the state of training of the subject, rather than the amount of work.

Nerve-tension of difficult exercise:

The act of co-ordination induces fatigue; illustrated in walking on the sidewalk, or on a narrow fence-board.

Loss of ~~Muscle~~-weight secured by sweating- baths; quickly repaired, often with additions by drinking and food assimilation

Exercise must be pursued daily; must burn up the fat by work.

Exercise reduces fat, not only by increasing muscle-work, but by introducing more oxygen.

M. Marey observed in the gymnastics of Joinville, a universal increase in the respiratory power in such proportion that even in a state of repose, they introduced into the chest in a given time, Parkes Experiments 7 times a quantity of air nearly double that which had entered the lungs before they had been increased in size by the forced respiratory movements resulting from vigorous exercise.

In short, exercise increases the draft of the body.

Respiratory exercises specially valuable in cases of obesity.

The skin or muscles must also be made to respire freely; accomplished by moderate sweating-baths, cool baths, shampooing, rubbing.

by making them

Oertel, of Munich, cures his patients walk a little farther, and on a little more elevated ground, each day.

In very fat, feeble, obese cases, begin with massage and manual Swedish movements, first passive, then active; the patient may exercise his legs with pulley-weights.

Cold wet sheet packs especially useful .

Hydrotherapy or gymnastics of the skin; cold baths; remove surplus heat; stimulate the vessels of the skin, and increase oxidation.

Gradually the patient must be trained to swift and vigorous exercises.

Exercise in the morning is twice as valuable as at other seasons of the day, for the obese.

Hereditary obesity: not curable by exercise or regimen; can only be controlled; the result of several generations of sedentary and gluttonous ancestors.

Over-training : an obese person should never be reduced below the medium weight of a person of his height.

~~Show a table in connection with this chapter, deduced from Seaver's, Hitchcock's Wellesley's, and my own charts.~~

The weight should always remain above the average weight of a person of the same height.

Over-trained persons who have reduced their weight below the average, are weak, have little resistance to disease, fall an easy prey to many maladies; not infrequently become consumptive.

What is to be done for sleeplessness? In the first place, we must recognize these physiological facts in order to understand physiological treatment. We must not simply inquire "What will put a man to sleep?" There are many things that will do this. Bromide of potash, opium, alcohol, chloroform, or ether will put men to sleep; but the sleep they produce is not the most restful sort, and one must always reckon with the after results.

What we want to do for the men who cannot sleep, is to put him in a condition favorable to sleep,—a condition in which he can sleep physiologically and naturally; and the way to accomplish this is to remove the cause of the sleeplessness. Here is a man who has broken his leg; he is accumstomed to sound sleep, because he has worked hard and has earned the right to sleep. But now he cannot sleep, because he cannot exercise. To produce natural sleep we must give him exercise. Some simple passive movements, such as bending the limbs, serve the purpose well, when greater activity is impossible.

Exercise in the open air, produce substances adapted to make one sleep. When a boy comes in from coasting, and sits down by the warm fire, it is not more than five minutes before he is nodding. And when he goes to sleep after such exercise, his sleep is refreshing and sweet, like that of an infant. This is because of the generation of substances within the body which have power to put an animal to sleep. This is the reason the sleep of the laboring man is sweet. It is the reason exercise is a means which enables us to sleep.

When for any reason one does not work, the sleep-producing substances naturally formed by exercise are lacking. Instead, the body is full of the poisons which accumulate during idleness, and the influence of these is irritating and exciting to the nerves. We are uneasy, the brain is excited, and keeps thinking, cannot stop thinking! The legs twitch and jerk, and we cannot find a comfortable position, but lie first on one side and then on the other, and cannot be quiet long enough to go to sleep.

There is really no excuse for any one being sedentary. A man said to me not long ago, "I cannot take time for exercise ~~for any length of time;~~ I am a student, and I have no time for exercise." But the man who is sitting at his desk can take exercise, if he will, without interfering with work. By simply extending the arm and holding it perfectly steady, the muscles are given some work to do, and after about two minutes the arm will be so tired that it cannot stay in that position any longer. Drop both arms at the sides, and energize every muscle, straighten out all the fingers, make them stiff, and hold them so; or, bend one leg up close to the body, make it rigid, and hold it in that position, and you will be astonished to see how tired you will become.

One can put all his energy into one set of muscles in trying to set the limb in motion, and all his energy into another set of muscles in trying to hold it still. This is just as hard work as it is to lift a heavy weight. One can make his muscles work just as hard in this kind of exericse as in ordinary work, by putting one set of muscles in opposition to another set, as the flexors in opposition to the extensors of the arm. Set the muscles absolutely rigid, hold them so, and in five minutes one will be perspiring freely. A large number of movements of the head, limbs, and trunk can be made by Even the bedridden invalid, by which the benefits of good hard, exercise may be secured. ~~All this work, the sedentary invalid can do for himself.~~

If one is able, he should work two or three hours before going to bed. Ericsson, the great inventor, made it a habit of his life to go out two hours before he went to bed, no matter whether the evening was pleasant or stormy. This practice kept his brain active, because it secured refreshing sleep. William Cullen Bryant, the poet, the literary man, and the editor, for forty years before his death, took systematic and vigorous exercise every day of his life. He took exercise the first thing on arising in the morning, and the last thing before going to bed. He walked from eight to ten miles daily, never using street cars, coaches, or elevators, so as to get the benefits and blessings of work. Many persons do not have the resolution to do this. Often the business or professional man will take a carriage or hack to carry him from his business office to his residence (perhaps only four or five blocks) and from his residence to his office again, simply to let the world know that he

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~~secures other advantages which are of great service to the neurasthenic, increasing nerve tone, appetite, and improving digestion and general vital resistance.~~

~~A Simple Device for Inducing Sleep~~

~~A simple device which sometimes aids in inducing sleep is the following: on going to bed take along a card and a short bit of pencil. After taking care to compose the body and mind in as comfortable a state as possible, begin taking regular and deep breaths, putting down a mark on the card for each breath. The number of marks on the card in the morning will serve as a record of the time required for getting to sleep. This simple means serves to divert the mind from harassing subjects and induces a monotonous mental state which is favorable to sleep.~~

<u>Sleep and Rest</u>

Sleep eight hours each night. If not strong, or if neurasthenic, take a nap before dinner. Growth, assimilation, and repair are most active during sleep.

Surroundings at night should be quiet. Sleep amid noise is not normally refreshing.

On the right side is the best position during sleep for most persons. Change sides.

5'

On ~~Getting~~ Restful ~~Sleep -2~~.

~~Now,~~ We cannot all belong to the fortunate working class who live in the wide open spaces. We work hard in cities, at desks, in shops and in all sorts of places where we do not get fresh air. Laboring and sweating in bad air will not give us restful sleep at the end of the day unless we get out and walk or exercise where we can fill our lungs with life-giving oxygen. We must work in this way to earn sleep, and we must sleep with open windows so that our rooms are filled with fresh air. Do not be afraid of breathing nightair. Some people say they are afraid of night-air. But did you ever stop to think that there is nothing except night-air to breathe at night---that nature planned it that way for our good?

It is during sleep that oxygen is stored in the tissues in readiness for the day's activities. For this reason it is important that pure, fresh air be abundant for breathing.

The blood too is made principally while we are sleeping.

In very feeble patients the leg may be raised and lowered while the patient endeavors to hold it in position. After a time the patient will be able to control the movement of the elg whil sinking to position. Later, will be able to raise the leg. When the patient acquires a little strength slight resistance may be made with the hand placed upon the ankle.

5. Elbow-support-lying, hips-raising.

Remark:--This movement executed properly brings the abdominal muscles into vigorous play. First the patient may need the assistance of the attendant to lift the hips, especially in the case of feeble patients who are very fleshy. The movement should be executed but two to four times When the muscles become stronger the movements may be repeated 8 to 16 times

6. Elbow-toe-support-lying, hips-raising.

Remark:-- This is an exceedingly vigorous movement for developing the badominal muscles. It must be executed carefully at first, and with resistance.

7. Head backward raising. (a) With hands grasping support, (b) tips of fingers resting upon top of head, (c) with fingers touching back of neck.

8. Head backward raising in combination with the different leg movements. The head-back-ward raising should be practiced in alternation with the various leg movements from the beginning as the patient acquires st strength.

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Round shoulders and flat chest:- This is one of the most common of deformities. The two conditions, flat or hollow chest and round shoulders, go together. A round shouldered person is one who is simply carrying his chest behind instead of in front of him. This deformity is not necessarily indicative of a weak chest or small lungs, but rather of weak back muscles and the habit of sitting in a stooped or relaxed position, as shown in figure....... This habit naturally results from much sitting at study, writing, the keeping of accounts, and similar occupations. Most persons who sit much or whose employment naturally involves a stooped position are round shouldered. This condition is nearly as common among farmers whose occupation is chiefly out of doors as among clerks, students, and business men, because of the careless habit farmers have of sitting in a stooped position in driving or resting from active work. Even athletes are not infrequently very round shouldered. This deformity not only gives a person a weak and ungraceful appearance, but lessens the breathing capacity and leads to inactivity of the upper part of the lungs, thus inviting consumption and other diseases, which arise from the lodgement of germs in contact with inactive or weakened lung tissues.

When a person sits with the chest flattened, and the shoulders rounded, the muscles of the trunk are relaxed. The breast bone, or sternum, and the ribs are depressed in front and the result is a pushing downward of the stomach, liver, and other abdominal organs. The abdominal muscles are relaxed so that they afford no support to the viscera, and the certain consequence is congestion, and sooner or later more serious disease of the liver, stomach, bowels, and other organs which are involved.

When one sits erect, as shown in figure...... the chest is elevated, the abdominal muscles are drawn in, the internal organs are held up in their proper positions, and the movement of blood through these oggans is active and their functions normally performed.

The simple correction of the stooped position in sitting and the dultivation of an erect attitude, with deep breathing, will be found in itself sufficient to cure many a back ache, side ache, headache, and a considerable part of the indigestion, heavinness and the accompanying distress from which multitudes suffer, and for the relief of which quanities of nostrums are swallowed in vain. A correct sitting position is of the highest importance as a means of correcting this deformity. Parents and teachers should admonish the children under their care to sit tall, to reach their heads up as high as possible, and should take the advice to themselves.

In sitting, the seat should be of the proper height, so that the fee may be squarely placed upon the floor and supported without undue pressure upon the under side of the leg. When the lower extremities hang over the edge of the chair, the blood circulation is interferred with, the nerves are pressed upon , and the limbs become numb and cold, or "go to sleep" to use the common expression. To avoid this discomfort, the occupant of a seat which is too high slips forward and reclines in his seat, as shown in figure...... This is an exceedingly bad position resulting in relaxation of all the muscles of the trunk and extreme flattening of the chest.

It is well to bear in mind that one should never lie down when sitting up, but should maintain an erect position. The chest should be well raised forward, and the abdominal muscles well drawn in. To do this will at first require attention with an effort. One must every few moments correct his position. After a while the habit of correct sitting will be acquired and great advantage healthwise will thereby be gained.

One of the obstacles to assuming and maintaining a correct position in sitting is a weak, over-stretched condition of the muscles of theback. Correct sitting is a splendid exercise for these muscles, but certain exercises aid greatly in developing them. It is worse than useless to say to a round shouldered person "Put your shoulders back". The proper thing to do is to instruct him to put his chest forward. His shoulders will then naturally fall back in the effort to balance the ~~deformity~~ body. The shoulders may be put back without in the slightest degree correcting the deformity, as shown in figure......

The correct standing position is shown in fig.... This position is easily acquired by a little practice. The improvement in health and personal appearance is so great as to make it worth while to make the effott to obtain a good poise and graceful carriage. First of all, it is necessary to get a correct idea of the erect position. With a teacher this can be acquired in a few minutes. Having no teacher, one may employ a wall as a trainer. With the wall and the floor anr a chair as apparatus, all the exercises required may be easily learned without other assistance than the directions here given. These exercises should be taken daily, increasing the amount of work done each day as the muscles acquire strength. It is still better to take the exercises two or three times daily, each time devoting to the work at least one hakf hour. On rising in the morning, before retiring at night, and a little while before or after dinner, are the best times for these corrective or " setting up" exercises.

Position:- Standing against the wall facing the center of the room, place the heels, hips, shoulders and bamk of the head firmly against the wall. Reach the arms downward as far as possible, holding them to the sides with the thumbs turned outward.

The door is more convenient than a poastered wall as there is no baseboard and the surface is smooth. It is well to count either mentally or audibly during the movements so that they can be taken regularly The counting should be at the rate of ohe each second.

1. While standing in this position take ten deep breaths, filling the lungs as full as possible, raising the chest high and drawing the abdominal muscles in. Try to make each breath a little deeper than the preceding if possible. Slowly count four whole breathing in and the same number while breathing out.

2. While keeping the head, shoulders and hips in contact with the wall, raise the heels as high as possible, keeping them near together. Slowly return to position. Repeat the exercise tin or fifteen times, rising quicqly and sinking back to position. Count one while rising and breathing in, amd three while sinking and breathing out.

3. Standing in position, heels, hips, shoulders and head against the wall; roll the head backward as far as possible, allowing the chest at the same time to move forward, but keeping the heels and hips firmly against the wall. Return to position. Now move the head back until the shoulders are again in contact with the wall. Repeat this movement five to fifteen times, breathing out while the head moves slowly forward. Count four while moving the head backward, and the same number while ~~xxx~~-returning to position.

4. Standing against the wall, heels, hips, shoulders and head touching, fix the head firmly against the wall so that it shall not change position. Then rise upon the toes, keeping the hips against the wall. The effect will be to push the chest forward and upward while the head is rolledbackward against the wall, but without sliding upward. Breath slowly in during the upward movement while counting four, and exhale while returning to position during the same time.

This is a capital exercise when properly executed, bringing the body into perfect poise and completely correcting the roundness of shoulders and the flatness of chest.

5. This exercise may be easily taken after the preceding have been well learned. It is for the purpose of assuming the correct positin in standing and maintaining it.

Standing against the wall, raise on the toes, allowing the head to roll backward and pushing the chest forward as directed in the preceding movement (4). Before returning to position, while the heels are still ~~xxx~~ raised and the chest held exactly in the position to which it is raised by the ~~chest held~~ movement, bring the head forward into the natural position, holding the chin well in. Now, without relaxing the muscles of the trunk, let the heels sink and remain a moment in position. It will be noticed that the heels and hips are in contact with the wall while the head and shoulders are held several inches in front of it.

Relaxing the muscles slightly to avoid stiffness ofmovement, one will find himself in exactly the correct standing position, as is shown in fig. .... (There should be figures illustrating all these different movements). It is only necessary to maintain this position ~~xxx~~ constantly in walking and sitting to entirely correct in a short time the deformity in a person whose shoulders are very round and whose chest is very flat. The outlines shown in Figs. .. and ./. show the figure of a young man before and after the taking of this exercise.

Other exercises are of value in strengthening the muscles of the back, the weakness of which is the chief cause of this deformity. The following are to be especially recommended, because they can be effectually executed without the aid of a teacher.

6. Lie flat upon the back upon the floor on a hard mattress. Fix the head in position, then push the body upward without allowing the head to slide upward. The effect will be to raise the chest, which should be pushed up as high as possible. Hold the chest in position while slowly counting four, then return slowly to position. The breath should be drawn in while the chest is forced upward, held while counting four, and slowly expelled while the body is returning to position.

After breathing once or twice, repeat the exercise until it had been taken ten to twenty times.

7. Lying on the face with the arms extended by the dides, raise the head backward as far as possible. While holding it in this position count eight; then return to resting position. After a few deep breaths, repeat the movement, gradually increasing the number of counts until the head can be held well backward while slowly counting twenty-five or more. Repeat the exercise five to twenty times.

8. Lying on the face with the arms extended by the sides, flex both legs backward, pushing the feet up as high as possible ( Fig. ..) Count as before.

9. Raise the head backward and flex the legs as much as possible. Make as effort to approach the head and the feet as near together as possible, containing as before.

10. Sitting in a chair, place the hands against the back of the neck. Roll the head backwards soas to look up at the ceiling, and at the same time behind forward, endeavoring to keep the eyes upon the ceiling as long as possible. After placing the hands in position, before starting the movement, fill the lungs as full as possible and hold the breath while bending forward, during four counts. Then breath out while returning to position in the same time.

11. Sit with the hands upon the hips, push the shoulders to one side, keeping them level. This movement will be accompanied by a rolling mavement of the hips upon the seat. The mavements should be first to one side and then to the other, the shoulders being moved to one side as far as possible. The effect will be to cause vigorous contraction of the muscles of the trunk. The vigor of the exercise may be increased by placing the hands at the back of the neck. The movement in each direction.

12. Standing with the heels together and the toes well separated, extend the arms sidewise as shown in Fig. ... describing a small circle

with the arms while holding them as rigid as possible as indicated in Fig. ... The circle movement should be brief, quite vigorously, and repeated five to twenty times.

13. Standing, place the hands upon the back of the thighs with the thumbs outward. Bend the head and trunk backward as far ad possible allowing the hands to slip down upon the thighs during the backward movement. In returning to position, stop before the original standing position is reached, place the hands firmly against the thighs for support, drawing in the chin. This will give the position shown in Fig. .. (Shown the backward position as well as the correct standing position)8 This exercise may be practiced frequently, when the walls are not convenient or when one has by exercise against the wall become thoroughly familiar with the correct position.

14. Standing in the doorway, the feet firmly braced u pon the door-sill mid-way between the posts, place the hands upon the door post as high as possible above the head/ Now rise upon the toes and sway forward allowing the hands to slide upward, and pushing the chest forward as far as possible while the chin is well drawn in. Rise quicqly to this position, taking a deep breath at the sametime; hold the breath while counting four, and then sink back to the starting point while breathing out in four counts. This is a very excellent exercise for expanding the chest and for improving the figure.

Club swinging and dumb-bell exercises and all gymnastics in which the arms are brought into active movement are helpful in correcting a flat chest and round shoulders.

A word further with reference to sitting. It is important to assume in sitting down as erect position, and then maintain it. The body should be placed in the seat in such a way that the hips will be braced firmly against the back of the seat. The shoulders should come in contact with the back of the seat but the central portion of the back should not come in contact with the back of the seat unless the back has a considerable forward curve. If this position becomes tiresome because the muscles have not been properly trained, persons sitting at work or studying may place a pillow or cushion at the small of the back for support. This will prevent the assuming of the extremely bad position which results when the spinal muscles are relaxed and the trunk allowed to bend into the curved position into which gravity naturally draws it.

Round-shouldered or flat-chested persons should avoid the sitting position when too tired to sit erect. The standing position may be assumed for rest, or if too tired to stand, lie down upon the floor or some other flat hard surface, with the body extended full length upon the back, and no support under the head. In this position the muscles are relieved of the weight o fthe bones and other organs and are able to rest while their position id such that resulting deformity is prevented.

It is doubtful whether chairs are not on the whole as injury to health when one is tired, it is far better to lie down than to relax himself in a sitting position. Habitual sitting in a relaxed position is unquestionably the cause of many grave disorders of the internal organs as well as ugly deformities which, though curable in childhood and youth, are almost incurable in adults who have attained middle age.

Lateral curvature of the spine:- These curvatures are not curable when they have existed for many years and have become rigid, but in young persons they may always be greatly improved and many times entirely corrected. If they have existed but a short time, complete recovery may be obtained by simple exercises which can be taken at home as well as in an institution. Serious cases of course requires the care of a skilled physician.

Lateral curvature of the spineis usually indicated by the appearance of the shoulders and the hips. For example, if there is a curvature toward the left side, the right shoulder will be lower than the left, the right shoulder blade more prominent, and the right hip will appear higher or larger than that of the left side. These curvatures are due to general weakness or uneven developement of the muscles of the back. T The exercises prescribed for round shoulders are all aplicable to cases of lateral curvature, whether affecting the right side or the left side. In addition a few special exercises are valuable, among the best of whichlåre Sbtfaglewiagchair, grasp the seat with the hand on the side of the high shoulder. Pull downward with as much force as possible, while reaching the other arm as high as possible over the head. Repeat this exercise at the rate of about four times a minute, making ten to twenty counts during the exercise. Care should be taken to sit in a correct position during the exercise, the chest being held well forward and the chin drawn in ( Fig. ..) By this means the low shoulder will be pulled up, the high shoulder pulled down, and the curvature temporarily straightened. Repeat the exercise three or four times daily.

16. Attach a pulley to the ceiling. Pass a strong window-cord through it and tie a pail to one end. Tie several knots in the other end of the cord to aid thehand in grasping it. Have on hand a supply of stones or pieces of iron sufficiently to permit a regulation of the weight from five to twenty-five pounds. Under the pulley, a foot or two to one side, attach a strong knotted cord.

Standing under the pulley grasp the rope at a height which will render it taut with the hand of the low side. Pull hard upon the rope attached to the floor while at the same time lifting the weight with the hand of the low side. Begining with a small weight, five or ten pounds, the weight should be graddally increased from day to day until twenty-five and even fifty pounds can be lifted. The exercise may be con tinued for five to ten minutes, the weight lifted at intervals of two of three seconds.

17. Sitting with the hands upon the hips, execute the exercise

given in Number 11, for five minutes. Then push the shoulders over as fa far as possible foward the low shoulder side of the body and hold the trunk in this position while breathing deeply two to twenty times. Return to position and repeat and repeat three or four times, or until the muscles are slightly fatigued.

18. Lying upon the side on the floor or a hard couch with the high shoulder side uppermost, flex the trunk toward the upper side as much as possible.

19. Stand with the side of the high shoulder against a table. Place the hand of the same side upon the head. Reaching the other arm upward as high as possible, bend toward that table, taking care to keep the chest well held forward and the chin drawn in. Repeat the movements several times while slowly counting four and breathing deeply.

20 Practide daily lifting a weight by means of a pulley. The weight shauld be gradually increased until the weight of the entire body can be lifted. This exercise should be practiced for five to ten minutes two or three times a day.

When the weight can be easily lifted, overhead exercises for the arms in which the body is lifted may be practiced with advantage, such as swinging on rings, exercising on the overhead ladder, climbing a rope.

All exercises which bring the muscles of the arms and trunk into full play are useful in correcting spinal deformities. Chopping, plowing, and other farm exercises are highly to be recommended. It is important, however to remember that while engaged in exercises of this sort or in any kind of muscular labor, the body must be continually held as near as possible in proper position. If this is not done, the effect of the exercise is to increase the deformity father than to diminish it.

Exercise for developing the abdominal muscles:- Exercises for developing the abdominal muscles should be taken in the horizontal position. The exercises should begin with breathing movements in which the lungs should be freely inflated. In breathing out the abdominal muscles should be well drawn in. One to three deep breaths should be taken after each movement before the next is made. In the following table, the exercises are made progressive

It is a poison to everything that lives. Some time ago an old gentleman came here, and he was perhaps like the man who asked this question. He would like to smoke a little if he could. He was an old gentleman and didn't care to reform. He wanted to know if we didn't have a smoking room. I told him no. "Well, isn't there any corner where I can smoke on these premises?" "Yes," I said, "There is one." So I took him out to our greenhouse. I happened to notice a rosebush with some green flies on it. I set him down in front of this rose bush. I said, "See those green flies? Now, when you smoke, every puff of smoke must go against that bush." After two or three puffs the flies began to fall in a shower of corpses right before his eyes. His own breath was laden with poison that killed those bugs. I thought that would be a lesson to him. I explained the thing to him and went off and left him smoking. The next day he came to me and called for another bush. He was a hopeless case.

Q. Is there any difference between chewing and smoking?

A. ~~Xaxx~~ Just the same difference as between highway robbery and safe breaking. There isn't any difference. It depends on the amount you chew and the amount you smoke, don't you see? I knew a man some time ago who stopped smoking--had been a patient here and had been told he must not smoke any more and said he never would. He went home, but came back again with the same disease he had before. He had heart trouble. I said, "You have been smoking?" He said, "Now, I haven't." His wife said, "Doctor, he has stopped smoking, but I will tell you what he does. He puts a cigar in his outh in the morning, and it all disappears before night. He eats cigars, swallows them, instead of smoking." Now, I don't think he made any improvement.

Q. How long will it take to get rid of the nicotin in the body of a man who has smoked a long time?

A. We had a man here some time ago, an old smoker, who had wet sheet

Air.

1. Oxigen one-fifth each breath or 20-25 per min.

Use of oxigen sets energy free.

Oxigen stored, wastes with work accumulates druing sleep.

Hence sleeping rooms.

Amount per hour, 12 to 15per cent., 2/3 cu. feet per hour.
16 cu. feet or four bbles. per day.

Need three cu. ft. per hour. How to get it.

Proper breathing-expand waist, breathe through nose, snoring-cold air through nose-germ filter and moisten air.

Air impurities.

Exhalation man and animals.

Lamps, cnadles, stoves, gas, oil, charcoal, dust soot, etc.

Chicago stone-cutters.

Germs--flies etc.,

Parasites-Masine-fog, night air.

WATER.

Soft or hard, distilled, natural.

Germs dangerous.

Source-artesian, rain, spring, rivers, lakes, all impure dug wells always dangerous. Lead pipes.

Purification--filters, boiling (bathing) distilling, cost 1 lb. coal 19 of water.

Charcoal--rail water only,

Pasteur--Chemical.

Amount. 3 to 4 pints a day, fruits.

Water drinking, carbonated waters, mineral water, soft drinks, fruit juices, water-melons.

PURE FOOD.

Fruits, grains, nuts, vegetables/

Adapt amount to weather and work.

Child 1/3 more than man in proportion.

Woman 4/5 [illegible].

Sedentary man less than working woman.

Overeating, grave fault.

4. Work, muscular and mental, healthy, idleness dry rot. Not too much mental, too little physical. not add physical tp exhaustion m mental.

5. Sleep eight hours, hard bed, low hard pillow, air, bran, cotton 

Cool air, single bed, bed clothing.

Bowels and stomach empty, ifnot moved, wet girdle, warm bath.

6. Enough nottoo much equable, unrestricting, feet and head, barefoot, when can, air baths, swimming.

7. Daily bath, creases, arm pits, groins, teeth, scalp, fingernails, fingers, feet , boils, eyes, nose, spitting, swallowing, sputum, chag change of clothing.

Skin diseasesand neglect of baths, prevailed in Europe in middle ages. no baths? Institutions in Continent of Europe and France.

8. Children emasculation . Prue in heart.

9. Moderation in legimate enjoyments, Dissipation in music in exciting reading, in recreation, eating. "Let moderation be known in all things. Excitement kills, high tension, bane of modern life.

Dreams a warning.

10. Worry kills, speculators die early generally, commit suicide. Real peace only from harmony with God.

Respiratory Fatigue.

Cause.--- Stimulation of respiratory center by $CO_2$.

Respiratory Rhythm. (Air thirst)

Cause.--- Depends on amount of work done.

Experiment.--Man running makes $CO_2$ seven times as fast as when lying still. Bees make $CO_2$ twenty-seven times as fast as when at rest. Sleeping marmot lived several days in a bell-glass. Died in a few minutes when awake and active.

Cause of Breathlessness when Running.

Rapid exercise, employing numerous muscles.

Leg work.

Jumping.

Raising body with arms.

Holding arms rigid.

Horse runs with his legs, gallops with his lungs.

Respiratory Exhaustion.

Carrier pigeons.

Birds at sea.

Singers.

Causes of Breathlessness.

Violent exertion.

Unusual exercise.

Emotional excitement.

High altitude (at 3-1/2 miles, density 1/2; at 900 miles, density 3/4. Expands 1/490 of volume for each degree of temperature.)

Heated air.

<u>Pathological Causes.</u>

Obesity (fat in the chest and abdomen, and over-heating).

Anemia.

Pneumonia.

Tuberculosis.

Adhesions.

Rigid chest.

Stooped position.

Fever.

Weak heart.

Emphysema.

Nasal obstruction.