

and who would have been detected and rejected by the present board (Tables 2 and 3).

The most obvious thing shown by Table 4, the diagnosis tabulation, is the large relative and absolute increase in the number of certain types of abnormalities noted, especially cardiac murmurs, mitral insufficiency, mitral stenosis and irritable hearts. The increase of apical systolic and decrease in pulmonic systolic functional murmurs resulted from the more strenuous method of exercise used, which we find tends to bring out murmurs at the apex while those at the base tend to disappear.

The detection of a greater number of mitral insufficiency and stenosis cases and those of mitral stenosis

due to a long, arduous trip to the camp, he is given a rest, a good night's sleep, and his pulse is counted again on the following day.

Attention will probably be brought to the large number of men with mitral insufficiency accepted for full duty. These men show the characteristic murmurs with no cardiac hypertrophy, very slight or no accentuation of the pulmonic second sound, and no history of recurring attacks of acute rheumatic fever, chorea or tonsillitis. The apex beat is well within the nipple line and of normal character; the pulse and reaction to exercise are normal; the systolic murmur at the apex is transmitted well into the axilla; there is a systolic murmur at the mitral area, and the pulmonic second sound is more distinct than the aortic but is not definitely accentuated. These men are not classified as rejects in the recruiting regulations and have been accepted for full military duty. A list has been made of all these men, and I am at work at present preparing a report of their final disposition, especially as to their ability to undergo severe continued physical strain, such as given in the intensive training in camp.

TABLE 4.—DISPOSITION OF CASES BY DIAGNOSIS \*

Diagnosis	April 20 to July 20			July 20 to October 1		
	Accepted	Rejected	Total	Accepted	Rejected	Total
1. Normal hearts.....	900	0	900	937	0	937
2. Apical systolic murmur.....	309	0	309	680	1	681
3. Pulmonic systolic murmur.....	173	1	174	100	0	100
4. Cardiac respiratory murmur.....	34	0	34	33	0	33
5. Murmurs without significance.....	0	0	0	4	0	4
6. Mitral insufficiency.....	211	172	383	1,298	418	1,716
7. Mitral stenosis.....	1	2	3	2	12	14
8. Mitral insufficiency and stenosis.....	2	92	94	0	272	272
9. Aortic insufficiency.....	0	32	32	0	32	32
10. Aortic insufficiency and stenosis.....	0	14	14	0	37	37
11. Mitral insufficiency and stenosis.....	0	13	13	0	14	14
12. Aortic stenosis.....	0	1	1	2	0	2
13. Pericarditis.....	0	0	0	3	0	3
14. Myocarditis.....	0	0	0	0	5	5
15. Congenital lesions.....	1	1	2	1	0	1
16. Bradycardia.....	11	0	11	6	0	6
17. Simple tachycardia.....	138	5	143	121	11	132
18. Sinus arrhythmia.....	51	0	51	9	0	9
19. Extrasystoles.....	90	0	90	25	0	25
20. Tachycardiac paroxysms.....	2	1	3	0	0	0
21. Auricular fibrillation.....	0	4	4	0	2	2
22. Auricular flutter.....	0	0	0	1	0	1
23. Pulsus alternans.....	0	0	0	0	1	1
24. Irritable heart.....	2	2	4	20	25	45
25. Hypertrophy without hypertension.....	20	7	27	28	5	33
26. Hypertrophy with hypertension.....	7	4	11	1	0	1
27. Arterial hypertension.....	1	1	2	1	2	3
28. Displaced heart.....	14	3	17	34	0	34
29. Dilatation of aorta.....	2	0	2	0	0	0
30. Aortic syphilis.....	0	0	0	0	3	3
31. Aneurysm of aorta.....	0	1	1	0	1	1
32. Gout.....	94	40	134	30	30	60
33. Hyperthyroidism.....	0	1	1	0	0	0
34. Substernal thyroid.....	0	0	0	0	2	2
35. Tricuspid lesion.....	0	1	1	0	0	0
36. Pulmonic lesion.....	0	1	1	0	0	0
37. Elephantiasis.....	0	1	1	0	0	0
Total.....	2,063	411	2,474	3,336	873	4,209

\* Four cases accepted with waiver of disability are not included in the list.

† Eleven cases classified as combined lesions were recorded in whom duplicate records were not kept and the exact diagnosis is not obtainable.

is due also to the improved exercise, as it is well known that presystolic and diastolic murmurs many times are heard only after violent exercise.

Increase in the number of cases of irritable heart (neurocirculatory asthenia) was due to the more careful observation by the preliminary examiners. All cases in which an abnormally high pulse rate was noted after exercise or in whom objective symptoms, such as undue dyspnea or faintness, were observed were sent to the refer examiners. We have been enabled also to detect many cases of acute infectious disease before the onset of subjective symptoms, tachycardia without history of previous trouble putting us on our guard. In these cases, temperature was taken; and if it was above normal, the recruit was isolated and sent to his infirmary. If the man complains of fatigue

#### CONCLUSIONS

1. The system of referring recruits for supposed cardiovascular defects by a mustering board or tuberculosis board when abnormalities are detected during the course of other examinations is entirely unsatisfactory. At least 50 per cent. of men coming to camp with disqualifying cardiovascular defects are not detected by this method.

2. A system such as the one in vogue at Camp Lewis, whereby every recruit is given a special cardiovascular examination, is efficient and should be instituted in all camps receiving large draft increments.

#### EFFECT OF CARDIAC DISTRESS ON THE WORK OF RECRUITS

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Physically, an army, like a chain, is only as strong as its weakest part. Each individual link or element in the make-up of the soldier-to-be is examined by the orthopedic, neuropsychiatric, tuberculosis, cardiovascular, genito-urinary and other examiners. On their arrival at Camp Sherman, the recruits pass before the different examiners, and the manifestly unfit are rejected. The tuberculosis examiners make a cursory examination of the heart. The apparently normal are passed. Those showing any abnormality are referred to the cardiovascular examiners. Here they are examined more carefully, from ten to fifteen minutes, or more when necessary, being devoted to each case. As a rule about 3 per cent. are referred to this board, a varying number of whom are accepted. The organic valvular diseases give little trouble, as the rules governing this type of case are more or less definite. The same group of cases that offers trouble in the examining line causes the greatest difficulty when more time is given for examination. We refer to the individuals complaining of some dyspnea, some cardiac distress or pain, and showing a rapid pulse, a poor response to exercise, often blue, cyanotic hands and feet, profuse sweating, especially in the axillae, a coarse, irregular

tremor, and apparently little change in the heart. What becomes of the milder cases when accepted?

Three hundred men returned to the development battalion from the various line organizations because of complaints of "heart trouble" throw some light on this problem. The men, passed as apparently normal, were placed in organizations, found unable to drill, rejected as unfit for full military service, and referred to the development battalion.

#### OCCUPATION

As shown in Chart 1, the largest number of cases occurred among farmers, with laborers next, the two classes forming 168 cases, or 56 per cent. of the total. The clerical positions came next, with 17 per cent. The remainder were fairly evenly scattered. Sedentary occupations seemed to have little to do with the cases referred to the development battalion.

#### HISTORY OF PAST ILLNESSES

Chart 2 shows the relative frequency of the past illnesses. In every case the disease was named, the man answering "yes" or "no" to the inquiry. Whether measles and whooping cough are so common, or the familiarity with the names caused the men to believe that they had had the diseases in the past, is an open question, although all answers seemed to have been given in good faith. Excluding measles and whooping cough, acute rheumatic fever was the most common illness, 33 per cent. of the men giving a definite history of swollen, tender joints, with the acute process going from one joint to another. Occasionally, there were men who dated their trouble back to an acute infection. The acute infections of scarlet fever, typhoid fever, pneumonia and tonsillitis have about the same frequency, while the considerable number of men from the South raises the malaria incidence.

It is interesting to note that 154 have had symptoms for five years or more, some insisting that they

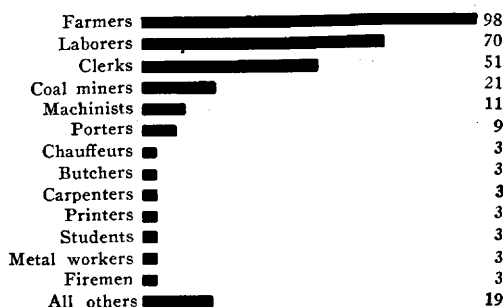


Chart 1.—Relative occupations.

have always had distress. Among those who have had trouble for six months or less, only twenty-three in all, most attribute their difficulty to an acute infection.

As would be expected in youths of this age, the use of tobacco is almost universal, 253 out of 300 using it in some form or another. Alcohol also has its share of followers, two thirds using it as a beverage, some to excess. Whether these proportions are high for males of this age it is impossible to state.

#### PRESENTING SYMPTOMS

Giddiness, present in 242 cases, was the most common symptom. It was especially noted on sudden stooping or change of position, when drilling in the hot sun or when standing at attention, and was a frequent

cause of dropping out of line at drill or when on a hike. As a rule it was momentary and was relieved by a short period of rest.

On prolonged effort or on sudden severe effort, dyspnea occurred in 239 instances. A hike or double quick time sent these men out of formation in short order. On hopping 100 times, a few showed marked dyspnea; but as a rule it was slight or of moderate severity. However, it seemed to be very troublesome, and "shortness of breath" was the complaint that sent many to the surgeon.

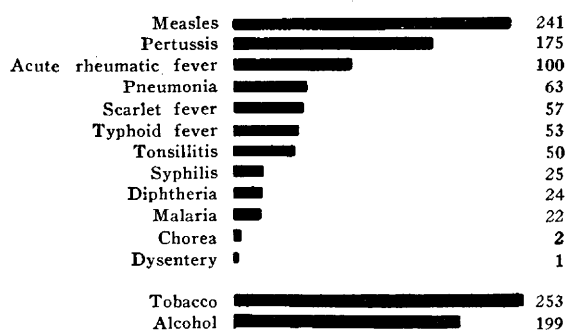


Chart 2.—Relative frequency of illnesses in the past.

Palpitation occurred in 218 out of the 300 cases.

Forty-seven gave a history of fainting. This does not include those with a single syncopal attack, but only those in which there was a history of repeated attacks.

In 154 there was a cough, which seems to be a common complaint among the recruits.

Varied complaints were received, but the foregoing seemed to be a group that persistently ran through the 300 cases.

#### PHYSICAL FINDINGS

The physical findings were interesting. Among the 300 men returned to the development battalion, 19 had hypertension with hypertrophy; 12, myocarditis; 9, mitral insufficiency; 8, hyperthyroidism; 5, aortic insufficiency; 4, hypertrophy of uncertain etiology; 3, mitral stenosis, and 1, tuberculosis.

This leaves 239 of the original 300 who belong to the large group of the so-called persistent tachycardias, certainly an important group. Two hundred and forty-eight were white, and fifty-two were colored. The average weight was between 120 and 150 pounds, with 190 between these limits. The extreme varied from 100 to 205 pounds. Cyanosis of the hands and feet occurred in 142, and a coarse, irregular tremor of the hands was present in 175 instances. The heart showed enlargement only when definite organic disease could be demonstrated. The apex beat was diffuse in 108 cases. A presystolic thrill was present in three cases of mitral stenosis, but was not demonstrated in any of the "persistent tachycardias." A definite systolic thrill occurred in six cases, although an indefinite suggestion of one was present in some of the rapid overacting hearts. The heart tones were distant in twenty-two instances, and in fifty-nine the first tone at the apex had lost its muscular element and was approaching the second tone in quality. The first tone at the apex was reduplicated in eight cases, and the second tone at the base twice. A systolic murmur was heard at the apex in 118 individuals, and at the pulmonic area in forty-one.

The three mitral stenosis lesions revealed presystolic murmurs over the apex, while over the third left inter-space the diastolic blow of aortic insufficiency was found five times. A cardiorespiratory murmur was discerned nine times. A definite respiratory sinus arrhythmia was present in twenty-one cases, and premature systoles occurred in nineteen of the 300 cases. The systolic pressure fluctuated between 110 and 280, while the diastolic was more constant, varying between 80 and 100 mm. of mercury. With the exception of the broader top of the systolic curve, the two curves resemble one another quite closely (Chart 3).

An extremely interesting finding was the high percentage of the men who were returned with an enlargement of the thyroid gland. Many men coming to this camp were recruited from Ohio, Indiana and Illinois, or the so-called goiter belt about the Great Lakes. Many of these cases were passed as simple goiter and sent to the line organizations. Out of the 300 men that were returned to the development battalions because of cardiac distress, eighty-six, or 28.6 per cent., showed a definite enlargement of the thyroid gland. Eight were classed as instances of hyperthyroidism, as they presented an enlarged gland, a fine tremor, tachycardia, exophthalmos, sweating, flushing, a high pulse pressure, and other symptoms accepted as an expression of a toxemia due to an excessive, or a deranged, secretion of the thyroid gland. In seventy-eight, the thyroid was enlarged without question, the heart was rapid, a coarse, irregular tremor was evident in the hands, which were often cyanotic, and sweating in the axillae was profuse; but no exophthalmos, no fine tremor and no history of alimentary disturbances could be obtained, so that these cases were not the typical accepted textbook thyroid intoxications, but, certainly, the large number returning suggested that

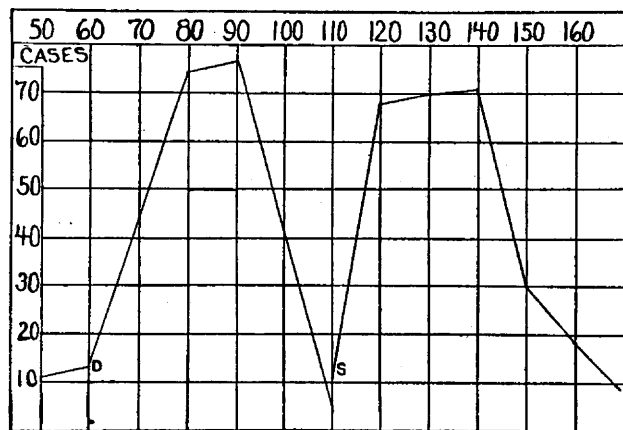


Chart 3.—Height of blood pressure in millimeters of mercury: D, diastolic; S, systolic.

the so-called simple goiters may be potentially or actively toxic, or at least that the men who have the so-called simple goiters do not stand intensive training well.

A definite thyroid enlargement can easily be seen on the first examination, and if not classified, at least a notation should be made so that the individual may be kept under observation by the battalion or regimental surgeon.

The nervous element sometimes predominates in the individuals with a persistent tachycardia. Out of 100 cases classified by the heart examiners, twenty were

also under observation by the neuropsychiatrists, who were doing their work independently in another part of the building. The accompanying table shows how the various diagnoses run in a series of such cases.

Probably some of the tachycardias will be eliminated through examination by other examiners, who may find the basis for the rapidity of the heart, which must be considered a symptom and not an entity. It is probable that neurologic conditions as well as some of the thyroid cases or endocrinopathies are classed

#### CARDIOVASCULAR AND NEUROPSYCHIATRIC DIAGNOSES IN PATIENTS WITH PERSISTENT TACHYCARDIA

Initial of Patient	Cardiovascular Diagnosis	Neuropsychiatric Diagnosis
J. N.	Simple tachycardia	Traumatic neurosis
F. H.	Nervous tachycardia	Psychoneurosis, neurasthenia
T. C.	Nervous tachycardia	Neurasthenia
E. W. F.	Nervous tachycardia	Epilepsy
A. S. W.	Hyperthyroidism	Hyperthyroidism
W. C.	Tachycardia	Epilepsy
J. A. C.	Tachycardia	Inebriety
J. Z.	Goiter, heart negative	Hyperthyroidism
D. C. L.	Persistent tachycardia	Neurasthenia
F. B.	Goiter, hyperthyroidism(?)	Hyperthyroidism
H. E. S.	Persistent tachycardia	Family tremor
W. W.	Goiter, tachycardia	Hyperthyroidism
S. W. R.	Persistent tachycardia	Imbecile
J. W. P.	Persistent tachycardia	Moron
J. J.	Tachycardia, hypertension	Psychoneurosis
J. J. G.	Nervous tachycardia	Intention tremor

among the so-called neurocirculatory asthenia cases. Many of the patients with persistent tachycardia complain of identical symptoms and present the same clinical picture. The diagnosis of neurocirculatory asthenia could be used to cover a large number of cases in which the etiology is uncertain, and, indeed, may be a group of conditions instead of a well defined clinical entity. Mackenzie says:

It has already been pointed out that when the heart is forced to do work beyond its normal capacity, or, in other words, after the reserve force has been exhausted, sensations of distress arise. The sensations may vary, at first, a slight breathlessness, a sensation of suffocation referred to the throat, or a tightness across the upper part of the chest. These are the signs usually experienced by healthy people whose hearts have for the time being been subjected to a severe strain. In addition to these sensations, pain may be induced, and be followed by other sensory disturbances, as hyperalgesia of the skin and subcutaneous tissues of the left chest wall.

In the group of men referred to the development battalion, the 239 cases showing a tachycardia showed a systolic-diastolic rate or energy index, as described by Barach, consistently over 20,000. Add to this the work put on a heart by the intensive training of the military routine, and one can readily see why a certain number complain of "heart trouble."

#### SUMMARY

1. Few organic valvular heart lesions escape during the routine examination of recruits.
2. Men with persistent tachycardia due to various causes form the largest group slipping by the examiners, later to return unable to perform full military duty.
3. The number of alcohol and tobacco users among those complaining of cardiac distress seems high. Sedentary occupation seemed to have little to do with the cases examined here.
4. A large number of men with enlarged thyroid glands develop cardiac symptoms when put under severe physical strain. Soldiers with enlarged thyroid glands should be kept under observation.

5. A certain percentage of the persistent tachycardias are fundamentally nervous conditions and can be eliminated by the neuropsychiatrists.

6. The persistent tachycardias are a group of conditions, the etiology of which must be determined before a rational plan of treatment can be prescribed.

### RELATION OF METEOROLOGICAL CONDITIONS TO THE PREVALENCE OF PNEUMONIA

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While there seems little doubt that meteorological conditions have a distinct influence on the occurrence of pneumonia, and although a good deal of investigation has been carried on in the endeavor to throw light on this relationship, yet there is still a considerable lack of unanimity of opinion in our present views regarding this connection.

Concerning the relation of season to pneumonia, it is apparent that the greatest incidence from this disease occurs during the cold months. Seitz<sup>1</sup> showed that for a period of twenty years in Munich, 37 per cent. of the cases occurred in the spring, 32 per cent. in winter, 16 per cent. in autumn and 15 per cent. in summer. Anders<sup>2</sup> found the incidence in Philadelphia for a period of ten years to be: first quarter, 43.2 per cent.; second quarter, 24.5 per cent.; third quarter, 9.6 per cent., and fourth quarter, 22.8 per cent. Analyses that I have made of the deaths from lobar pneumonia in New York City for the years 1901 to 1915 show, for the first quarter, 38.1 per cent.; second quarter, 25.8 per cent.; third quarter, 10.9 per cent., and fourth quarter, 25.3 per cent. The monthly incidence is shown in Table 1, from which it will be seen that the maximal number of deaths occurs in March and the minimal number in August.

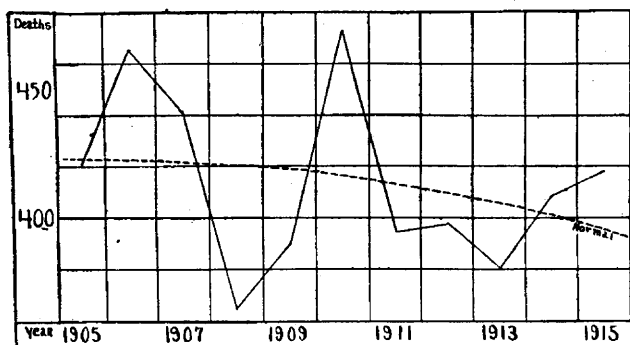


Chart 1.—Annual number of deaths and normal number of deaths from pneumonia, Providence, R. I., 1905-1915.

It was long recognized that temperature alone altogether fails to explain increases and decreases in the pneumonia death rate, and the answer was sought for in other meteorological conditions. As to the relation of temperature changes or variability, Aufrecht<sup>3</sup>

found the incidence of pneumonia to be directly dependent on the prevalence of unequal and changeable meteorological conditions, especially on the occurrence of abrupt and marked changes of temperature at a time when the mean temperature was very low. Anders contends that abrupt oscillations of temperature per se have a restricted influence, if any, as a favoring factor. On the other hand,

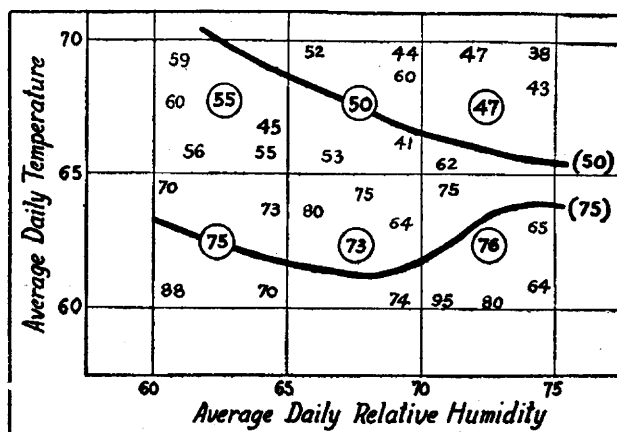


Chart 2.—Method of constructing the climograph: A sheet of ruled paper is divided into squares, each square corresponding to a certain combination of temperature and humidity, one square, for example, for a combination of temperatures between 60 and 65 F. and humidities between 60 and 65 per cent. The percentage mortality for each month is then recorded in the proper square determined by the combination of temperature and humidity prevalent for that month. The values recorded within each square are then averaged, and the resulting value is indicated within the small circle. Thus, 75 is the average percentage of mortality for months having a temperature between 60 and 65 degrees and a humidity between 60 and 65 per cent. Points of equal value from the standpoint of percentage of mortality are then joined by lines. Thus, the upper sloping line on the diagram is intended to pass through all points having a value of 50 per cent. In the middle square, the line passes through the point 50; but in the square to the left, having a greater value than 50, the line passes above this point, while in the square to the right, it necessarily must pass below the value of 47. The lower line, which is supposed to pass through all points having a value of 75 per cent., will be noted to pass below the value 73 (central square) and above the value of 76 (square on the right).

Fraenkel<sup>4</sup> has pointed out that, in certain localities (London, Dublin, Wurzburg and Tübingen) most of the pneumonia cases occur during those winter months in which, while the actual temperature is lower, yet the daily variation is less than during the spring.

TABLE 1.—DEATHS FROM LOBAR PNEUMONIA, BY MONTHS, IN NEW YORK CITY (1901-1915)

Month	Deaths	Month	Deaths
January.....	11,331	July.....	3,258
February.....	10,555	August.....	3,024
March.....	11,943	September.....	3,358
April.....	10,193	October.....	4,882
May.....	7,974	November.....	7,104
June.....	4,704	December.....	10,448

Concerning the influence of relative humidity Riebe<sup>5</sup> believes that a contributing cause of pneumonia (in Posen) is found in excessive humidity. Baker<sup>6</sup> noted a slight correlation between a low absolute humidity and a low pneumonia incidence. Anders, who studied this matter in detail, does not come to any definite conclusion on this point.

In regard to the effect of barometric pressure, Jurgensen<sup>7</sup> maintains that a high barometer is coincident

1. Seitz: *Beircher Intelligensblatt*, 1874.

2. Anders, J. M.: *Meteorological Conditions in the Causation of Lobar Pneumonia*, *Am Med.* 8: 407, 1904; *Social Conditions in America in Their Relation to Medical Progress and Disease*, J. A. M. A. 40: 1284 (May 9) 1903.

3. Aufrecht, in *Nothnagel: Practice, Diseases of the Bronchi, Lungs and Pleura*, p. 419.

4. Fraenkel, quoted by Osler and McCrae: *Modern Medicine*, 1907.

5. Riebe: *Vrtijshr. f. gerichtl. Med. w. f.* 40-41: 128.

6. Baker, H. B.: *Relation of Certain Meteorological Conditions to Diseases of the Lungs and Air Passages as Shown by Statistical and Other Evidence*, *Tr. IX Internat. M. Cong.* 5: 52, 1887.

7. Jurgensen: *Traité de médecine* 7: 471.