The Measurement of Physiological Values in Industry

By M. E. Fulk, A.B., A.M., M.D., *Philo, Ohio*

"And the end is that the workman shall live to enjoy the fruits of his labor; that his mother shall have the comfort of his arm in her age; that his wife shall not be untimely a widow; that his children shall have a father; and that cripples and helpless wrecks who were once strong men, shall no longer be a by-product of industry."—Junke.

I. The Question Stated

ONE of the marked characteristics of this industrial age of ours is the enormous amount of investigation that has been given to the welfare of workers. Industrial medicine and all that it implies is an index, more or less complete, of the variations which have influenced the human side of industrial relations. No one will deny that, considered from the standpoint of public health, the status and the physical efficiency of labor, to say nothing of the exigencies of modern machinery and the new processes, with their innumerable regulations devised in the interest of safety, medicine has not advantageously effected and earned a high place in the industrial scale.

Workmen's compensation laws in the United States date from 1911. The restriction of immigration followed in 1915. It may be argued, and with a show of reason, that it is measureably due to these two additions to our code of laws, that a strong economic pressure developed, which demonstrated a compelling necessity for industry to accept the guidance of medicine. The compensation laws placed definitely the responsibility of disabilities that are bound to happen; while the immigration laws curbed the labor supply. Management, in search of means wherewith to master the issue, employed advanced technological knowledge and hastened mechanization. Hence, to have an intelligible understanding of the logical consequences of this legislation, one cannot pretend that industry was in any other position, than that of having its hand forced by public opinion. The worker, no longer in competition with the uncontrolled tide of European immigration, found that the balance of power had passed to the machine, work had become more specalized and the individual could no longer be seen as an economic factor, apart from his occupation, its nature, its hazards and its diseases.

On the other hand modern corporate management adopting a more institutional and social program towards its employees, sensed the need for a clear,

unbiased, comprehensively formulated and carefully executed labor and employment policy.

It is evident, therefore, that medicine became linked up with industry as a means of adjusting economic conditions. This must be fully recognized and understood because this is just what industrial medicine has always professed to do. It cuts down the amount of accidents, occupational disease, poverty and physical inefficiency. The more intelligent and powerful among the industrial groups thus affected know fairly well just what this means to them in terms of tangible assets.

For example the annual loss to the Pennsylvania Railroad Company due to illness and disability is 2,000,000 working days or 6,666⅔ working years. Based on the total production of the United States, the average annual production of each individual is $2,000.00. Therefore, the economic loss due to disability to the railroad is over $13,000,000.00 annually, or a dividend loss to the stockholders of approximately $900,000.00 each year. Even these figures, enormous as they may seem fail to take into consideration the intangible loss due to underproduction on the part of an estimated 60% who continue to work while suffering from minor defects.*

Perhaps proof was needed to convince industry that new considerations were necessary. In the United States over 70% of those industrially employed now work in plants employing more than a hundred workers. Fundamental changes have taken place since the days of the small shop, when the employer knew his men personally. We now have vast corporations employing thousands in which men have little knowledge of those who work next to them. Such concentration has led to not only social maladjustment, but also to difficulties of physiological adaptation.

This last factor, physiological maladjustment, one of the principal problems that we are facing today, is by no means new. It is simply the old problem that has always been with us, the conflict of the human body with its environment. Now the day has come when we see that this unequal struggle must stop. It is certainly true, that medicine must meet the consequences of acceleration, intensification and precision of effort in industry, or fail to justify its purpose. And only as we perceive all this can we see the importance of physical examination to industry.

The industrial physical examination is an attempt to regulate this struggle upon equitable principles, and in the interest of the greatest number. Yet the situation, as we find it today, is due in no small measure to our lack of a uniform sifting and selective process. It must be remembered that industrial medicine is comparatively a new thing in the world. It is merely at the beginning of its career; physicians in the field of industry have not yet tackled, in earnest, the great subject of physiological maladjustment. We have, as yet, no science of physical examination in industry, as exists, for instance, in life insurance.

At present the average industrial examination is a cross-section method expressed in many terms, varied in nomenclature, overlapping in many in-

stances, different in each specific industry and consequently, and worst of all, insusceptible of being used for the purpose of comparison.

It seems that the ideal towards which we should work is illustrated by the analysis of a concrete situation. The selection of drafted men at the time of the war was one of the great factors which led to the growth of physical examination. These examinations challenged industry's sense of security in the estimates of health conditions among its employed. They were important from the standpoint of social and industrial life, since they gave some insight into the availability of the population for the various occupations which our social organization requires. Thousands of medical officers were secured for the purpose of making these examinations. These physicians each rendered an independent verdict upon the drafted man's physical and mental condition. A great variety of diagnostic terms were used and one wonders at the efficiency with which the problem of statistical analysis was handled. Eventually, as the draft progressed, there were various attempts at standardization. Finally it became necessary for the Surgeon General to create a uniform language, to write a dictionary in which each physical defect was so clearly defined that misunderstanding was impossible. It might be added that this was not finally accomplished until November 8th, 1918, and that these final standards were not utilized because of the armistice.

It is evident that, under modern industrial conditions, physical examination vitally affects great numbers of workers every day in the year. It affects wages and thus indirectly values mounting into millions. It affects various manufacturing interests. It is of interest to labor. It has an interest to the nation as a whole, actuated as we are by different sentiments and views about health but undivided with respect to any plan that will maintain the standard of living.

Therefore, is it not conceivable that a comprehensive uniform plan could be adopted, the aim of which would be to devise means of measuring and testing according to common specifications; and to use the results in classifying upon the basis of functional capacity? *That is the question.* Our thesis concerns itself with the answer. The purpose of which is to outline a method of procedure in developing such specifications and tests that will determine classification. Such classification would be the worker's ability to carry on the tested physical requirements of the job in so far as they are modified by functional capacity.

Let us say that such a criterion of measurement is conceived for the purpose of accomplishing economies. Then we must ask: To whose account do these economies accrue? The great benefit of physical examination applied to applicants for employment, is not from the small number that it is necessary to reject, but in the proper placement of those accepted. We must bear in mind that classifications have to do with a changing condition, a condition that is subject to correction, the rating of which brings this to light. We contend that such a form of classification has great value, in that it aids in predicting the achievement the applicant will make at his job; because

the activities required by the job have been independently appraised. Furthermore, a uniform criterion means a finer technique for the industrial physician in his contact with the worker. And this leads to a surer means of correcting many of the preclinical conditions found in industry. Human wastage in industry through improper placement is equally as pernicious as it is through accident or disease and its elimination will mean an increased output at lower cost, decreased insurance rates and continuity of production.

Our conclusion may be summed up thus: If the future of industry is to be safe we must rise above the difficulties in adjusting the physical qualities of man to work, and develop a more uniform scale of functional valuation. Actually, such a scale must rest upon principles which command the sanction of medical science, the approval of labor and, at the same time, attain the maximum efficiency demanded by modern industries. In practice it must satisfy certain obvious occupational tests. It must insure the security of the worker by reducing the volume of occupational disease and the number of known industrial accidents, with due respects to the rights and interests of not only the employee, but the employer. In other words, it must decrease the turnover of labor and increase the worker's margin of safety. It must do these things without degenerating into an instrument of oppression and with the least possible infliction of industrial disturbance or economic loss.

II. Measuring Functional Capacity

"The great word of life is Use.
Everything was given to use.
The principle of use is the main guide post.
Use is positive, active, life-giving.
Use adds to the sum of good."

—HENRY FORD.

The basis of all physical examination must necessarily be fact, the substantial reality of the human body as a whole. When medicine comes to deal with industry we find that the fundamental problem which underlies the development of a system of measurement is that, theoretically, the physical examination should be based on functional valuation. The physician in addition to recording the clear cut cases of physical disturbances due to occupation, has always this vital element to reckon with. The doctor in industry must forecast. The future must not be left to take care of itself. He must set himself with grim, persistent determination, to the task of testing each human being in his organization for his or her functional capacity. Such is one of the sober truths with which medicine has to negotiate in forecasting the future of industry; the other is the constancy of human nature. The same conclusion is not less certain, although it may be less obvious in other walks of life. But in industry the resources of the individual are drawn

upon to the fullest extent to keep his efficiency at the highest pitch. The consequence is that improper placement is an indication that the worker is unable to rise above the physiologic difficulties of the job. This much every physician knows instinctively, but it was not until after the compensable theory had been put into force that industry grasped its economic significance. In the United States industry involves nearly all classes. The springs of action lie very deep, therefore improper placement is still a point of view which, in many other matters as well as the economic, belongs to the future, when we shall have more comprehensive and accurate information as to just how much our new industrialism is going to cost biologically.

The influence of occupation upon the health of the worker has been noted and recorded ever since tools and implements began to determine occupation. Yet from the time of Hippocrates the growth of knowledge concerning organic function has been irregular. In the eighteenth century, physicians were confident that they had solved the problem of human behavior and again in the nineteenth, after generations of laborious research it was felt that a basis of understanding had been reached. Yet, today has medicine solved that every day phenomenon known as industrial fatigue? Aside from its simple elementary physiologic point of view, does not this complicated subject still lie beyond present day medical knowledge? Can we get today any plain answer to such a pertinent and practical question as why, apparently healthy, normal men react differently to identical industrial conditions? The answer is very apt to call forth a string of words such as neurasthenia, neurosis, neurotic, nervous—about which pathology tells us nothing.

It seems reasonable to assume that before we measure anything we must know what dimensions it has. We must also have a definite unit in terms by which each dimension, when measured, is expressed. At this point it is well to remind ourselves that in measuring the worker's physical condition we are not measuring the man, nor are we measuring the amount of self expression he can manage to demonstrate in his community, nor are we even measuring his health. We are measuring *functional capacity*. Our purpose is to predict a proper way of earning a living. Industry's first consideration of the prospective workmen is, "*Can he do the work required?*" Therefore, while the industrial physician must always see the worker as a living whole and consider dimensions such as the anatomic, etiologic, social and the mental, his yardstick is essentially the physiologic—the delicate measurement of each and everyone of the bodily organs to the function it subserves. That is the test. The term by which it is expressed is, "occupational classification." Surely all physicians agree, no matter how valuable may be the other dimensions, such as the anatomic and etiologic, unless the physiologic is satisfactory, they are of little importance to industry.

This means that the examiner must learn to sift evidence, to test his findings with the exact physical requirements of the job. He must learn to compare their conflicting claims and

weigh their contradictions. He must reject and accept with a delicate nicety of appreciation realizing that he is dealing, not with commodities in which results can be measured and graded with secure finality, but with men and women who are infinitely variable.

Though his material is fact, the industrial physician has to search exhaustively and expeditiously to get his facts together, to test and verify them. The mere assemblage of fact is only the basis of his work. It is not simply the gathering of facts, it is what he does with them that counts, and it is just here that the value of measuring with the single dimension, the physiologic, triumphantly asserts itself in industrial practice.

Industrial physicians will admit there is a demand for such an examination. They should let it be known that they wish to assist in arriving at such an examination. That they wish to assist in finding out what the conditions are that are necessary to produce an enlightened administration of human relations in industry. Before it is too late industry should decide to change the "laissez faire" doctrine which dominates its health problem today; forget the set-backs and defeats it has experienced and start out valiantly to rectify the detestible condition of wrong physical placement, by adopting a standard for the most essential of measurements—physical conditions.

III. A Standard for Nomenclature for Classifying Industrial Employees Physically

Perhaps nothing shows the exigency of standards in industrial medicine more than the present confusion resulting from the large vocabulary used by physicians in describing different preclinical conditions. Different physicians may have in mind the same physical condition and yet may mean a different thing to each of several different physicians. For this reason, data, to be comparable, must be defined by a common nomenclature.

At the present time there is no criterion of nomenclature for industrial physical examinations. Therefore, in attempting to write down the different features of human activities in industry—those considered evidence of either health or disease, it is necessary to establish precise methods of labelling. This necessitates two things, (1) a standard of nomenclature and (2) a standard of classifications for using this nomenclature. Such labels, or nomenclature, should as far as possible, be descriptive and descriptive only of the conditions which they indicate. The classification should be preicse definitions of the preclinical states named in the nomenclature. To achieve its purpose physicians examining in different localities or in different industries must have the same idea as to what a label indicates. This is all the more important to industry if statistical studies are to be made.

Today physicians who practice industrial medicine are in a difficult position. Ever since the compensation laws were enacted they have felt the necessity of a standard for measuring the different organic functions in their

relation to industry. One of the difficulties, of course, is to be found in the charts and forms of the physical examination itself. These are so varied and have undergone so many changes, that even though a movement was afoot to legislate more uniformly or to codify the existing acts, it is doubtful whether data involving the collection and tabulation of the effects of our modern industrialisms upon the health of the worker would be self-explanatory or of comparable statistical value.

Uniform nomenclature would make it less difficult for industrial physicians to sense the kind of problems now confronting them and make it easier to describe what form of constructive action should be recommended. It would also be easier to suggest a remedy and give constructive advice to workers struggling hard to fit themselves into environment which it is obvious nature never intended them to occupy.

Industrial physicians are really naturalists, engaged in the study not only of physiological but biological problems. It is their duty to sense the causes of the fruitless struggles of individuals trying to adjust their lives under modern industrial conditions. With unwearied patience they must survey the field of physiologic phenomena, describing, analyzing, classifying with practical sagacity. It is reserved for the physician in industry to demonstrate the utility of the method of inspection, observation and experiment as exemplified in physical examination. The obligation under which he is placed can scarcely be overestimated. His investigations must never be superficial nor his view narrow. He is a pioneer in a new path, therefore the style of his expression must be determined by the object in view.

Every examination must necessarily result in classification. The standard of guidance most essential in placing workers in jobs for which they are physiologically fitted and to prevent them from being transferred to jobs for which they are not fitted. When we try either to review the present industrial situation or judge the trend of events from the physician's view point, a standard of grading workers based on a scale of functional valuation is essential.

Today, improved machinery is not only displacing men but requires greater skill on the part of the operator. This results in more highly skilled jobs and much fewer really unskilled ones. Therefore while the demand from industry may be for workers of only average skill, they must be as nearly physically perfect as it is possible to get them.

Surely, we shall make a sad mess of affairs if we set out to encourage the study of groups of workers without standards of classification to identify and control the groups. As an illustration let us take the problem of industrial fatigue. To attempt to survey a large group of men composed of some in good health, others slightly impaired, still others seriously impaired, and study them as a whole is unscientific. To learn anything they must be unmixed and classified physiologically.

It is in just this orderly process, in which the physician's findings are so classified, exhibiting their physiologic significance so they can be grasped at

a glance, that lies all the difference between the physical examination of the future and the average examination used by industry today.

Functional classification should not be influenced by the anatomical diagnosis or by the prognosis.[1]

IV. The Technique of Charting Functional Capacity

PART I. PSYCHOLOGICAL TECHNIQUE

This chapter has been prepared as a course of instruction in using the accompanying chart of physical examination. The details have been grouped under general headings.

No. 1. The interviewer

Referring to the chart, it will be noticed it is so arranged that the physician's finding may be kept confidential. They may be sealed subject to executive orders and filed. From the employee's standpoint, this is very important and knowing that, the worker is more apt to coöperate. The examinations are so arranged that they are periodic. The best practice is to send to the physician only those applicants who have been found otherwise acceptable.

Therefore, prior to the initial physical examination, an oral examination requiring a minimum amount of clerical work has been tabulated. This consists of twelve questions and a statement of accuracy which the applicant for employment signs. These form the basis of the worker's record for the use of the personnel department. Also as a reference for future record by either the applicant himself or subsequent employer. Therefore, it is important that they should be properly and accurately answered. It is not necessary that this part of the examination be conducted by a physician; he who undertakes it will be referred to as the interviewer, while for the sake of clarity, we will refer to the physician as the examiner.

The interviewer should be seated at a table with a place for the applicant opposite. To insure greater privacy during the physical examination, this should be in a room adjacent to the physician's room. It is essential that the interviewer adopt a friendly conversational style that will put the applicant at ease. By so doing, he will encourage him to give full and intimate record of his occupational career. This information is necessary for a complete understanding of the applicant's educational and occupational experience. Unlike the physician's part of the examination it is apt to vary according to the experience, education and personality of the applicant. However, the interviewer should bear in mind that in the case of an applicant

[1] From a reading of this chapter it must not be inferred, however much functional classification may be characterized by special emphasis, that the rating is arrived at without due consideration to age, sex, weight, and personal habits. The test is the worker's physical ability to carry on the activities of his job in so far as this is modified by functional capacity. Furthermore, it must be understood that in most industrial establishments the psychological factor has been employed previous to the physical examination in determining occupational fitness.

Employment Record of________________ Address________________

Date	Occupation	Rate	Location	Department	Remarks

		1	6	12	18	24	36	48
Appearance	Good							
	Fair							
	Indifferent							
Health	Good							
	Fair							
	Doubtful							

		1	6	12	18	24	36	48
Personality	Positive							
	Pleasing							
	Retiring							
Characteristics	Active							
	Slow							
	Thorough							
	Indifferent							

Willingness to improve________
Any special inclinations________
General observations________

EFFICIENCY RATING *Semi-Annual*

	1/12 Yr.	½ Yr.	1 Yr.	1½ Yrs.	2 Yrs.	2½ Yrs.	3 Yrs.	3½ Yrs.	4 Yrs.	4½ Yrs.	5 Yrs.
Quality											
Production											
Speed											
Attendance											
Conduct											
Dependability											
Intelligence											
Neatness											
Cheerfulness											
Activity											
Strength											
Total per cent											

Efficiency rating given by: 1st mo.______ 6th mo.______
1st year______ 1½ yrs.______ 2nd yr.______
2½ yrs.______ 3rd yr.______ 3½ yrs.______
4th yr.______ 4½ yrs.______ 5th yr.______
Remarks:______

Physician's Chart of Examinations

Questions submitted to applicant prior to his first examination.

1. Sex, M.F. Race, W.C.Y. Occupation________Other occupations________
2. Date of birth________Age____Place of birth________Are you naturalized?______1st papers______
3. Father's age________Mother's age________Brothers' ages________Sisters' ages________
   If deceased, give ages and cause of death________
4. Married______ Single______ Divorcee______ Widower______ Years married______ Children______ Other dependents______
5. Relatives in employ of this Co.______ Name________
6. Do you own your own home?______ Savings account?______ Are you insured?______ How much?______
7. Name of Church, Athletic, Fraternal or Social Organizations________

8. Education	Common School	High School	University	Business	Technical
Where located					
How many years					
Dates finished					
What course					

What foreign languages do you read or speak?________

9. Have you taken the prophylactic treatment for Smallpox?______Typhoid?______ Would you object to physical examination?______
10. Have you now, or have you ever had the following? *Tuberculosis*______*Paralysis*______ *Fits*______ Dizziness______ Asthma______ Shortness of breath______ Chronic cough______ Influenza______Pleurisy______ Pneumonia______ Heart trouble______ *Sun stroke*______ Nervous breakdown______ Gastric or Duodenal ulcer______ Appendicitis______ Piles______ Liver, kidney or bladder diseases______ Sugar or albumen in urine______ Gravel or gall-stones______ *Cancer*______ Tumors or open sores______ Skin diseases______ *Locomotor ataxia*______ Lumbago______ *Mental disorder*______ Rheumatism______ *Syphilis*______ Gonorrhoea______ Difficulty with sight or hearing______. Is there any history of Tuberculosis or Cancer in your family?______ Have you ever had a surgical operation?______ Have you ever had occupational diseases?______ Name other diseases you have had not mentioned. None only as stated,______

(those in *italic* type are cause for rejection by the interviewer)

11. I hereby declare that to the best of my ability the answers given are correct, and that I will report all accidents to my foreman.
    Interviewer________ Date________19____ Signed________
    Referred to doctor______ To return later______ Not accepted______ Why?______

CLASSIFICATION FOR MEASUREMENTS OF THE PHYSICAL CONDITION OF INDUSTRIAL EMPLOYEES

Success in classification is fundamentally a question of determining functional capacity.

FIRST CLASS: 95%-100% *Within the Bounds of Normalcy.*

SECOND CLASS: 80%-95% *Defects.* Deviation from the normal but no evidence of functional disturbance.

THIRD CLASS: 60%-80% *Impairment.* This means a disturbance of functional capacity.

3a. *Usual Occupation.*

3b. *Limited Occupation.*

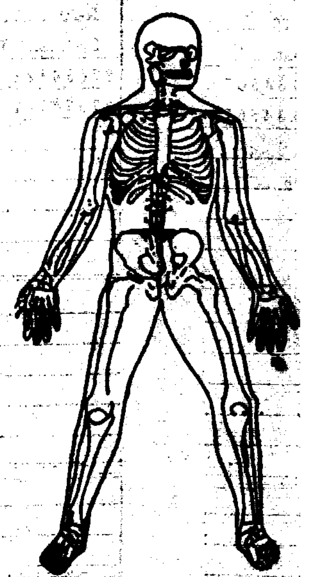
3c. *Temporary Lay-off* of not more than 30 days.

FOURTH CLASS: 40%-60% *Moderate Disability.* This means a disturbance of functional capacity to such an extent that a lay-off of more than 30 days is necessary, but a condition in which the element of come-back is generally there.

FIFTH CLASS: 0%-40% *Marked Disability.* Precluding further employment. Such a condition in which the occupational career is apparently ended.

JOB CLASSIFICATION FOR INDUSTRIAL EMPLOYEES

1st Class: Heavy work. 2nd Class: Medium work. 3rd Class: Light work. 4th Class: Extra light work.



Note and mark deformities or abnormalities on skeletal chart.

EFFICIENCY RATING *Semi-Annual*

	5½ Yrs.	6 Yrs.	6½ Yrs.	7 Yrs.	7½ Yrs.	8 Yrs.	8½ Yrs.	9 Yrs.	9½ Yrs.	10 Yrs.	10½ Yrs.
Quality											
Production											
Speed											
Attendance											
Conduct											
Dependability											
Intelligence											
Neatness											
Cheerfulness											
Activity											
Strength											
Total per cent											

	11 Yrs.	11½ Yrs.	12 Yrs.	12½ Yrs.	13 Yrs.	13½ Yrs.	14 Yrs.	14½ Yrs.	15 Yrs.	15½ Yrs.	16 Yrs.
Quality											
Production											
Speed											
Attendance											
Conduct											
Dependability											
Intelligence											
Neatness											
Cheerfulness											
Activity											
Strength											
Total per cent											

Efficiency rating given by: 6th yr.______ 6½ yrs.______
7th yr.______ 7½ yrs.______ 8th yr.______
8½ yrs.______ 9th yr.______ 9½ yrs.______
10th yr.______ 10½ yrs.______ 11th yr.______
11½ yrs.______ 12th yr.______ 12½ yrs.______
13th yr.______ 13½ yrs.______ 14th yr.______
14½ yrs.______ 15th yr.______ 15½ yrs.______

Remarks:______

REPORT OF ALL ACCIDENTS, SICKNESS AND GENERAL REMARKS

Date	Nature of Disability	Circumstances	Results	Time Lost Days	Statement of Services	Compensation

Discharged________19____ Cause of Discharge________ By whom?______
Discharged________19____ Cause of Discharge________ By whom?______
Discharged________19____ Cause of Discharge________ By whom?______
Discharged________19____ Cause of Discharge________ By whom?______
Discharged________19____ Cause of Discharge________ By whom?______
Remarks:______

CHART ARRANGED PROVIDING FOR SIXTEEN PHYSICAL EXAMINATIONS

	1	2	3	4
Occupation				
Wt. Ht. in.				
Temp. Pulse				
Age				
1 2 3a 3b 3c 4 5				
1. Past History				
2. Vision				
3. Hearing				
4. Nose and Sinuses				
5. Teeth				
6. Tonsils				
7. Thyroid				
8. Lungs				
9. Heart				
10. Arteries and Veins				
11. Blood Pressure				
12. Abdomen				
13. Genitalia				
14. Nervous System				
15. Lymphatic System				
16. Hernia				
17. Skin				
18. Bony System				
19. Rectum				
20. Abnormalities				
21. Laboratory, Urine, etc.				
22.				
23.				
24. Physical Rating (1 2 3a 3b 3c 4 5)				
25. Occupational Rating (1 2 3 4)				
26. Vision	R-20 L-20	R-20 L-20	R-20 L-20	R-20 L-20
27. Hearing	R-20 L-20	R-20 L-20	R-20 L-20	R-20 L-20
28. Blood Pressure	Syst. Diast.	Syst. Diast.	Syst. Diast.	Syst. Diast.
29. *Teeth Upper	8 7 6 5 4 3 2 1 - 1 2 3 4 5 6 7 8	8 7 6 5 4 3 2 1 - 1 2 3 4 5 6 7 8	8 7 6 5 4 3 2 1 - 1 2 3 4 5 6 7 8	8 7 6 5 4 3 2 1 - 1 2 3 4 5 6 7 8
Lower	8 7 6 5 4 3 2 1 - 1 2 3 4 5 6 7 8	8 7 6 5 4 3 2 1 - 1 2 3 4 5 6 7 8	8 7 6 5 4 3 2 1 - 1 2 3 4 5 6 7 8	8 7 6 5 4 3 2 1 - 1 2 3 4 5 6 7 8
30. Laboratory Findings, urine, blood, etc.				
31. Why above rating?				
32. How increase rating?				
33. Remarks				
34. Examinee sign				
35. Doctor's signature				
36. Date of examination				

*Draw a line thru missing teeth and a circle around apparently bad teeth.

SECOND EXAMINATION · THIRD EXAMINATION · FOURTH EXAMINATION

	5	6	7	8
Occupation				
Wt. Ht. in.				
Temp. Pulse				
Age				
1 2 3a 3b 3c 4 5				
1 2 3 4				
R-20 L-20				
Syst. Diast.				
8 7 6 5 4 3 2 1 - 1 2 3 4 5 6 7 8				
8 7 6 5 4 3 2 1 - 1 2 3 4 5 6 7 8				

FIFTH EXAMINATION · SIXTH EXAMINATION · SEVENTH EXAMINATION · EIGHTH EXAMINATION

*Draw a line thru missing teeth and a circle around apparently bad teeth.

	9	10	11	12
Occupation				
Wt. Ht. in.				
Temp. Pulse				
Age				
1 2 3a 3b 3c 4 5				
1 2 3 4				
R-20 L-20				
Syst. Diast.				
8 7 6 5 4 3 2 1 - 1 2 3 4 5 6 7 8				
8 7 6 5 4 3 2 1 - 1 2 3 4 5 6 7 8				

NINTH EXAMINATION · TENTH EXAMINATION · ELEVENTH EXAMINATION · TWELFTH EXAMINATION

*Draw a line thru missing teeth and a circle around apparently bad teeth.

	13	14	15	16
Occupation				
Wt. Ht. in.				
Temp. Pulse				
Age				
1 2 3a 3b 3c 4 5				
1 2 3 4				
R-20 L-20				
Syst. Diast.				

THIRTEENTH EXAMINATION · FOURTEENTH EXAMINATION · FIFTEENTH EXAMINATION · SIXTEENTH EXAMINATION

*Draw a line thru missing teeth and a circle around apparently bad teeth.

for employment, this is very likely his first contact with the plant and every effort should be made to impress him with his surroundings. After securing his name and address, which is written very carefully on the stub of the chart where it will be clearly seen in the file, the interviewer preceeds to question number 1 on the upper left hand half of the inside of the chart. In recording age be careful to get the years and months. Under "other occupations," record the real preference, if any, but do not force this question. Judge the value of the answers by their spontaneity.

Such questions as number 6, "do you own your own home?" "Do you have a savings account," etc., should be asked with an occasional word of encouragement to stimulate the applicant's pride and also create an incentive to relate his experience. Under "schooling" try not to humiliate the applicant if he is illiterate. Try to determine just how much schooling he has had. If he cannot read in any language, he is illiterate, but if he can read and write in a foreign language, although not in English, he is not illiterate.

Continuing "how many years in high-school?" "Did you graduate?" Here record the years and where the school was. In, "how many years in college, did you graduate?, name of college, degree received and subject of specialization:" follow the same procedure for night and correspondence schools.

When the interviewer has proceeded as far as question 10, he should have become more or less familiar with the applicant's general physical make-up. Pigment of skin, frequent coughs, puffiness beneath the eyes, and slow guarded movements are a few of the signs he should watch for. He then begins to ask the applicant if he has suffered from the following diseases, "tuberculosis, paralysis, fits, sunstroke, cancer, locomotor ataxia, mental disorder, syphilis," etc. These are printed in black type and are cause for rejection. The interviewer should write in carefully under "remarks," any impression he may have made of the applicant or any authentic information at this stage of the examination. This becomes very valuable when the applicant appears before the physician. The interviewer should be cautioned not to go about his task as if he were making a telephone directory. He should try to obtain a full history of the applicant's working life. A good plan is to have a scratch pad handy, and jot down present age, then the age when he left school, the difference must necessarily be covered by years of inexperience, indispensable in getting a true history.

No. 2. Precautionary don'ts for interviewers

1. Don't write across the top, ends, or unused spaces of the chart.
2. Don't place any irrelevant or superfluous information on the chart.
3. Don't take anything for granted. When in doubt, keep asking questions until absolutely sure of your point.
4. Don't forget that the chart must be filed, and become the permanent occupational record of the applicant.

5. Don't write the word "no" or "none," in answer to questions. Use a (——) where no positive information can be obtained, or the answer is "No." A check mark (√) is now almost universally accepted as a positive indication, and used wherever practicable on the chart, as a substitute for "Yes."

At the conclusion of the oral examination, the interviewer asks the applicant to sign his name, marks the date and signs it himself. He then conducts him to the physician or makes an appointment.

No. 3. The Medical Examination

Using a prescribed chart, the examiner will very easily be able to record his own findings, thus allowing the applicant to be alone with the physician, insuring a privacy for which he is generally grateful.

Before proceeding to discuss the question of how to examine the industrial worker, it seems necessary for the sake of continuity and, as a sidelight upon questions that are likely to arise, to consider for a moment the relationship between the applicant for examination and the examining physician.

In conducting an examination, the physician should bear in mind that he is working on a different basis than that of physician and patient,—the applicant's very livelihood is at stake. The handicapped worker must always be assured of fair treatment, even though his rating may preclude further employment. The examiner should be as much interested in each applicant as though he were the only one examined that day. Care should be taken not to examine a man after he has finished a hard day's work. As a matter of fairness, his vitality should be at par.

The physician will be quick to recognize the difference between the applicant and the patient. The patient is eager to volunteer information. The applicant is as equally reticent. He has no symptoms such as aches or pains. The patient is examined diagnostically, while the applicant is approached as a healthy individual and examined to determine his proper industrial placement.

The industrial physician should never be asked to violate any confidence or secret that might transpire during the examination. At the outset, the applicant should be assured that the purpose of the physical examination is not to disqualify, but to place him in the line of work for which he is physically fitted. It should be explained that all information revealed, is confidential. A placard on the wall such as:

"Tell the examiner everything pertaining to your life, his purpose is to help you, to make it possible to live longer and promote your economic resources."

"Honesty to one's self is as important as to one's fellowman."

Functional deficiency should be overcome by correction rather than discrimination. Under such a policy, there need be but relatively few disbarred from work.

The employee's objections to physical examination can generally be classified in the following order:

1. Fear of being discharged.
2. Not considering examination necessary.

3. Thinking themselves ill, don't wish to know true condition.
4. Disrobing.
5. Religious view based on denial of medical science.
6. Opposition to intrusion into private life and affairs.
7. Secret defects.

However, when the applicant understands that by submitting to an examination, he will gain much valuable information, which will assist the management in using him more effectively, and above all, not only will his health and well-being be protected but, his physical condition will be corrected,—knowing this, he rarely interposes objections.

Honesty to one's self is as important as to one's fellowmen. Yet when the applicant appears for his first physical examination, involuntarily his mind goes through a process of comparison. Apprehensively, he frequently tries to mask his fears with the swagger of self-exaggeration, which is often mistaken by the examiner, for humility. However, if men are approached, dealt with, and reasonably trusted upon the basis of their visible strong points, they very often respond to the examiner's advances, give him their confidences and allow him to help them.

The experienced examiner soon learns to conduct an examination in such a manner that the applicant will volunteer symptomatic information very quickly. Trial and practice will soon reveal a technique in questioning.

In the last analysis, much depends upon the examiner. In the hands of an incompetent or inexperienced person not capable of interpreting his findings, the most complete chart can do little to make the service efficient. some examining physicians acquire great aptitude. Thus with greater agility, as well as ability, the time required is much reduced without sacrifice of efficiency or thoroughness.

The submitted Chart of Examination has been so compiled as to cover the essentials requisite, (as far as industrial workers are concerned) in a concise and logical manner. An incomplete examination, as a matter of record or for the purposes of obtaining an injured or sick employee's preëmployment physical condition, is of no or very little value.

No. 4. Scope of examination

The object of the chart is to guide the physician in the rating of each and every one of the bodily organs to the function it subserves and make it possible physically to classify the applicant. All parts of the body that can be measured and all parts, just so far as they can be measured according to the scale of functional valuation, come within the scope of this examination. Furthermore, the chart is so arranged, that the physician can by turning to the outside sheet, obtain at a glance a report of all accidents, sickness, and general remarks; this information should coördinate with the physical rating. A second source of information is the semi-annual efficiency rating and the employer's observation regarding the worker's general appearance, health, personality and characteristics,—data essentially valuable in the testing of men and women for functional capacity in relation to job requirements.

No. 5. Standardization

It can not be urged too strongly that the records of industrial physicians, and those who have to do with the keeping of records of injury, occupational diseases, and the general physical condition of the American industrial worker, should agree upon a standardized form of physical examination. These standardized examinations should eventually be placed at the disposal of the government or some competent agency, so that in time of war, the truth may be known in regard to the health of the nation's workers; in time of peace, that the truth may be known and used by the several states, not only that they may legislate for the protection of the health and welfare of the workers, but legislate more uniformly.

The physical examination of the industrial worker requires the same type of technique and skill and is very similar to that of any patient, but it differs in that it results or should result in an exact measurement of his physiological fitness for his job, rather than an appraisal or an interpretation of the causes of symptoms and discomforts.

The applicant for examination should be personally introduced to the doctor who is to examine him. Much of importance in the narrative of his occupational history may be read between the lines by the observing physician, in the way he expresses himself both his degree of intelligence and his education are indicated. Every skilled examiner learns how to make a word serve the duty of a sentence. It is very useful in developing the technique of physical examination. If anything, the industrial physician must be more keenly alert to detect early suspected evidences of faulty function in the physical structure of the worker than the physician who is usually required for the diagnosis of disease present in a sick person.

PART II. PHYSICAL TECHNIQUE

When the applicant for examination presents himself at the medical department, decision having been made as to what position he is best fitted for and his questionnaire completely filled out, he is shown to a dressing room where he removes all or the upper part of his clothes.

The examining room must be warm, preferably between 70° and 80°F. An examining cot or table, two chairs, and a desk for the physician constitute all the furniture needed. The instruments needed are:

Tongue depressors
Stethoscope
Snellens' test type chart
Thermometer
Otoscope
Laryngeal mirror
Sterilizer
Color Chart
Urinary testing outfit (including centrifuge)
Reflex hammer
Blood pressure instrument
Rubber gloves
Weight scales with height rod
Tape measure
Nasal speculum
Vaginal speculum
Microscope
Ingersoll watch
Hemoglobinometer
Wassermann tubes.

In industry, physical examination must necessarily be made with rapidity, but not at the expense of exactness. The chart upon which the pertinent

facts are reported constitutes a guide to the logical step by which the examination should be conducted. However, owing to the great variations which will be encountered by the industrial physician, variations in social, economic and intelligence levels, certain questions which might be classed as the technique are indispensable. It is important to know how he sleeps, whether he has any worries, what he eats, and the condition of his bowels. The answer to these questions are not necessarily marked on the chart, but used as evidence for a summary in the physician's mind.

Before the examination is over, the applicant should be completely measured from the top of his head to the soles of his feet. He is then told to return to his dressing room and his physical examination card and the questionnaire which has been filled out by the interviewer is carefully examined by the doctor and the applicant is approved or disapproved for the work for which he was examined. If the industrial physician disapproves, owing to certain correctible impairments, an effort should be made to find another job in which he can be employed during the period of correction. In questionable cases the physician consults with the employment manager with whom the final decision generally rests.

In all cases of inherited or acquired impairments and disabilities, keep in mind the following vital points and note them in remarks.

1. Date of onset.
2. Degree of involvement.
3. Is it stationary or progressive?
4. Cause of impairment or disability.

To what extent does the impairment or disability increase the hazard as to accident or life, and the health of fellow workmen?

The first aid department can give the examiner information as to previous accidents, their extent and results. The foreman or other officials of the plant can give information as to his efficiency, and if inefficient, the possible cause of it. The family physician can assist in the man's past or present physical condition. Such information is of assistance in determining solutions to unknown causes that may arise.

When unable to ascertain the functional rating of the organs on first examination, have the individual return at some later date under more favorable circumstances. If the organ in question requires the work of a specialist, make arrangements for such consultation and defer rating until after his report. Mark on skeletal chart, (preferably in red ink) impairments or imperfections.

Class five precludes a man from further employment. Great caution should be used in making this rating. Public health is a community problem rather than an industrial one. As a social duty, the examining physician should, in most cases, notify the proper health authority. Old employees that come under this rating, should be brought to the attention of the executive offices, that all question of pension or insurance pay may be adjusted.

After the examination has been completed, the examiner should explain to the examinee, his approximate physical rating. When possible, felicitate him. In case abnormal conditions are noted, encourage him to have them

taken care of, in the interest of his own health. Have him sign the blank "Form F," informing him that a copy goes to the main office.

On reëxamination, if the employee has made an extraordinary effort to regain his health but not quite enough improvement for an increased rating, but in the opinion of the physician will in a short time, give him the increase, encourage him and, in most cases, he will make good.

The examiner rates only upon the present physical condition. Increased ratings are given when the abnormal conditions have been corrected and recuperation completed.

In all cases of doubt, do not hesitate to send him to his physician or specialist for treatment. This applies to class four and five and, in many cases to class three.

After finishing the examination, individual ratings should be considered before making the final rating. An average of the individual ratings does not necessarily make the final. In practically all cases the low rating of a single organ is the final rating. Arriving at the final physical rating and knowing the requirements and qualifications for the job, the examiner can approve or disapprove. Where there is doubt, consult with officials.

NOMENCLATURE

1. Defect

This is a condition in which the examiner considers a deviation from the normal has taken place providing there is no evidence of functional disturbance. Physiologically, a defect should have no economic bearing on the worker's occupational fitness.

2. Impairment

Impairment on the other hand, has a distant economic significance in that it defines a physiologic change in something that is chargeable—functional capacity. Therefore, impairment is a deviation from the normal to such an extent that the examiner can positively record a disturbance in organic function.

3. Disability

Disability is a state in which there is positive evidence of disabled function. A condition that requires more than a thirty day lay-off for recuperation and may or may not improve to allow limited or usual work.

With this precise labelling we now come to classification.

CLASSIFICATION

First class

Here the findings are practically normal. Of course, it is understood that few individuals are perfect. However, there are a great many who come within the class of being normal. To this class belong the aristocrats of the great state of health.

Second class

This is the popular class of adequacy. Adhering to the precision standards of labelling it is the class of defects, which fail to impair the function. Missing teeth which do not interfere with proper mastication, scars and disfigurements and even minor deformities which bear no physiologic relation to job requirements are herewith classed. Economically and physiologically the difference between these first two

classes is very slight, no matter what it may be otherwise.

Third class

Here we come upon the economic factor; the worker's stock in trade, functional capacity, is impaired in some form or other. In making this classification exact knowledge of job requirements is necessary and must be given deep consideration. Because of the economic factor this class is subdivided into three sections A, B, and C.

A. Usual occupation. The first evidence of disturbed function is here apparent. The worker should be informed in this case that he is receiving wage in payment for all the activities which would be expected from one in normal condition. This his condition fails to justify. He is, however, to be allowed to continue at his present work provided that the period of correction is not too long.

B. Limited Work. In this case the functions have been impaired to such extent that regular work would further endanger health and which the worker could not be expected to perform without undue discomfort. Lighter work is therefore recommended as it allows continuation of employment and in many cases permits a form of correction.

C. Temporary "Lay-off." Under this section comes the more severe cases of impairment. Not only are the slighter but more severe exertions which would be expected, performed at a disadvantage. Usually this estimate is based entirely upon symptoms on effort. Is distress produced by working? Generally impairment hovers on the border line of disability. If the physician is in doubt as to this rating an observation of the worker in his usual place of employment or after he has performed a day's work may be helpful. Employees receiving this classification are "laid-off" for not more than thirty days for the purpose of correction and recuperation. Enlarged tonsils demanding an operation, mouth correction, carbuncles, abcesses, and strain, are in this class.

It will be seen that the impaired class is not a fixed adjustment. On the average we fine a certain type, merely because the factors named and others not named have assailed him in a certain average degree. When we come to examine men so classified we find the factors of causation are obviously susceptible to scientific control. The impaired class generally contains the danger signals which predispose disability and which the examiner must be most careful not to run past. As a clinical illustration let us use tuberculosis of the lungs. In class three there is found disparity of respiratory sounds some cough, beginning anemia, and certain chest signs. X-ray and sputum tests are still negative for tuberculosis, but there are signs that would cause a careful examiner to be suspicious of pulmonary involvement, though hardly enough to make a positive diagnosis. In the case of teeth,

gums or tonsils, the infections have progressed to such an extent that bodily functions are interfered with,—either fatigued, nervousness, or any of the accompanying symptoms. Such cases demand careful watching and likewise very careful classifications.

Fourth class

Moderate disability. We now come to the serious class of disabled function. Of course it is well known that many men work who belong to this class. This should not be so no matter from what point of view we consider it. Confronted by the evidence placing a man in this class the examining physician is of course challenged by the question, is there any escape from it? He should be advised that with proper medical or surgical care he may be able to resume a normal or limited occupation. In this classification the examiner does not shut a door in the worker's face. Men with a moderate amount of disability should take an extended "lay-off," that is longer than thirty days, and should be made to feel that with proper attention the element of comeback is generally there. Following up the example of tuberculosis, this class of moderate disability manifests positive clinical and laboratory signs.

Fifth class

Marked disability. This is the end of the scale, the class of marked disability, the occupational career is apparently ended. Replacement should be immediate. In the case of tuberculosis the disease has advanced to such a state that the possibility of a comeback is not apparent.

Such classification gives the industrial physician a real chart of the physiological coasts wherein some of his findings may be laid down incorrectly, but the general direction of all is perceived.

V. The Physician's *Key* in Detail

This key to the accompanying chart is devoted to the development of a correct technique in measuring and classifying functional capacity as applied to industrial workers. Inasmuch as every industrial physician is making more or less frequent use of some form of examination to determine the efficiency of the human body, the different functional tests are herewith collected together with necessary data whereby they may be intelligibly intrepreted. This will be useful particularly to the busy practitioner.

Other things being equal the physician who has best knowledge of plant operations will be most successful in using this key; for it is not only correct classification but also proper placement according to classification that determines the difference between success and failure. Obviously, therefore, there must be some system of appraising each operation in the plant from the standpoint of the natural physiological differences of individuals. For this purpose plant processes could be classified as follows:

Class 1. This job requires physical energy to such an extent that de-

ficiency in it on the part of the worker would make him absolutely incompetent.

Class 2. In this case while physical energy is important it is not one that distinguishes the job.

Class 3. This means that physical energy is not the most significant demand of the job.

Class 4. Here physical energy is called for to such a slight extent that a worker convalescing from injury or illness might perform efficiently the duties of the job.

WEIGHT AND MEASUREMENT

AGE GROUP	5 FT.		5 FT. 4 IN.		5 FT. 8 IN.		6 FT.	
	Men	Women	Men	Women	Men	Women	Men	Women
	lbs.	*lbs.*	*lbs.*	*lbs.*	*lbs.*	*lbs.*	*lbs.*	*lbs.*
15–19	113	112	124	123	140	138	158	155
25–29	124	118	134	129	150	144	169	159
35–39	129	124	140	136	157	152	178	165
45–49	134	131	144	142	161	150	183	173
55 up	135	133	145	144	163	163	184	177

Overweight

Overweight is a functional defect and can generally be corrected by changes in personal habits. One is said to show overweight when his weight is more than 20 per cent above the average weight for his height. Overweight lessens the worker's life expectancy and seriously interferes with his efficiency.

The girth measurements are especially useful in demonstrating to the examinee his own faulty proportions in a graphic way and in terms in which he can gauge his own improvement. Less than a two inch difference between the constricted and expanded chest suggests a rigidity of chest, incompatible with youthful vigor. The abdominal girth taken at the level of the umbilicus and the second lumbar vertebrae should not exceed that of the chest. Incidently we might add, that the umbilicus should be on the level of the 2nd lumbar vertebra.

The industrial physician should approach each applicant examined in regard to over-weight in a manner varied according to the occupation which he or she is about to fulfill. The judicious personal comments of the physician may carry considerable appeal to the examinee's qualities of pride, vanity, pleasure, comfort, humor or intelligence.

For a more exact table of the average weight of men and women according to their height and age see standard weight tables.

To the industrial worker, especially to the more ambitious type, however, efficiency is or should be the soundest of appeals. The doctor might illustrate as follows:—"How would you like to carry a fifty, sixty or a hundred pound bag of stones around constantly in addition to the work you are already doing for us or about to do for us?" This grips the worker's imagination, especially if the doctor points out that this extra weight is usually carried in the abdomen where it makes a special strain on the back which can bear it less conveniently.

Another type of worker showing overweight may be more scientifically minded. The doctor quick to size his man, would give him the idea of the heart having to pump blood through this extra mass of tissue. This has a good effect, especially if, like most

persons of overweight, he has become conscious of his heart either by shortness of breath or palpitation.

The physician should bear in mind that industrial workers considerably overweight become industrial hazards as well as allowing their functional defect to become a personal hazard. The slow moving, bulky and slow thinking worker is more liable to meet with an accident than the normal individual. Diabetes is notoriously a penalty that obese folks pay for getting fat. Overweights persistently eat more sugars and starches than their pancreas made insulin can handle. Other personal hazards due to overweight are diseases of the heart, degeneration of the blood vessels and impairment of the kidneys.

Underweight

Moderate underweight although it has its disadvantages in youth, unless due to pathological conditions, has its advantages, according to the mortality ratios calculated by life insurance companies, as age advances.

Weight, of course, whether it be above or below the average depends upon many factors. It may be a matter of the bones and musculature of the body, or it may be a matter of racial or family inheritance. It may result from hard physical work, but whatever it may be, it is never the only consideration in determining the health of an individual.

In the case of the industrial worker, and this is especially so in the case of an old employee, who has been referred to the medical department because he shows a letting down on the job, the physician must try to find if the underweight is not recent or sudden, and if the physical findings show that it is not due to the presence of disease, the physician should try to find out if the worker is tired, or worried about his job, if there is friction in his home, if he has financial worries, and if he eats regularly. Sometimes the simple adjustment of jobs suggested by the physician does more than anything to contribute to the bringing back of the worker to normal weight.

Standard weight tables (men and women according to age and height)

The tables for weight by age and height (pages 255–256) are based on the medico-actuarial investigation of approved ordinary applications for life insurance on the lives of 231,819 men and 136,504 women. These tables will enable an examiner to determine the degree of underweight or overweight in each case.

TEMPERATURE

In America the industrial physician uses the Fahrenheit scale. Temperature should be taken under the tongue. Before inserting the thermometer the examiner should assure himself that it is clean and that the index has been well shaken down. He should leave it in place until the reading has become constant, three minutes, as it takes about that time for the closed mouth's temperature to reach that of the blood.

An abnormal temperature is the effect of an irregularity in the physical structure, the cause of which becomes one of the objectives of the examination. An abnormal temperature should be checked at intervals during

STANDARD WEIGHT ACCORDING TO AGE AND HEIGHT

Men

AGE	5 FT.	5 FT. 1 IN.	5 FT. 2 IN.	5 FT. 3 IN.	5 FT. 4 IN.	5 FT. 5 IN.	5 FT. 6 IN.	5 FT. 7 IN.	5 FT. 8 IN.	5 FT. 9 IN.	5 FT. 10 IN.	5 FT. 11 IN.	6 FT.	6 FT. 1 IN.	6 FT. 2 IN.	6 FT. 3 IN.	6 FT. 4 IN.	6 FT. 5 IN.
15	107	109	112	115	118	122	126	130	134	138	142	147	152	157	162	167	172	177
16	109	111	114	117	120	124	128	132	136	140	144	149	154	159	164	169	174	179
17	111	113	116	119	122	126	130	134	138	142	146	151	156	161	166	171	176	181
18	113	115	118	121	124	128	132	136	140	144	148	153	158	163	168	173	178	183
19	115	117	120	123	126	130	134	138	142	146	150	155	160	165	170	175	180	185
20	117	119	122	125	128	132	136	140	144	148	152	156	161	166	171	176	181	186
21	118	120	123	126	130	134	138	141	145	149	153	157	162	167	172	177	182	187
22	119	121	124	127	131	135	139	142	146	150	154	158	163	168	173	178	183	188
23	120	122	125	128	132	136	140	143	147	151	155	159	164	169	175	180	185	190
24	121	123	126	129	133	137	141	144	148	152	156	160	165	171	177	182	187	192
25	122	124	126	129	133	137	141	145	149	153	157	162	167	173	179	184	189	194
26	123	125	127	130	134	138	142	146	150	154	158	163	168	174	180	186	191	196
27	124	126	128	131	134	138	142	146	150	154	158	163	169	175	181	187	192	197
28	125	127	129	132	135	139	143	147	151	155	159	164	170	176	182	188	193	198
29	126	128	130	133	136	140	144	148	152	156	160	165	171	177	183	189	194	199
30	126	128	130	133	136	140	144	148	152	156	161	166	172	178	184	190	196	201
31	127	129	131	134	137	141	145	149	153	157	162	167	173	179	185	191	197	202
32	127	129	131	134	137	141	145	149	154	158	163	168	174	180	186	192	198	203
33	127	129	131	134	137	141	145	149	154	159	164	169	175	181	187	193	199	204
34	128	130	132	135	138	142	146	150	155	160	165	170	176	182	188	194	200	206
35	128	130	132	135	138	142	146	150	155	160	165	170	176	182	189	195	201	207
36	129	131	133	136	139	143	147	151	156	161	166	171	177	183	190	196	202	208
37	129	131	133	136	140	144	148	152	157	162	167	172	178	184	191	197	203	209
38	130	132	134	137	140	144	148	152	157	162	167	173	179	185	192	198	204	210
39	130	132	134	137	140	144	148	152	157	162	167	173	179	185	192	199	205	211
40	131	133	135	138	141	145	149	153	158	163	168	174	180	186	193	200	206	212
41	131	133	135	138	141	145	149	153	158	163	168	174	180	186	193	200	207	213
42	132	134	136	139	142	146	150	154	159	164	169	175	181	187	194	201	208	214
43	132	134	136	139	142	146	150	154	159	164	169	175	181	187	194	201	208	214
44	133	135	137	140	143	147	151	155	160	165	170	176	182	188	195	202	209	215
45	133	135	137	140	143	147	151	155	160	165	170	176	182	188	195	202	209	215
46	134	136	138	141	144	148	152	156	161	166	171	177	183	189	196	203	210	216
47	134	136	138	141	144	148	152	156	161	166	171	177	183	190	197	204	211	217
48	134	136	138	141	144	148	152	156	161	166	171	177	183	190	197	204	211	217
49	134	136	138	141	144	148	152	156	161	166	171	177	183	190	197	204	211	217
50	134	136	138	141	144	148	152	156	161	166	171	177	183	190	197	204	211	217
51	135	137	139	142	145	149	153	157	162	167	172	178	184	191	198	205	212	218
52	135	137	139	142	145	149	153	157	162	167	172	178	184	191	198	205	212	218
53	135	137	139	142	145	149	153	157	162	167	172	178	184	191	198	205	212	218
54	135	137	139	142	145	149	153	158	163	168	173	178	184	191	198	205	212	219
55 and up	135	137	139	142	145	149	153	158	163	168	173	178	184	191	198	205	212	219

STANDARD WEIGHT ACCORDING TO AGE AND HEIGHT

Women

AGE	4 FT. 8 IN.	4 FT. 9 IN.	4 FT. 10 IN.	4 FT. 11 IN.	5 FT.	5 FT. 1 IN.	5 FT. 2 IN.	5 FT. 3 IN.	5 FT. 4 IN.	5 FT. 5 IN.	5 FT. 6 IN.	5 FT. 7 IN.	5 FT. 8 IN.	5 FT. 9 IN.	5 FT. 10 IN.	5 FT. 11 IN.	6 FT.
15	101	103	105	106	107	109	112	115	118	122	126	130	134	138	142	147	152
16	102	104	106	108	109	111	114	117	120	124	128	132	136	139	143	148	153
17	103	105	107	109	111	113	116	119	122	125	129	133	137	140	144	149	154
18	104	106	108	110	112	114	117	120	123	126	130	134	138	141	145	150	155
19	105	107	109	111	113	115	118	121	124	127	131	135	139	142	146	151	155
20	106	108	110	112	114	116	119	122	125	128	132	136	140	143	147	151	156
21	107	109	111	113	115	117	120	123	126	129	133	137	141	144	148	152	156
22	107	109	111	113	115	117	120	123	126	129	133	137	141	145	149	153	157
23	108	110	112	114	116	118	121	124	127	130	134	138	142	146	150	153	157
24	109	111	113	115	117	119	121	124	127	130	134	138	142	146	150	154	158
25	109	111	113	115	117	119	121	124	128	131	135	139	143	147	151	154	158
26	110	112	114	116	118	120	122	125	128	131	135	139	143	147	151	155	159
27	110	112	114	116	118	120	122	125	129	132	136	140	144	148	152	155	159
28	111	113	115	117	119	121	123	126	130	133	137	141	145	149	153	156	160
29	111	113	115	117	119	121	123	126	130	133	137	141	145	149	153	156	160
30	112	114	116	118	120	122	124	127	131	134	138	142	146	150	154	157	161
31	113	115	117	119	121	123	125	128	132	135	139	143	147	151	154	157	161
32	113	115	117	119	121	123	125	128	132	136	140	144	148	152	155	158	162
33	114	116	118	120	122	124	126	129	133	137	141	145	149	153	156	159	162
34	115	117	119	121	123	125	127	130	134	138	142	146	150	154	157	160	163
35	115	117	119	121	123	125	127	130	134	138	142	146	150	154	157	160	163
36	116	118	120	122	124	126	128	131	135	139	143	147	151	155	158	161	164
37	116	118	120	122	124	126	129	132	136	140	144	148	152	156	159	162	165
38	117	119	121	123	125	127	130	133	137	141	145	149	153	157	160	163	166
39	118	120	122	124	126	128	131	134	138	142	146	150	154	158	161	164	167
40	119	121	123	125	127	129	132	135	138	142	146	150	154	158	161	164	167
41	120	122	124	126	128	130	133	136	139	143	147	151	155	159	162	165	168
42	120	122	124	126	128	130	133	136	139	143	147	151	155	159	162	166	169
43	121	123	125	127	129	131	134	137	140	144	148	152	156	160	163	167	170
44	122	124	126	128	130	132	135	138	141	145	149	153	157	161	164	168	171
45	122	124	126	128	130	132	135	138	141	145	149	153	157	161	164	168	171
46	123	125	127	129	131	133	136	139	142	146	150	154	158	162	165	169	172
47	123	125	127	129	131	133	136	139	142	146	151	155	159	163	166	170	173
48	124	126	128	130	132	134	137	140	143	147	152	156	160	164	167	171	174
49	124	126	128	130	132	134	137	140	143	147	152	156	161	165	168	172	175
50	125	127	129	131	133	135	138	141	144	148	152	156	161	165	169	173	176
51	125	127	129	131	133	135	138	141	144	148	152	157	162	166	170	174	177
52	125	127	129	131	133	135	138	141	144	148	152	157	162	166	170	174	177
53	125	127	129	131	133	135	138	141	144	148	152	157	162	166	170	174	177
54	125	127	129	131	133	135	138	141	144	148	153	158	163	167	171	174	177
55 and up	125	127	129	131	133	135	138	141	144	148	153	158	163	167	171	174	177

the day. A nurse or the first aid department can relieve the physician of the necessity of doing this.

The industrial physician in cases of unexplainable high temperature should be on the watch for the malingerer, who has held the thermometer against a hot water bottle or rubbed it with the tongue or, if the opportunity has been allowed, shaken the mercury index up the tube.

RESPIRATIONS

Respirations should be taken while the examinee is in a relaxed position. Frequency, type, rhythm, and depth should be noted. Also in case of abnormality the position which the examinee assumes for greater comfort should be considered.

Respirations between 16 and 24 are generally considered normal. Evidence of pain on breathing, and the presence or absence of cyanosis is important.

PULSE

1. Regular.
2. Irregular.
3. Respiratory variation.
4. Pulsus paradoxus.
5. Extra systoles, etc.

It is often best to check pulse with heart rate determined by

a. Take pulse. If faster than normal have examinee relax before repeating.

b. Have the examinee exercise to the equivalent of fifty hops on one foot; this is the approximate rate the heart beats when it is doing its heaviest work.

Heart efficiency or the various degrees of such is what the examiner aims to record. Observations sometimes reveal variations immediately after exercise.

c. Take pulse two minutes after exercise. This often shows the true come-back of the heart and from it other symptoms that physicians are taught to observe.

d. The normal pulse rate for the average person should be seventy-two beats per minute. Immediately after exercise it may go some above a hundred beats per minute and within two minutes should be not more than ten beats above normal. There are variations beyond this of which the examiner must satisfy himself as to the significance. The normal rate for a woman is approximately 7 to 8 beats faster than a man's pulse.

The average physician approximates the pulse over a period of ten seconds.

Always examine vessels for arteriosclerosis. Probably the best artery to examine is the radial artery. The presence of thickened arterial walls is evidence enough for the physician to ascertain the true cause associated with some previous or former abnormal condition.

AGE

The hiring age generally speaking comes within the sphere of the employment department. However, if the future is to be safe the age of competency must be advanced at least fast enough to keep pace with the growth of industry. Today industry is in grave danger of becoming top-heavy; it demands huge numbers of young people while the number discarded for reasons of age grows rapidly greater. One of industry's greatest needs at the present time is to cut off the great sur-

plus among the less competent half of our population. Such a demand is laid squarely at the door of industrial medicine.

In principles of biology, Herbert Spencer has attempted to define life for us in scientific terms. It is, he says, "the continuous maintenance of such inner actions as will counterbalance outer action." According to the tables of actuaries we begin to grow old at twelve years of age. It is then we begin to lose our vital resistance and the death rate begins to rise until at forty the rate in the cities among males is twice that of twenty. It is entirely within the bound of scientific possibility to increase the vitality of forty to that of twenty. Death rates are not due to time but to infections, poisons, mental and physical strain, too much food, too little food, badly balanced diets and accidental injuries.

The mortality among graduates of women's colleges where medical inspection, supervision and instruction have been used is less than one-third of the general population, showing that the ordinary mortality of youth is two-thirds preventable.

PAST HISTORY

Man in his relation to the past is a product of antecedent causes, partly physical and partly social. In his present relation to his job these antecedents are apt to become a disturbing element in a greater or less degree. In his relations to the future we must remember that the growth of modern industry demands a constantly increasing percentage of workers who are able to advance in the industrial scale. Almost any large employer will testify that he has far less trouble in filling a score of jobs at the bottom of the ladder than filling one near the top.

Medicine recognizes the fact that past history is an important factor in measuring man physically. This is equally true whether the examination is conducted from its preclinical side as in industry, where proper placement is the physician's purpose, or at the bedside where his sole intent is diagnosis of disease.

Determining past history is an art of extreme nicety and precision rather than a science, but the classification of the evidence must be scientific because of the influence upon the verdict to be rendered. For a correct reply to those inquiries as to former illnesses, family history, and social factors, patience, experience and tact are very essential.

What are the present tendencies? Are these tendencies such as to command to the examining physician a deeper penetration? With due regard to the rights and interest of the worker, as well as the industry which he seeks to protect it is sometimes necessary to physical the foundation on which the lay bare structure has been reared. He who would tell those who labor and suffer from the reactions of the law of the body must do so with a heart full of charity.

VISION

Rate eyes with proper fitting glasses the same as eyes without glasses. In specific occupations it will be necessary to test vision with and without glasses.

Right or left eye

First class. 20/20 to 20/40.
Second class. 20/40 to 20/50. Defects.

Third class. 20/50 to 20/100. Impairment.

(a) Usual occupation.

1. Impossible to correct eyes to better rating.

(b) Limited occupation.

1. Where eye condition is such that with or without glasses it is advisable to change to other occupation on account of physical or mechanical hazards.

(c) Temporary lay-off of not more than thirty days.

1. This includes either (a) or (b). In this class those suffering with constitutional conditions or disabilities requiring surgical or medical treatment for promotion or restoration of health.

Fourth class. 20/100 to 20/200. Moderate disability.

Requiring more than thirty days layoff for treatment for restoration of health, but a condition in which the examiner feels will improve in time for employee to resume limited or usual occupation. I.e., glaucoma, cataract.

Fifth class. 20/200 and up. Marked disability.

This rating precludes further employment. Eye conditions where examiner feels that best of treatment will fail to restore eyes to such a degree that employment will be possible. Inoperable eye degenerations, cataract.

In using the Snellen chart of test types the relation of light to the chart and the employee is most important. This test is best in a room where the minimum distance of twenty feet can be marked off. Have the examinee at ease, then test each eye separately. If the test is made with eyes corrected with glasses, state so on chart of examination. If one eye is entirely blind mark on skeletal chart. Indicate upon the physician's chart of examination the reading as shown on Snellen's chart. Have examinee read normal letters at distance of 14 inches for near vision.

Ofttimes eye conditions can be traced to other than eye strain, such as albumen or sugar in urine, stomach disorders, abnormal blood pressure, irregular habits, etc. Abnormal conditions should be referred to physician or eye specialist, or both.

Due to the great amount of discussion among physicians, particularly eye specialists, on the subject of compensation for eye injuries, the section on Ophthalmology, at the annual meeting of The American Medical Association appointed a committee on compensation for eye injuries. The committee submitted several reports which were accepted but not adopted until Cassius D. Westcott, reporting for this section of the association submitted their final report at the regular association's meeting in 1925. The aim of the committee was to establish a method determining the loss of visual efficiency of a person who had suffered any degree of impairment of vision as the result of occupational disease, or injury. "Such loss is to be the basis on which the amount of compensation shall be determined.

They further state, "there are three elements of vision, each of which has an independent and coördinate relation to full visual efficiency. These co-

ordinate factors are (*a*) acuteness of vision (central visual acuity); (*b*) field of vision, and (*c*) muscle function. Although these factors do not possess an equal degree of importance, no act of vision is perfect without the coördinate action of all."

"The Snellen test letters or characters as published by the committee and designated "Industrial Vision Test Charts" subtend a 5 minute angle, and their component parts a 1 minute angle. These test letters are to be used at an examining distance of 20 feet for distant vision and 14 inches for near vision from the patient. The illumination is to be not less than three foot candles, nor more than ten foot candles on the surface of the chart."

Unless the industry is large enough to support an eye specialist the industrial surgeon's duty is to detect impaired vision, send the employee to a competent eye specialist for final report.

Whether or not eyes should be corrected depends upon discomforts and occupation, i.e., a laborer with a vision R 20/30 L 20/50 capable of working comfortably may not need glasses while a clerk in an office where close, accurate work is demanded with the same vision should be requested to consult a reliable oculist.

Other abnormal conditions are rated depending upon impairments or degeneration as mentioned under general instructions.

Test for light and accommodation. If eye reflexes are suggestive of syphilis, always take a Wassermann test. Ascertain cause.

A table for visual efficiency was tabulated according to Snellen notations, both for distant and for near vision.

SNELLEN NOTATION FOR DISTANCE	SNELLEN NOTATION FOR NEAR	PERCENTAGE OF VISUAL EFFICIENCY	PERCENTAGE LOSS OF VISION
20/20	14/14	100.0	0.0
20/25	14/17.5	95.7	4.3
20/30	14/21	91.5	8.5
20/35	14/24.5	87.5	12.5
20/40	14/28	83.6	16.4
20/45	14/31.5	80.0	20.0
20/50	14/35	76.5	23.5
20/60	14/42	69.9	30.1
20/70	14/49	64.0	36.0
20/80	14/56	58.5	41.5
20/90	14/63	53.4	46.6
20/100	14/70	48.9	51.1
20/120	14/84	40.9	59.1
20/140	14/98	34.2	65.8
20/160	14/112	28.6	71.4
20/180	14/126	23.9	76.1
20/200*	14/140	20.0	80.0
20/220	14/154	16.7	83.3
20/240	14/168	14.0	86.0
20/260	14/182	11.7	88.3
20/280	14/196	9.7	90.3
20/300	14/210	8.2	91.8
20/320	14/224	6.8	93.2
20/340	14/238	5.7	94.3
20/360	14/252	4.8	95.2
20/380	14/266	4.0	96.0
20/400	14/280	3.3	96.7
20/450	14/315	2.1	97.9
20/500	14/350	1.4	98.6
20/600	14/420	0.6	99.4
20/700	14/490	0.3	99.7
20/800	14/560	0.1	99.9

* 20/200 industrial blindness.

Graphic representation might be made in the following manner:

Suppose one eye has less vision than the other? Determining the visual acuity of each eye, adding the totals, and dividing by two, does not tell the correct result. Consider the man blind in one eye, vision 20/20 or perfect in the other. His visual efficiency

is much better than 50 per cent. The Committee on Compensation for Eye Injuries of the American Medical Association reported that the more efficient eye should be assessed a tripple value, and the total ratings of the two eyes, thus modified, divided by four, i.e.

Blind eye: No visual efficiency, 0.

Good eye: 100 per cent visual efficiency.

Multiply by 3 = 300

$0 + (100 \times 3)\ 300 = 300$

$300 \div 4 = 75$ per cent

The employees visual efficiency is rated 75 per cent.

Let us suppose the efficiency rating of the weaker eye is 40 per cent, and the stronger eye 80 per cent.

$40 + (3 \times 80)\ 240 = 280$; divided by 4 = 70 per cent.

The individual's visual efficiency would be considered 70 per cent.

Near vision is of more practical importance to a person than distant vision. The American Medical Association Committee took cognizance of that fact by allowing a two-fold value to near vision, adding one-fold value for distant vision, and dividing by three, i.e.

Near vision: 40 per cent visual efficiency.

Distant vision: 70 per cent visual efficiency.

$(40 \times 2) = 80 + (70 \times 1)\ 70 = 150$.

Divided by 3 = 50.

The employee is considered to have a 50 per cent visual efficiency.

COLOR VISION

Use standardized color chart. In case of color blindness, note on the physician's chart of examination the form it takes. If the occupation of the examinee requires exact color vision and it is found lacking, rating will be low. A conference with the employer is suggested in such cases.

HEARING

First class. Whispering or low voice, 20 feet; Ingersoll dollar watch, 36 inches.

Second class. Whispering or low voice, 15 feet; Ingersoll dollar watch, 27 inches.

Third class. Whispering or low voice, 10 feet; Ingersoll dollar watch, 18 inches.

(a) Usual occupation.

(b) Limited occupation. Acute hearing being essential to efficiency. Change to other than usual occupation because of physical or occupational hazards.

(c) Temporary lay-off of not more than one month, (this includes (a) and (b)).

Fourth class. Whispering or low voice, 5 feet; Ingersoll dollar watch, 9 inches.

Fifth class. Whispering or low voice, 1/12 foot; Ingersoll dollar watch, 1 inch.

(Last class is practically or entirely deaf.)

Ears in which wax or foreign materials has been recently removed are less sensitive to sound. If the required occupation requires acute hearing, it is better to treat ears several days before making the classification.

The test for hearing should be made in a room as quiet as possible. Be sure eyes are closed and opposite ear securely closed, as the examinee may

know the approximate distance from the ear in which a watch would be heard by an individual with good hearing. In the speaking test the motion of the examiner's lips portrays the spoken word. If the examiner's enunciation is bad he should by all means use the watch test. In cases of doubt use both tests. The author recommends the ordinary Ingersoll dollar watch for best results. The above classification refers to one or both ears. Always use watch at a distance of 36 inches as normal. Quieter watches will have to be judged approximately as to distance.

NOSE

First class. Normal contour.

Second class. Partial obstruction, some deformity of either nostril due to normal growth of septum but to such an extent that the obstruction noticeable but not interfering; to such an extent that there is a noticeable disability. Deformities of the nose that have no disease back of it that would impair future health of individual. (One with deformed nose always attracts attention of fellow workmen, cause of comment, etc.)

Third class. Impairment.

(a) Usual occupation.

(b) Limited occupation.

(c) Temporary lay-off of not more than thirty days for correction of abnormalties.

Deformities of nose in which there is a progressive underlying factor back of certain conditions, i.e., tuberculosis, cancer, etc., but not advanced to state where it interferes much with work of individual.

Fourth class. Moderate disability. Deformities or disease of the nose that has advanced to such an extent that it is advisable to quit work but where examiner feels that with proper treatment in due time he will be able to resume his occupation.

Fifth class. Marked disability. Deformities or diseases where examiner feels usual treatment will not restore individual to where he can resume his occupation. I.e., advanced syphilis of the nose, advanced cancer of the nose.

Epistaxis. Nose-bleed.

The usual causes of nose-bleed are trauma, foreign bodies, picking nose and infectious diseases such as scarlet fever, measles, typhoid; (in women) vicarious menstruation; (in adults) anemia or hemophilia or nasal growths such as polyps, or exercising in rarefied air, such as mountaineering; (in advanced ages) high blood pressure conditions. Classification depends upon the cause and interference with functional capacity.

TEETH

First class. Normal or false teeth. Showing well kept mouth.

Second class. Impairments but causing no degeneration to other organs. Missing teeth. Retraction of gums from teeth.

Third class. Impairments.

(a) Usual occupation. Treatment of teeth or gums cared for outside of working hours.

(b) Limited occupation. Infection from gums or teeth has lowered his vitality to such an extent that he is forced to take a job requiring less physical effort.

Treatment of teeth or gums cared for outside of working hours.

(c) Temporary lay-off. Requiring not more than thirty days for correction of teeth or because of general debility resulting from teeth infection.

Pyorrhoea, infections, insufficient teeth for mastication causing indigestion, anemia, and general weakness.

Also infection revealing incipient degeneration of the heart, and other organs. Rheumatism generally results from such cases. Trench mouth, gingivitis, broken-off teeth with decayed roots are so classified.

Fourth class. Moderate disability.

Infected teeth or gums to which a temporary amount of disability can be traced. In case of heart refer to instructions under that organ, rheumatism and general disability. This is a case in which the examiner feels that with proper care in time occupation or limited occupation will be resumed.

Fifth class. Marked Disability.

Infected teeth and gums to such a deplorable extent that degeneration has set in reducing the vitality so markedly that even an extended lay-off would be useless.

The teeth and tonsils within the past ten years have been a fertile field of medical investigation. Many doctors are quite frank in saying, that more than one-half of the human ailments are due to these organs as foci of infection. A careful examination is emphasized. The least suspicion of impairments or degeneration with no outstanding cause other than teeth should be referred to a dentist or nose and throat specialist.

Draw line through missing teeth. Draw a circle around obviously bad teeth. Under remarks note the approximate extent of involvement. Apparently healthy teeth will sometimes elucidate pus upon massaging of the gums.

Facing individual for reading and marking of teeth.

Upper: Right, 87654321; left, 1234-5678.

Lower: Right, 87654321; left, 1234-5678.

THYROID GLAND

Classification

First class. No present or past enlargement of thyroid gland.

Second class. Past history of goitre, but having disappeared more than a year from date of examination with no accompanying symptoms. Operation for goitre more than a year prior to date of examination with excellent recovery, and still under thyroid gland feeding. Enlargement of thyroid glands with no apparent functional disturbance, such as colloid goitre.

Third class. Beginning functional disturbance or disability.

(a) Uusual occupation.

(b) Limited occupation. 120 + quiet work.

(c) Temporary lay-off requiring not more than thirty days for adequate recuperation to resume either (a) or (b).

An operation for diseased thyroid gland within one year prior to

date of examination, or one in which symptoms of diseased gland have not cleared up. Thyroiditis, thyroid tumors, colloid goitre and adenomatous goitre are included in this class.

Fourth class. Moderate disability. If basic metabolism is more than 120+ it belongs to this class. Exophthalmic and moderately advanced goitre or any diseased condition of the thyroid gland requiring medical or surgical care, but a condition in which the examiner feels must be corrected before the employee eventually resumes his usual or limited occupation.

Fifth class. Marked amount of disability or functional disturbance, in which the examiner feels the employee will never be able to resume employment.

Myxedema, cretinism, cancer, syphilitic and tubercular diseases of the thyroid gland are included in this class.

The thyroid gland is the "pep"gland, —the energizer of the body. It is a tiny bit of tissue to be entrusted with such important duties. It has thirty-five times the circulation of the brain and five times the circulation of the kidneys which shows something of its importance. It is nourished well, and the same blood stream that carries precious cargo to it, carries cargo no less precious from it. The thyroid juice (secretion) is vital. The secretion empties into the circulation.

The function of the thyroid gland is very important. Being the energy gland, too much secretion speeds up the process of living, what we call metabolism: too little secretion slows down metabolism and leaves one torpid. The most common disease of the thyroid gland is called goitre.

Increased secretion of the thyroid gland is known as hyperthyroidism: decreased secretion is known as hypothyroidism.

Hyperthyroidism; produces symptoms such as: general nervous disturbance, gastro-intestinal upsets, rapid heart action, abnormal sweating, tremors, flashes of heat and signs of excessive mental disturbance.

Hypothyroidism may be present in the following conditions, either as cause or as an accompanying complication: chlorosis, amenorrhoea, eczema, hysteria, vomiting of pregnancy, epilepsy, melancholia, adipositas dolorosa, excessive proportion of fat in the tissues, myxedema and senility.

Before the age of twenty, two-thirds of the goitres are simple, practically the rest are adenomatous. Due to the fact that they do not over function they are called "simple goitre." After the age of forty, two-thirds of the goitres are adenomatous and one in five of this class may develop into hyperthyroidism. The exophthalmic goitre is a precipitate affair. Boothby[2] states that within a year of gland enlargement 42 per cent of the patients are seeking relief, within two years 65 per cent.

RESPIRATORY SYSTEM

First class. Excellent condition.

Second class. Coryza, laryngitis, pharyngitis, bronchitis, disparity of breath, sounds, or similar conditions of short duration hardly interfering with efficiency come in this class.

[2] Boothby, W. M.: Oxford System Med., 3–905, 1921.

Third class. Impairment of any part of the respiratory tract; efficiency slightly endangered. This condition generally requires a rest assuring early recovery.

(a) Usual occupation.

(b) Limited occupation.
Vitality below normal, lighter work being desired to give individual the greatest opportunity to recover his health.

(c) Temporary lay-off of not more than 30 days. This class includes those suffering with constitutional conditions or degeneration requiring medical help for promoting the restoration of health.
In suspicious cases of tuberculosis.
(a) X-Ray findings
(b) Sputum test.
(c) Signs of disparity of apices.
(d) Weight.
(e) Color of skin.
(f) Appetite.
(g) Other symptoms common to suspicious cases, but lacking evidence for a definite diagnosis. Further examination upon return from rest may reveal whether the examinee is capable of resuming his work or whether he should be recommended limited occupation requiring less physical exertion.
Temperature especially afternoon.
Summing up, a temporary lay-off means an improvement in health.

Fourth class. Moderate disability.
Any condition of the respiratory tract in which there is positive information as to moderate amount of disability. In case of tuberculosis, where all clinical and laboratory signs are positive for tuberculosis, X-Ray positive, sputum test shows some bacilli, clinical signs positive, etc., is a case in which the examinee is forced to quit his work and take an extended rest, but where the examiner feels with proper medical and surgical care, he will in time recover to resume his usual or limited occupation.

Fifth class. Marked disability.
Afternoon temperature above normal. Any condition of the respiratory tract in which there is positive evidence of marked degeneration. In case of tuberculosis, one advanced to such an extent that recovery is doubtful, i.e. advanced stages of tuberculosis, cancer or sarcoma of lungs.

Under the heading of respiratory system, volumes have been written concerning diagnosis, treatment and prognosis.

The examiner's principle quest is for tubercular signs and the other occupational lung diseases. Under such conditions even in the earliest stages work is apt to lower resistance and endanger not only the examinee's life but the health of the plant in general.

To the examiner the only problem is to be able to diagnose the impairments or disabilities revealing whether or not the examinee should work, whether or not he should have limited work or whether he should take a short vacation or whether he is physically able ever to resume his occupation. Three factors are to be considered, namely:

injury to himself or his fellow workers and the longevity of his life.

Under this heading the following basic points should be weighed:

Laryngitis, pharyngitis and bronchitis

1. Acute or chronic.
2. Cause of chronic type (tuberculosis, syphilis, tumor such as papilloma or occupational).
3. Dates of attacks.
4. Prior treatment.
5. Present condition.

Pleurisy

1. Date and number of attacks.
2. Type.
   (a) Dry or with effusion.
   (b) Primary or secondary.
3. Any complications such as empyema or tuberculosis.
4. Treatment medical—operative—climatic.

Tuberculosis

Give if possible the date of exposure to tuberculosis. Ascertain extent of night sweats if any, afternoon temperature, loss of weight, loss of appetite, weakness and all of the cardinal signs of this disease. Is examinee a tubercular type? It is often valuable to consult the family physician as to the degree of involvement made. X-Ray and laboratory test for bacillus tuberculosis are valuable aids in examination. In case of doubt, the examiner should not confine himself to a single examination. If doubt still persists, recommend to a specialist.

1. Are apices clear, if not, type or râles, diminished or altered breathing, dullness or percussion.
2. Has the applicant recently lost weight? How much and over what period of time? Give figures under remarks.
3. Has the sputum or blood ever shown tubercle bacilli?
4. Has the examinee ever changed his occupation or residence or been treated at a sanitarium for tuberculosis or suspicion of this disease?
5. Is environment conducive to development of tubercular trouble?
6. Prognosis as to life and recurrence.
7. Results of x-ray and sputum findings.
8. Has examinee ever experienced hemorrhages from lungs?

Asthma

1. Frequency of attacks?
2. Degree of severity?
3. Any tendency to a tubercular complication?
4. Is it true asthma or simply hay fever?
5. Any physical signs at present, such as;
   (a) Emphysema? (b) râles? (c) barrel chest? (d) dyspnoea on moderate exertion?

HEART

First class. Apparently normal heart.

Second class. Evidence of past cardiac inefficiency, but where the causative factors have been corrected and the heart has compensated and at examination functions apparently normal, i.e., a case where previously infected tonsils have caused enlargement;

small murmur, etc. Heart returned to as near normal as possible; functionally apparently normal.

Third class. Evidence of functional disturbance. Impairment.

(a) Usual occupation.
Without interfering with the normal functions of the body to any great extent.

(b) Limited occupation.
Because of decreased efficiency of the heart it is advisable to change occupation where less physical exertion is required.

(c) Temporary lay-off.
Requiring not more than thirty days for recuperation to resume either (a) or (b).

Beginning disability, such as enlargement of the heart; small murmurs, due to existing or preëxisting causative factors, such as infected teeth or tonsils. Disability due to acute or contagious diseases, etc.

Fourth class. Moderate disability. Moderate amount of disability, such as cyanosis, dyspnoea, general weakness, loss of weight and appetite, etc., has marked this man to such an extent that it is hazardous for him to continue his work until corrected by proper treatment which may in time allow him to resume his normal or limited occupation.—Aortitis.

Fifth class. Marked disability. Men are so classed only when the examiner feels to the best of his ability, that the condition has progressed to such an extent that further employment is impossible, i.e., advanced heart conditions, angina pectoris.

Note: Aortitis 80 to 85 per cent syphilitic. Etienne, G., La Presse Med., 28, 344, 1920.

The examiner is directed to indicate on the anatomical chart the exact position of heart boundary, points where murmurs are heard, directions in which murmurs are transmitted and describe accurately under remarks any abnormal findings rather than just give diagnosis, such as mitral insufficiency. This enables the succeeding examiner to visualize past conditions and form a comparative judgment of the present situation.

The heart is probably the most important organ in the body, affected directly or indirectly by practically every abnormal condition, and yet often the least known as to its endurance. Men with apparently bad hearts live to old age and die of other causes. The examiner should acquaint himself with a thorough knowledge of normal boundaries, location of valves, character of sounds and their significance. If disabilities are noted, ascertain the cause. An examiner need not be a heart specialist to be able to judge approximately how disability is influencing the physical condition.

Since the majority of examiners hesitate to give prognosis of the heart condition, the examiner should bring out the important factors and record on the chart.

The pulse is valuable in determining the heart's reaction. The heart should first be examined when employee is relaxed. Count pulse, then have examinee take fifty hops on one foot, or the equivalent, take pulse immediately, or better count heart beats with stethoscope giving two fold result in rate of heart beat and action of heart at same

time. Record heart rate two minutes after exercise. In a normal individual the pulse rate should be within ten beats of heart rate before exercise. Examine the heart over all valves.

Cardiac murmurs

It is most important to differentiate between organic and other murmurs, as well as to describe a lesion accurately. The murmurs described below are arranged in their order of frequency. Make written answers on Physician's Chart, especially in regard to hypertrophy. An examiner frequently describes a certain degree of hypertrophy, at the same time showing none to exist diagramatically—and vice versa.

Be careful to locate the Apex impulse, which is diagramatically located, inside the nipple line at or above the sixth rib.

There is another class of impaired hearts, which from our rating standpoint, have proven to be unfavorable; namely, when there is a history of rheumatism, chorea, tonsilitis, or focal infection. Hence, we ask you to go into every case very thoroughly and exhaustively, and when such conditions as referred to above are elicited, obtain all the details possible and note them under remarks. Also, it has been demonstrated that the degree of hypertrophy (if present) has a bearing on mortality. Consequently the importance of careful examination for cardiac enlargement is emphasized. When there is a combination of mitral regurgitation with a history of rheumatism or other focal infection together with hypertrophy, mortality has been excessive.

Organic

Mitral regurgitation. Systolic—maximum intensity of apex, transmitted to axilla; heard behind at angle of scapula.

Mitral stenosis. Presystolic—turning into first sound, heart in mitral area; not transmitted: usually accompanied by a thrill along left margin of heart.

Aortic regurgitation. Diastolic—replaces or follows the second sound; maximum intensity at second right interspace to third left and downwards to ensiform cartilage.

Aortic stenosis. Systolic—maximum intensity at right second interspace, close to sternum; transmitted upwards into great vessels of the neck.

Non-organic

These murmurs may be weighed functionally.

Usually heard in second left interspace region and systolic in time.

Anaemic or haemic. Due to anaemia or hanged viscosity of blood—usually heard over the precordia and great vessels,—systolic in time. General condition of appiicant important.

Respiratory. Due to variation of intrathoracic pressure due to respirations; usually heard at apex and disappears when breathing is arrested.

Note. Auricular fibrillation is often amenable to treatment.

In consideration of heart block of what importance to Stokes Adams Syndrome?

The importance of the electrocardiograph in determining the efficiency of the heart.

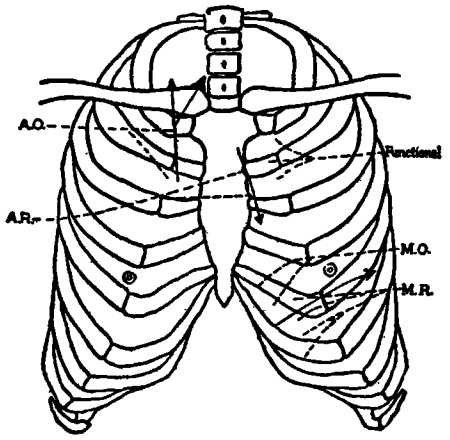
The x-ray is of great importance in

determining size and shape of the heart and especially in the drop form heart which practically always accompanies congenital asthenia.

All heart conditions depend purely upon heart muscle reserve and the degree of response of the heart to physical and mental strain

Indicate the following on Skeletal Chart.

1. Position of the apex impulse by (circle). ○
2. Area over which the murmur is heard by (dotted line). ◌



3. Point to where murmur is head loudest by (cross). ×
4. If murmur is clearly transmitted from the point of maximum intensity, indicate in what direction by the pointing of an (arrow). →
   a. In point of time, is the murmur systolic, diastolic or presystolic?
   b. Is it transmitted? (See No. 4.)
   c. Give tentative diagnosis of the lesion.
   d. Describe any history, giving dates of rheumatism (articular) tonsilitis, abscessed teeth or other focal infection.
   e. Is there any evidence of decompensation (such as dyspnoea, oedema, or cyanosis, dilatation, etc.
   f. Is there true cardiac hypertrophy, and if so to what extent? (Be careful to locate the apex impulse as above described accurately.)
      We do not consider true hypertrophy to be present if the apex impulse is inside the nipple line and at or above the sixth rib.
   g. Aside from the cardiac condition, do you find the applicant in first class physical condition?

Fatty Heart

1. Is the condition suggestive of fatty infiltration of the heart muscles?
2. Is they any:
   (a) Abnormal condition of the pulse?
   (b) Muffled heart sounds?
   (c) Dyspnoea on exertion?
   (d) Hypertrophy?
   (e) Change in the relative intensity of the heart sounds?
3. Is the applicant of the soft, obese type?

Functional cardiac trouble revealed by abnormal pulse:

1. Rate per minute in repose. (This means in a sitting and not a reclining posture.)
2. If accelerated (90) or over per

minute, is it due to nervousness occasioned by the examination or a true functional or organic condition?

3. Does the pulse become normal when the applicant's attention is diverted from the examination?
4. Is any acute condition present which might account for the cause of acceleration?
5. If intermittent or irregular is the condition increased or diminished after exercise?
6. Determine the cause, if possible.
7. Has the applicant known the condition to exist? If so, how long?
8. Any subjective symptoms?
9. If pulse persists in rate of ninety or over upon the first examination ask the applicant to return for another observation.
10. If the pulse intermits or is irregular, state the number of intermissions per minute or degree of irregularity.

Note: Some of the major conditions an examiner should keep in mind where examining the heart are: Palpitation, tachycardia, hypertension, hypertrophy, dilatation, insufficiency endocarditis, valvular lesion, angina pectoris, arteriosclerosis, aneurism, and thrombus.

BLOOD PRESSURE

First class. Any reading between minimum and maximum for given age.

Second class. Any reading per given age not more than eighteen (18) points above maximum or ten (10) points below minimum systolic. Any reading not more than six (6) points above maximum to twenty-one (21) points below minimum diastolic.

Third class.

(a) usual occupation.
(b) limited occupation.
(c) temporary lay-off of not more than thirty days for recuperation.

Any reading per given age between eighteen (18) points above maximum to forty-three (43) points above maximum systolic. Any reading between ten (10) points below minimum to twenty (20) points below minimum systolic. Any reading between six (6) points above maximum to eleven (11) points above maximum diastolic. Any reading between twenty-one (21) points below minimum to thirty-one (31) points below minimum diastolic.

Fourth class. Any reading per given age between forty-three (43) points above maximum to sixty-three (63) points above maximum systolic. Any reading between twenty (20) points below minimum to forty (40) points below minimum systolic. Any reading between (11) points above maximum to sixteen (16) points above maximum diastolic. Any reading between thirty-one (31) points below minimum to forty-one (41) points below minimum diastolic.

Fifth class. Any reading less than eighty (80) or more than two hundred (200) points systolic. Any reading less than forty-five (45) or more than one hundred and ten (110) diastolic.

The table of clinical averages shown below is compiled from blood pressure

taken on sixty-four thousand cases of apparently normal, healthy individuals and will serve as a basis for standardization for ratings on individuals examined. Due to the fact that so many different factors enter into normal blood pressure, only an approximate rating can be established. One must ascertain the cause, and in the examiner's own judgement, determine the significance of the normal pressure and from apparent cause of pressure, give a rating on a regular rating basis.

AGE	SYSTOLIC RANGE			DIASTOLIC RANGE			PULSE PRESSURE
	Minimum	Average	Maximum	Minimum	Average	Maximum	
15–19	107	119	131	81	85	89	34
20–24	110	122	134	83	87	91	35
25–29	110	123	135	83	87	91	36
30–34	110	124	136	85	89	93	35
35–39	110	126	137	86	90	94	36
40–44	114	127	140	87	92	97	35
45–49	116	129	142	86	91	96	38
50–54	119	132	145	89	94	99	38
55–59	120	135	146	95	100	105	35
60–64	121	137	147	96	101	106	36

For industrial ratings the above blood pressure tests may be classified in the following manner, for example:

Age of male, 35–39

FIRST CLASS	SECOND CLASS	THIRD CLASS	FOURTH CLASS	FIFTH CLASS
Systolic				
110–137	100–155	90–180	80–200	80–200 plus
Diastolic				
86–94	65–100	55–105	45–110	45–100 plus

Note: Until more definite information is ascertained, the above readings for normal blood pressure will be accepted as within the bounds of normal for given ages.

Ludwig made the statement that the discovery of blood pressure and the proper interpretation of it was a greater discovery than the discovery of circulation by Harvey.

As the story of blood pressure is read through the action of the heart, let us consider the daily work of the normal healthy heart in order to gain a fair basis for estimation. The human heart beats seventy-two times per minute, one hundred four thousand times a day, and thirty-eight million times a year. At every stroke ten cubic inches of blood are forced out into the body—one million cubic inches a day. In terms of work, this is the equivalent of raising one ton to a height of eighty-two feet every twenty-four hours.

The rapidity of change under temporary stress, such as exercise and excitement, marks blood pressure as the most delicate registering medium in the human body. Degeneration is always the result of abnormal processes and irregularities, which when they become too persistent soon become chronic. It is the germ involved in this idea, within the period of the past fifteen years, that has led practically all the insurance companies to adopt blood pressure as the yard stock for measuring the individual with respect to the risk-group to which he belongs.

Blood pressure, if persistently abnormal, is evidence of a present or impending pathological condition. Insurance companies report that in the tens of thousands of risks presented, notwithstanding the best efforts of all medical examiners, that thirty per cent of the accepted risks—supposedly nor-

mal, healthy persons—ultimately succumb to cardio-vascular diseases.

The relation of blood pressure to health is fundamental. Without pressure, there will be no circulation; without circulation, there can be no life; and without normal circulation, and hence normal blood pressure, there cannot be health. Heavy exercise and nervousness immediately after a heavy meal, are factors that tend to increase the blood pressure. In cases where there is a tendency towards high blood pressure, retake the blood pressure reading between meals and under more favorable circumstances.

How to take blood pressure

In order to get a uniformity of blood pressure readings, a recently tested mercury manometer is most trustworthy.

Take reading on left arm with cuff placed above the elbow on a level with the heart, cuff being applied comfortably with no air and no wrinkles in it. The patient should be sitting comfortably in a relaxed position, beside a table upon which rests the mercury manometer. If examinee is tense and reading suspiciously high without finding cause of little note, take pressure in horizontal position, always recording the lowest systolic and diastolic readings.

Diastolic

By continuing to deflate the cuff, a series of murmurs and tapping sounds are heard, gradually becoming less distinct and finally disappearing altogether. We wish to have the diastolic pressure recorded just at the point at which all sounds disappear.

A diastolic pressure that is too high (100 mm.) means that there is much resistance in the circulation and, therefore, added tax upon the heart, the driving power. The heart may be expected to wear itself out because of the opposing force. Paradoxically, almost, a diastolic pressure that is too low (50 mm.) means that the heart action is too great for the circulation and the heart may be expected to wear itself out because of the overwork.

In recording the diastolic pressure, be sure to avoid those factors which exercise a transitory effect on blood pressure, that is, posture, physical exertion, nervousness, acute pain and overeating.

Systolic

If the systolic is ten points or more above the maximum systolic as noted on the chart, per age, take a second reading later.

A high systolic pressure signifies a compensatory affair. Because of increased resistance due to kidney obstruction of arterial inflexibility, the heart, which is the dynamic force of the circulation, must work with greater effort. It is fortunate for the human system that there is this power of accommodation. But, when the cause is a permanent one, and the increased accommodation of the heart is required indefinitely, the strain that is put upon the heart, may be beyond its power to continue indefinitely.

All observation should be made by the ausculatory method. This is done by listening with the stethoscope placed at the bend of the elbow over the brachial artery. Air is then pumped into the cuff until the pressure

stops the pulse and no sound is heard with the stethoscope. The air should be allowed to escape slowly. The instant the sound reappears on deflating the cuff is that at which the dial should be read, as marking the systolic pressure.

George E. Fahr[3] emphasized the fact that when systolic blood pressure is 200 mm., the heart must do approximately 65 per cent more work than if the systolic tension is 120 mm. Fatigue ensues.

From investigations, the figures below represent normal blood pressure:

Age of male about 24

	Mercury (Hg) mm.
Systolic pressure	120
Diastolic pressure	80
Pulse pressure	40

This 3–2–1 (120–8–40) ratio is normal as many statistics have shown. The systolic pressure represents the driving force of the heart; the diastolic pressure represents the resisting force of blood vessel walls and friction and weight of blood. The pulse pressure being the difference between the systolic and diastolic pressures, represents the heart's leeway of safety.

The normal blood pressure for women per the same age as men is approximately ten points below that of men. The normal blood pressure in women may rise before menstruation.

From your examination and observation, give your impressions as to the cause of high blood pressure and what applicant can do to reduce the pressure.

[3] Fahr, George E.: Journal of American Medical Association, vol. 80, no. 981, 1923.

Blood pressure is one of the symptoms associated with cardio-renal disturbances and ratings for same must be considered in connection with either the heart or the kidneys.

ABDOMEN

Ratings

First class. Normal, no past or present diseases of the abdomen.

Second class. Past abdominal diseases, corrected or not corrected with operations, in which there have been no evidence of discomforts for one year. Appendix, gall bladder out, with no adhesions, or past operative impairments.

Third class. Impairment.

(a) Usual occupation.

(b) Limited occupation.

(c) Temporary lay-off requiring not more than thirty days for recuperation.

Recent symptoms of abdominal discomforts, attacks of acute or chronic appendicitis, acute or chronic gall bladder, chronic gastric or duodenal ulcers, colitis, etc. Abdominal conditions which do not preclude work but cause an increased effort on the part of the individual.

When abdominal discomforts becomes so marked that change of occupation such as lighter work becomes a protective necessity. Cases where a short period of rest is necessary for recuperation also come under this classification. Chronic appendicitis, chronic diarrhoea, colic of stomach or gall bladder, and mucous colitis, etc.

Fourth class. Symptoms that preclude the usual occupation until

correction has been made such as operation for appendicitis, ulcerative colitis, gall bladder, gastric ulcer, etc.

Fifth class. Abdominal conditions such that the examiner feels that even with proper surgical or medical care work should never be resumed, i.e., cancer, inoperable of abdomen or pelvis.

Abdominal nomenclature has become standardized, namely, epigastric, umbilical and hypogastric regions.

Examinations should be made both in a standing and prone position. Note abnormalities, if any, and state their significance.

Ratings for abdomen.

Rate upon the bearing that abnormalities have upon the efficiency of the body as a whole.

Some of the common diseases of the abdomen with consequences to be kept in mind.

Gall bladder: (with or without stones).

1. Number and dates of attacks.
2. Describe attacks—any pain, jaundice, etc.
3. Treatment (medical or operative) date of operation.
4. Was operation for drainage or removal of gall bladder?
5. Any subsequent symptoms of any character?

Appendicitis:

1. Number and dates of attacks.
2. Treatment (medical or operative).

Hematemesis:

1. Number and dates of attacks.
2. Cause (traumatic, gastric ulcer, malignant disease, etc.).
3. Prognosis as to life and recurrence.

Ulcer of stomach or duodenum: (which)

1. Date and duration of attacks.
2. Symptoms
   a. Pain? If present give exact location.
   b. Loss of weight—figures.
   c. Vomiting.
   d. Hemorrhage.
   e. Any hunger pain two or three hours after eating.
   f. Was x-ray picture taken? If so, results.
3. Treatment.
   a. Medical or operative.
   b. If operative, what was done, by whom, when?
4. Present condition.
   a. Has weight been regained?
   b. Is examinee still on diet?
   c. Any abdominal discomforts, digestive disturbances of any character?

GENITALIA AND VENEREAL DISEASES

Ratings

First class. Normal genitalia, negative to syphilis or gonorrhoea.

Second class. Anatomically imperfect but functional perfect. Testicle outside of scrotum, missing testicle. History of past gonorrhoea. Treated syphilis with negative Wassermann, more than one year previous to date of examination.

Third class. Positive, Wassermann evidence clinically of syphilis, but in non-infective stage. Persons under treatment for syphilis; or recovered from gonorrhoea; quiescent tuberculous testicle.

Fourth class. Primary, secondary syphilis; acute or chronic gonorrhoea; gonorrhoreal rheumatism; arthritis. Any condition where the examiner feels the case is possibly injurious to fellow employees by infection, and where the usual treatments are expected in time to restore case where usual employment may be resumed.

Fifth class. Tabes dorsalis, neurospinal syphilis, gummata, etc.

Testicles, descended or undescended: orchitis, syphilis; gonorrhoea; tuberculosis.

Syphilis:

1. Was there an initial lesion? If so, give date.
2. What were the ensuing symptoms? If any, give in order of occurrence.
   (a) Sore throat.
   (b) Rash.
   (c) Headaches.
   (d) Pain in bones.
   (e) Alopecia.
   (f) Nervous manifestations.
   (g) Lesions or scars on tongue and fauces.
   (h) Gumma. (With date of symptoms developed.)
3. Determine whether a diagnostic blood examination or dark field illumination test was made at any time. Results? Dates and number of tests.
4. What was the treatment employed? and continuous duration of same? If intermittent, give approximately the dates of employment and intermission.
5. Give the date of final discontinuance of all treatment.
6. In all cases of suspicious or positive cases of syphilis take blood for a Wassermann test.
7. No employee having an acute case of gonorrhoea or syphilis should be employed. Have his family physician observe case and report to employer when ready for work. On account of the danger to fellow employees from infection, check-ups should be made. If case is routinely treated, with no danger to fellow employees there is no reason why employment should not be resumed.
8. There are many symptoms that the examiner will note during examination. Whenever in doubt, have all necessary tests proving that the invasion of the organism is no longer present. The late Sir William Osler has reminded us of the fact that the invasion of syphilis in the human body manifests itself in symptoms common to practically all known diseases. There is an element of risk in all cases unless frequent tests and treatments are given.

NERVOUS SYSTEM

Classification

First class. Normal nervous system.

Second class. Those individuals having nerve involvement, with no apparent disability. Also those who become dizzy and lose their sense of equilibrium upon ascending to unusual heights. "Tic" would be in this class.

Third class. Impairment.
(a) Usual employment.
(b) Limited employment.
(c) Temporary lay-off of not more than thirty days for recuperation.

Facial neuralgia, neuritis, sciatica are included in this class.

Fourth class. Moderate disability. Requiring more than thirty days for treatment and rest to restore state of health.

Fifth class. Marked disability. Any nerve involvement that has progressed to such an extent that the examiner feels that the usual treatment will not restore occupational health.

Coördination. The study of the numerous accidents as a result of employees being off the ground, such as steel workers, has caused the industrial physician to pay more attention to coördination than in previous years. The advent of the airplane industry, has caused medical men to check thoroughly for coördination before granting pilot's licenses. The medical men of the air service have perfected their work to such an extent that they rate their pilots as to limits of height.

The reflexes and coördination tests are very important and in fairness to the employer and employee every effort should be made to determine coordination factors. Men with poor coördination should be confined to the ground, and their condition taken into consideration in the matter of placement.

Reflexes. Reflexes are like a great many other symptoms, they differ in different individuals under different stages of diseases.

The most common reflexes to keep in mind are the following:

Superficial, plantar, cremasteric and abdominal.

Deep: patellar, achilles, biceps, triceps tendon, ankle clonus and patellar clonus.

If there is an increased or diminished reflex then the examiner should exhaust every means to determine significance. The diminished or absent knee reflex is usually found in tabes dorsalis, anterior poliomyelitis, peripheral neuritis, trauma of the cord at the level of the 3rd. and 4th. lumbar segments and in various cord scleroses. It is often absent in diabetes mellitus. The knee kick is very active in various hypertensive mental states and in diseases of the upper motor neuron, as in hemiplegia from cerebral hemorrhage, spastic spinal paraplegia, amyotropic lateral sclerosis and disseminated sclerosis.

If the eye or knee reflexes are abnormal, some of the following tests may be tried. Examinee standing, eyes closed, walk forward or backwards to ascertain perception of distance. Again standing eyes closed, or sitting in a revolving chair, turn him rapidly in one or both directions, stopping the movement suddenly, have the examinee with eyes still closed locate certain objects in the examination room.

Tremor of the hand. A tremor may be fine or coarse, and rapid or slow. A good way of demonstrating a constant fine tremor is for the examinee with arm and hand fully extended to support a sheet of paper flat on the back of his hand, or to spread the fingers and thumbs and note tremor of hands, viewing the hands at right angles.

Some of the more common tremors to note are:

Simple—are those for which no cause can be assigned and which are occasionally manifested by normal persons or are characteristic of the members of certain families. These tremors are often intensified by fatigue or mental strain.

Senile—slow (5 or 6 per second) and a fine tremor, present sometimes only as a part of, and sometimes diminished by voluntary movements.

Goiter—a passive, fine and rapid tremor from 8 to 12 oscillations per second.

Toxic—are fine, passive and rapid, from 8 to 12 per second. Such may be due to tobacco, coffee, alcohol, lead, mercury and opium poisoning.

Paresis—fine and rapid 8 to 12 per second, this tremor is also noted on lips, face and tongue.

Chorea or St. Vitus' Dance. This is chiefly a disease of childhood but in some cases extends into middle life. It is partly rheumatic in nature, partly nervous. Recurrent attacks may be expected, but the tendency is to milder and shorter attacks. The hazards are mental and heart. Heart lesions show in an astonishing proportion of chorea cases, 50 per cent and more. Mental and psychical sequelae are much less frequent although a chorean insanity is occasionally associated with menstruation.

Habit chorea or "tic." Another nervous manifestation but often of little industrial significance is the habit chorea or "tic." Functional spasms of the facial muscles may be rhythmical or irregular. Among the former are the following: the nodding of the head, the rhythmical chorea of adults, and the various forms of habit spasms more especially found among children. In the last, the quick contractions of certain facial muscles, always the same for the same person and always intensified by excitement, produce a grimace, a sniff, the rapid winking of an eye, the drawing up of one corner of the mouth or a sudden, quick shake of the head.

Mental.

Alert.

Average.

Dull.

An examiner can gain information as to a person's mentality during the course of his examination. The way the questions are answered, thoroughness of explanation, views on life, his work and his fellowmen. An employer would rather have an optimist than a pessimist, though the evenly mental balanced man is the one usually sought. A pessimistic employee among fellowmen cuts down the efficiency of the men as well as often breeds dissatisfaction, etc.

A man with a dull mentality could probably do the usual routine laboring work. The alert is usually sought for places where quick action is desired. They are usually given credit for being more progressive, while the average fits in at all other places. An examiner knowing the occupation can capably judge fitness of mentality for desired place.

NERVOUS BREAKDOWN

Neurasthenia is nervous fatigue. The individual becomes exhausted too

quickly, irritable, unsteady, undependable. It is unsafe to allow such a worker to be close to dangerous, noisy machinery, not only to himself but to his fellow worker. Proper placement in the plant, quiet, non-monotonous work with good environment and attempt at correction of the causative factor will often make this individual a valuable worker.

Limited tolerance is prone to show in four classes on inadequate individuals, well described by Walter Timme:

1. Constitutional inferior states, both physical and mental due to hereditary germ plasm defect, to metabolic and endocrine dysfunctions and to prenatal disturbances.
2. Constitutional disease states such as tuberculosis, hookworm infection, pellagra and similar disabling affections, which have an intense effect on the resisting power of the individual and which have especial deteriorating influences on the nervous system.
3. Environmental deteriorating influences, such as poor light and air and food, with employment hazards in those occupations dealing with metallic poisions, lead, arsenic, phosphorus, zinc and dyestuffs.
4. Intoxication from alcohol and habit-forming narcotic drugs.

The examiner must keep in mind that all who have had a previous attack of nervous breakdown broke under a strain of some sort. Invariably there is a story of long hours, of overwork, long sick spell, unusual siege of work, financial difficulties, family troubles, but the fact remains that the worker went nervously bankrupt in time of stress.

The examiner cannot assume that there will be no further trouble of this kind. The nervous system has already demonstrated a limited tolerance. But unless the circumstances are unusual, such as lengthy convalescence, successive discouragements, and melancholia with the probability of suicide, the worker can be properly placed and become a useful member of society.

All individuals who have suffered a nervous breakdown regardless of the severity and degree of recovery cannot be placed in a higher than 2 classification of rating, and if evidence present of nervous breakdown, or if examiner feels there is possibility of a near attack, he certainly would be placed in class 3, or even 4.

Case representing importance of nervous system examination in Industrial Medicine[4]

Introduction

There is probably no type of Psychosis, which aggregates a great number, and yet so often disregarded as that of a paranoid condition and true paronoia. It has been said by one author "If we were to begin to hospitalize all the paranoid conditions and true paranoia it would not be complete as there would be insufficient hospital space to accommodate all of them." This statement is true to a very great degree and it is this particular psychosis that the author of this case history wishes to confine his remarks and herewith recite a very interesting case history.

It is an actual fact that the one suffering with a paranoid condition or true paranoia,

[4]Kindly supplied by Wm. A. Eshelman, M.D.

all too often is not only considered the laughing stock of his fellow employes, as well as his neighbors and friends and his physician may consider his condition too lightly and the patient is named "A Fool," or probably if his condition is diagnosed it will be that of Dementia Praecox or Psycopathic Personality.

Case history

Male—aged 35. This case history is taken from the case files in a state hospital in Ohio where the author of this history was Clinical Director for a time and the information obtained prior to his admission to this hospital was supplied by his sister and wife, who stated that there were apparently no abnormalities presented in his early life.

He passed through the school years as an average student including a four-year high school course. The sister states, however, as soon as he was graduated from high school that it was noted that he somewhat displayed a feeling of self-importance. Thereafter he worked as an apprentice in a foundry and learned the trade of a machinist. If this patient could have been examined by a psychiatrist at that time it might have been that he would have considered this patient as one suffering from a true Megalomania. However, this was not done, therefore no further history at this time was obtainable.

After his apprenticeship as a machinist was completed he secured employment in a large manufacturing or machine shop. Nothing was noted for several years other than that he was an efficient employee and one of the best machinists where he was employed. In the meantime the patient was married.

At the age of thirty years he again displayed arrogance and became somewhat irritable and, according to his wife's statement, this episode apparently passed over without any very significant symptoms other than recited. For a period of probably eighteen months his mental attitude was normal and no episode or outbreak was noted.

However, at the age of thirty-two years these symptoms were again in evidence and so marked that his employer would often reprimand him for his arrogance and irritability, along with his apparent lack of efficiency in producing various models, etc., which had been assigned to him to perfect, and during this period the patient developed mild persecutory ideas, with the idea that the particular device he had in mind would completely revolutionize various forms or molding in brass, etc., and would often change the models assigned to him in order to correspond to his own ideas. Along with these ideas there developed mild suspicions that fellow workmen were attempting to appropriate his own ideas for their own use and in short he accused them of stealing his inventions.

At this juncture his employer instructed the company physician to conduct a complete examination after which it was decided the patient should be relieved from work and have a complete rest. He apparently improved and returned to his former employment at the end of four months. After six months elapsed he again developed more pronounced persecutory ideas which were considered at that time beyond any question of a doubt to be true psychotic delusions. Then, it was recited that they were very well systematized. These were woven around his inventions and including these delusions he proclaimed his undying love for the secretary to this company. In fact, he wrote very many love missives to the young lady in question, all the while his efficiency as a machinist was decreasing at a rapid rate.

Again his employer suggested to his wife and sister another trip and period of rest. This rest period lasting for six months when the patient again returned to his former employment, apparently refreshed and as to general appearances in outward mannerism and attitude he was that of a normal individual mentally.

Then came the third episode in which his inventive importance as well as a very definite persecutory delusion not only directed against his fellow employes whom he accused of stealing his ideas and inventions during his absence but also personally accused the young lady mentioned hereto-

fore as attempting to assist these employes along with disregarding his attentions and being untrue to him during his absence, and finally attempting homicide both upon the young lady and two of his fellow employes.

Now it became quite evident to his employer that his efficiency as a machinist was greatly decreased. A commission was asked who committed him to the state hospital where a diagnosis was rendered of paranoia. There was little or no mental deterioration, no hallucinations nor illusions noted; he was quite alert mentally, nevertheless well systematized delusions with rank suspicions. He is now a resident of this institution and no doubt will continue to reside there as his delusions and persecutions have become so severe that it is necessary to confine him to a ward at all times and his efficiency is nil as a machinist.

Conclusion

This case history recited above is a record covering a period of approximately four years from the date his mild arrogance and no doubt Megalomania was noted with his efficiency as a machinist moderately impaired up to and including the period when he was diagnosed as a definite psychosis and admitted to a state hospital. His efficiency gradually declined each year until his employer and the company physician considered him unable to perform his duties at all.

It will be noted that each period he was away for rest and change of scenes his mental condition apparently improved. This is all too disappointing. Had he remained away it would have been only a question of time until his true condition would have again been in evidence. However, had there been an early diagnosis in this case and the patient hospitalized and interested in occupational therapy, which would have been a change in occupation as well as light work, it is not improbable that he may have been induced or at least influenced to direct his mind to another channel whereby he would have at least adjusted himself to society to a fair degree or at least to such an extent that continued hospitalization would not have been necessary.

THE AERIAL INDUSTRIAL WORKER (CONSTRUCTION OR ANY ONE WORKING OFF OF THE GROUND)

The industrial worker at various levels of height with little in the way of substantial support is relatively in the same category as the airplane pilot. He must be examined with the same amount of care. This is especially true with regard to his eyes and his balancing mechanism. The following points should be especially considered.

(1) Medical history. Hereditary syphilis, insanity, epilepsy, circulatory disease and eye defects should be thoroughly investigated.

(2) History of the applicant. Past or present, treated or untreated; lues, insanity, (especially dementia praecox), epilepsy, cardio-vascular-renal disease, eye defects, encephalitis lethargica, fainting, insomnia, somnambulism, fear, use of alcohol and drugs.

(3) Physical examination.

a. Aside from the regular physical examination special tests of vision, depth perception and ocular muscle balance should be included.

b. An examination in regard to the applicant's recognition of his position in space (balancing tests, "muscle-tendon sense").

c. Circulatory efficiency test (Schneider test or modification of that test).

d. 1. Psychic phenomena and psychomotor test.

2. Normal reflex tests.

3. Normal coördination tests.

e. Summary of applicant's general nervous makeup. (Notes of ego.)

f. Education. (Roughly, Intelligence Quotient.)

Ceiling. This refers to the height which an airplane pilot can go before

he begins to suffer from want of oxygen. Roughly speaking this begins between 13,000 and 15,000 feet. In so far as the industrial worker is concerned it can be, of course, dispensed with.

We must, however, consider the industrial worker as poised several hundred feet above ground. Any of the hereditary diseases mentioned above should disqualify him for this work. Syphilis cannot be trusted. One may easily see why an applicant for employment that will take him to great heights must be free from all backgrounds of mental disturbance such as insanity in any of its forms, epilepsy, and all forms of organic heart defect will also disqualify.

The use of alcohol and drugs must necessarily be counted against the applicant, also whether he is subject to faintness, walking in his sleep, lacks sufficient nerve, or is of a cowardly disposition.

As to the examination of the eyes, the applicant should have an acuity of vision of 20/20 without correction. This may, however, be waived for private flying providing he has a correction to 20/20.

"Ocular muscle balance" is absolutely the most important of the eye tests. This being simple should be routine. The apparatus for such a test consists of one red glass held before one of the applicant's eyes, both eyes being open, and a common candle flame at a distance of twenty feet. If any degree of diplopia, (double vision), develops the applicant should be rejected. Hyperphoria is tested in the same manner as diplopia except a Maddox Red Rod lens is used. Hyperphoria developing over one prism diopter disqualifies. Duction test should be done, candle flame at twenty feet using prism lens from two to twenty prism diopters in strength, first "base out," second "base in." Result "base out" reading should be at least four diopters more than "base in" reading.

"Depth perception" is the ability accurately to judge distance. It is measured by a simple apparatus which is described in the Department of Commerce Regulation for Pilots. It consists of an open box within which are two upright $\frac{3}{8}$ inch black iron bolts ten inches high, one immovable, while the other can be moved backward and forwards in a slot by pulling two strings. The test is for the applicant to sit at a distance of twenty feet and try to bring these two rods parallel while looking at the rods through a small window in the front of the box. Three or more trials are given. An average of from 0 to 20 mm. is good, and from 20 to 25 mm. fair, and over 30 mm. disqualifies.

Orientation in space has long been the subject of much controversy by physiologists. Some say that the "semicircular canals" control this entirely; others, that vision is a large factor. Very little mention, if any, is made of "muscle tendon sense." Grouped in order of their importance, orientation in space in the flyer is determined by, first: "vision," second and third: the action of the semicircular canals and the muscle tendon sense. Airplane pilots continually talk of "the feel of the seat," "the feel of the ship," —this is simply a recognition of "muscle tendon sense." This phenomenon is tested simply by having the applicant close his eyes and stand on one

foot for a period of fifteen seconds. This brings every muscle in the body into coördination action. If he is steady he passes. If he is unsteady with his eyes shut but able to maintan his position, he passes, but it is not as good as the previous result. If he falls down or has to put his other foot down he fails and should be disqualified. This is one of the simplest yet one of the most important tests.

"Circulatory efficiency" is tested by the Schneider test or a modification of it. For the industrial worker the modified Schneider is sufficient. This is simply:

(1) Applicant standing, take pulse and blood pressure.
(2) Applicant hops on one foot a distance of twenty feet, pulse and blood pressure recorded.
(3) Applicant stands motionless for two minutes, pulse taken and recorded.

The initial pulse should not be over 88 per minute. Immediately after exercise an increase from 20 to 30 beats is to be expected. Two minutes after exercise the pulse should return to the initial pulse recorded. If it does not, and remains high, this shows "effort-syndrome" or "neuro-circulatory-asthenia," and disqualifies temporarily. The blood pressure should, of course, be normal for the height, weight and age of the applicant. After exercise the systolic pressure will increase 8 to 10 points. This is normal. Should, however, it fall below the initial blood pressure an electrocardiogram should be made.

The normal reflex tests should be performed and findings recorded. The normal coördination tests should be performed and recorded. A test of "psychomotor tension" should be performed. A simple test for this is to have the applicant seated upon a stool and told to relax. The examiner lifts his elbow to the height of his shoulder and suddenly drops his arm. If the arm is relaxed it will drop like so much dead weight. If the applicant's psychomotor tension is increased, he will hold his arm out voluntarily. This shows that the autonomic nervous system is overworked. The applicant should have a vacation. He needs rest.

Psychic phenomena during the examination should be recorded and the applicant's reaction towards the examination, i.e. coöperation, truthfulness, stubbornness or resentfulness. Notes should be made on the character of his ego.

LYMPHATIC SYSTEM

First class. Normal tonsils, adenoid, cervical and inguinal and all other lymph nodes.

Not more than one attack of tonsillitis, quinsy or enlarged lymph nodes during life time, no trouble with lymph system within one year from date of examination. No functional disturbances as result of lymphatic infection are included in this class.

Tonsils and adenoids having been cut out one year prior to examination with excellent recovery is included in this class.

Second class. Some enlargements of lymph nodes, but no disability, or degenerative changes in lymph or other organs.

Enlarged glands due to infection

from abrasions of body surface of temporary nature is included in this class.

Third class. Impairment of functional disturbance.

(a) Usual occupation.

(b) Limited occupation.

(c) Temporary lay-off of not more than thirty days.

Infection of lymphatic tissue causing beginning functional disturbance of heart, rheumatism, anemia, inguinal glands, specific or otherwise would be in this class.

Cutting out of tonsils and adenoids, drainage of lymph glands requiring not more than thirty days for recuperation are also in this class.

Fourth class. Moderate disability due to infected lymph glands or degenerative changes in body due to this infection.

Tuberculous glands, enlarged glands due to gonorrhoea, infected lymph nodes apparently responsible for functional disturbance of the heart, rheumatism, anemia are included in this class.

Fifth class. Marked disability.

A condition where infected lymph nodes are responsible for changes in the bodily organs, and where the examiner feels that the usual surgical or medical treatment will not give the employee much of a chance to resume his employment. Cancer, Hodgkins' disease, etc.

The lymphatic system includes all lymphoid glands, vessels, spaces, sinuses and lacteals collectively.

The most important glands that become seats of disease are the tonsils, adenoids, cervical and inguinal glands. Gonorrhoea is the most frequent cause of involvement of the inguinal glands.

The term "rheumatism" is ordinarily applied to a group of symptoms, chief of which is ill-defined pain in the bones, muscles or joints. Many authorities do not hesitate in stating that infected tonsils and teeth are chiefly responsible. At the time of the war 400 soldiers suffering with arthritis were placed under observation and it was found that in 52 per cent of these men, the focus of infection was traced to the tonsils and the teeth in 35 per cent.[5]

HERNIA

Classification

First class. No hernia, or examinee who has had a successful operation for past hernia.

Second class. External ring open admitting tip of little finger, impulse felt when pressure applied to abdomen by straining of abdominal muscle but no apparent bulging. Slight umbilical hernia, suggestive femoral hernia.

Third class. External ring open, incomplete inguinal hernia, mass in inguinal canal extending to or for short distance below level of external inguinal ring. Hernia kept in place by truss or support.

(a) Usual occupation.

(b) Limited occupation.

Where the physical efforts of usual occupation increases physical or occupational hazards with or without properly fitting truss.

[5] Pemberton R. and J. W. Robertson: Archiv. Int. Med. 25–231, 1920.

(c) Temporary lay-off. Requiring not more than thirty days for correction or for recuperation of health.

(Most cases would be in 4th class as operation and recuperation require more than a thirty day period.)

Fourth class. External ring open, inguinal mass extending into scrotum, reducible or unreducible.

Fifth class. Inoperable hernia or large hernia that extends into scrotum, enlarged, and where examiner feels examinee will never be able to resume employment.

A hernia is a protrusion of viscus through an abdominal opening in the walls of the cavity within which it is naturally contained.

Careful consideration and examination is directed to possibilities and significance of hernias. Hernias have been the bone of contention between employers, employees and surgeons in industry dating back to practically the time of compensable hernias.

The examiner should inform the employer of any hernias noted, giving as far as possible the extent, and possibilities of future complications that may arise in the employee's condition.

Common hernias:

1. Inguinal.
2. Abdominal.
3. Femoral.

SKIN

First class. Excellent condition: small moles, scars, freckles, racial color, natural alopecia, warts are in this class.

Second class. Defects. Noticeable scars, keloids, senile skin, subcutaneous dilated small vessels of the cheeks or bodily surfaces. Occupational skin conditions, showing no evidence of disability or interfering with the examinee's work. One would certainly put an ill-kept skin, filthy, etc. in this class.

Third class. Impairments.

class.

(a) Usual occupation.

(b) Limited occupation.

(c) Temporary lay-off, requiring not more than thirty days for correction of skin or because of general debility resulting from skin infection.

Pale skin such as in anemia, found in under-nourished individuals. Skin of suspicious cases of tuberculosis, boils, carbuncles, contagious eczema, contagious diseases not requiring more than thirty days for recuperation, burns and frost bites. Dermatitis venenata which is beginning to show a disturbance of bodily functions. Jaundice, tuberculosis of the skin, cyanosis, ground itch, ring-worm psoriasis, varicose ulcers and skin parasites.

Fourth class. Moderate disability. Marked jaundice, shingles, all contagious diseases such as smallpox and erysipelas. Primaries or secondaries in syphilis, ulcers due to syphilis, large varicose ulcers, oedema, herpes zoster and dermatitis venenata showing considerable disability. Any condition of the skin in which the examiner feels that with proper

treatment the employee will in time resume his usual or limited occupation.

Fifth class. Marked disability. Cancer of the skin, gangrene of the skin, corus ulcers, gummatous skin, great amount of oedema and anasarca. A skin condition which the examiner feels that the usual treatment will fail to put the examinee in condition for industrial work.

The skin is supplied with a net work of blood vessels and nerves, and is a sensory, respiratory, excretory and heat-regulating organ. As a sensory organ, it combines with the tactile functions the power of perceiving impressions of warmth and cold. The respiratory functions of the skin are limited, small quantities of oxygen and absorbed and carbonic acid is eliminated. The skin in an average adult eliminates, through the sweat glands about 2½ pounds of water a day. Human sweat contains about 2 per cent of solid constituents mostly in the form of waste matter or impurities. The skin also secretes a fatty substance through the sebaceous glands. As the water from the skin evaporates, the solid matter remains upon the surface, combines with the dirt, harbors germs and readily undergoes decomposition. Any disturbance of the function of the skin, whether be it filth or disease, interferes with the efficiency of the worker. The term dermatitis venenata has been given to that class of inflammations of the skin that is produced by external contact, with irritating agencies, whether of a solid, liquid or gaseous nature. There are a great many occupational disorders of the skin, spoken of in industrial medicine, according to the various trades and callings. Each one must be considered and rated according to impairment or disturbance of functional capacity.

One can often obtain valuable information as to impairments or degenerations from close observation of the general body surface. Is the skin healthy? Has it had good care or is it filthy? Is the skin normal in color for the type of individual, or is it pigmented, yellow, pale, anemic, does it show redness or different shades of blueness? Is the cyanosis limited or general over the body surface? Are the secretions of the skin normal? Is the skin dry or is it moist? Is the skin elastic or is it tight? Is there any noticeable edema, anasarca or dropsy?

Is there any evidence of pruritus or itching? Any noticeable scratching marks? Is there a sensation of tingling pricking, stinging, heat, or burning of the skin? Is the pruritus general or local? If local, is it due to body lice, scabies or eczema? A great many of the contagious diseases are manifested by skin rashes.

Changes in the skin not conspicuously related to internal degenerations such as senile skin, scars, warts, moles, skin horns, ichthyosis should be noted.

Any abnormal condition of the skin, that does not affect the functions of the body, longevity of life, efficiency at work, his fellow man, is not considered a disability.

Note: Any skin eruption contagious in nature and effecting the well-being of fellow employees should at once be reported to the employer and employee protected for his own health and taken away from his fellow-workmen to prevent exposure.

BONY STRUCTURE OF BODY—FLAT FEET

Anatomical classification

First class. Excellent, no present or past injuries or abnormal conditions of the bony structure of the body. Any past injury or abnormal condition of the bony structure of the body that has shown a complete recovery for more than one year prior to examination.

Second class. Past or present injuries of the bony structure of the body showing functional disability within one year of examination but at time of examination showing no functional disturbance. This includes fractures, strains, sprains, dislocations, disease of bones such as osteomyelitis, periostitis, etc. Amputation of digits, such cases where the loss does not interfere with occupation. Curvature of spine with no evidence of functional disability.

Third class. Impairment:

(a) Usual occupation.
(b) Limited occupation.
(c) Temporary lay-off requiring not more than thirty days for correction of abnormalities.

Under this classification are included such as, strains, sprains, dislocation of digits, wrist, ankle, bone felons, abscesses, amputations, small amount of contractures, and curvature of the spine showing beginning functional disability. Sagging of one or both arches of the foot.

Fourth class. Moderate disability. This includes any abnormality of the bony structure of the body, in which the employee is required to take a lay-off of more than thirty days, but a condition in which the examiner feels that he will again resume his usual or limited occupation.

Fractures, dislocations, sacro-iliac joint, fracture of vertebrae, diseases of the bone such as osteomyelitis, periostitis, and amputations are included in this class. One or both arches of foot touching the floor with no eversion of the foot.

Fifth class. Marked disability. The class in judgment of examiner precludes further work. Permanent disability such as amputation of legs, arms, dislocation of hips in which proper reduction is impossible, arthritis deformans, chronic laxation, marked contractures are included in this class. One or both arches touching the floor with eversion in which feet are responsible for inability for further work.

The testing of movements of extremities is important and often assists the examiner in obtaining clues to other doubtful points of interest in connection with the examination. Impairments in movements of joints are often responsible for inefficiency as well as causes for frequent accidents.

The following general movements of the body have been adopted for the examiner's guidance.

1. Standing straight, bending forward touching floor without bending knees.
2. Bending backward.
3. Standing erect, pivoting head on shoulders.
4. Standing on right leg, swinging left leg forward and backward

to maximum extent, bending knee, turning ankle all directions.
5. Same way with the other leg.
6. Flexion and extension of arms and forearms, wrists.
7. Abnormalities of bones.
8. Enlarged or tender joints.
9. Observe masculature and its relation to any subnormal condition of the body.

Ratings. Keep in mind occupation. An individual with anatomical or functional abnormalities may cause accidents and should be placed accordingly.

Feet. In classification of the feet one must consider two separate and yet interlocking factors; namely, anatomical structure of the foot and functional capacity. Many an individual comes into the doctor's office complaining of tired feet, pains and aches of lower extremities, etc. An exhaustive study reveals perfect anatomical structures and yet the individual is partially or entirely unable to do strenuous manual labor.

During the war the Government emphasized flat feet as a disability from the anatomical structure alone. Many of these men never knew before that they had abnormal feet and were capable of doing the usual amount of work. The Government used as a basis of classification three degrees of flat feet, depending on whether or not there was sagging of the arches. From the anatomical standpoint we know of nothing better than to adopt their plan of classification.

The degree of functional disturbance depends upon mobility of joints and amount of discomfort that the individual complains of. In connection with the functional disturbance one must consider previous accidents and diseases.

A fractured tibia or fibula, or any of the bones of the foot in which there has been poor apposition of the bones causing strain or pressure of abnormal structures. Strain or sprain of feet, effects of ill-fitting shoes, improper heels, Morton's disease, a painful heel due to gouty deposits in the deep fascia of the sole, a spur (often gonorrheal) from the lower side of the os calcis, bursa beneath the tendo Achillis, periostitis syphilitic or otherwise, chronic arthritis, infantile paralysis, muscular paralysis, transmutism are a few of the conditions to bear in mind when considering the functional capacity of feet.

Means of measuring degree of anatomical flat feet.
1. Inspection when standing on flat surface observing the sagging of the arches.
2. Standing on smoked paper.
3. First putting feet in water and then standing on black surface.

One of the perplexing problems facing the industrial physician in recent years is the traumatic foot. He observes proper apposition of fractured bones and normal time for recovery and yet the individual complains of varied degrees of discomfort. No physician can justly deny the complaints, no insurance company refuses to pay compensation.

Some means of measuring functional flat feet.
1. History of discomforts.
2. Position of body.
   (a) Standing on toes.

(b) Standing on heels.
(c) Standing first on lateral, then median sides of foot.
(d) Manual manipulation of foot.

RECTUM

Abnormal conditions of the rectum are included in the same class as teeth and tonsils as foci of infection causing many of the common human ills.

Have examinee in knee chest or suitable position for thorough examination.

Classification

First class. No evidence or history of past or present abnormalities or diseases of the rectal region.

Second class. Evidence of past diseases of the rectum showing full recovery. Rectal tags, small amount of eczema or suspected haemorrhoids with no apparent functional disturbance is included in this class.

Third class.
(a) Usual employment.
(b) Limited employment.
(c) Temporary lay-off of not more than thirty days to promote recovery.

Evidence of acute or chronic rectal conditions, such as bleeding piles, external or internal non-bleeding piles, giving evidence of possible foci or infection; fistula, abscess, fissure, than more small amount of eczema, prolapse of rectum, rectal polyp, stricture of rectum, or small non-malignant tumor. All of the above showing beginning degeneration or functional disturbance are included in this class. An operation for rectal diseases within one year from date of examination.

Fourth class. Severe bleeding piles, causing extreme weakness, anemia and infection from rectal conditions, incapacitating individual from work for more than thirty days, but with proper care the examiner feels that the employee will be able to resume same or limited work.

Abscess, fistula-in-ano, fissure, tumor, stricture, chancre or condylomata, specific proctitis, requiring surgical or medical treatment.

Fifth class. Cancer of rectum or any diseased condition of the rectum where this examiner feels that proper treatment will not restore health of the individual sufficiently to resume same or limited occupation.

Injury to the rectum is more serious than we ordinarily think it to be, not only because of perforation, which may set up a peritonitis but because of abrasions which become infected so easily. Injury to the rectum is ably discussed by Madelung[6] supplementing an analysis of 276 cases. Peritonitis caused the death of 82, early death was observed in 29 within 24 hours of the injury. The intestinal tract was damaged in 17 cases.

Hemorrhoids (piles). Tumors in the rectum due to enlarged veins and connective tissue. The main causative factor is constipation and purgation. The tendency in those having piles is that the piles gradually become

[6] Madelung, O. W.: Archiv. f. klin. crirurg., 137–1 (1925).

worse. Piles leads to abscess, and abscess leads to fistula. Bleeding often causes anemia and anemia which often predisposes to further rectal trouble such as infection and ulceration.

Abscess. About one rectal complaint in four is due to abscess. From the industrial surgeon's standpoint, contusions and injuries of rectum predispose more to abscessed condition than any other rectal condition.

The four main factors causing rectal proctitis are, syphilis, gonorrhoea, chancroidal ulceration and tuberculosis.

About 5 per cent of all malignant tumors are in the rectum. An employee with a malignant tumor should be precluded from further employment. Average length of life, postoperative of 102 patients at the Mayo Clinic, was only 1.47 years. (MacCarty)[7]

PROSTATE

The prostate, an accessory sexual organ in males, surrounds the urethra for about one inch as it emerges from the bladder.

Ratings

First class. Normal.

Second class. Past history of prostatic trouble or an operation for disease prostate, either of which has cleared up and has been normal for at least one year. Tenderness, small amount of enlargement, no discomforts.

Third class. Impairments.

(a) Usual occupation.

(b) Limited occupation.

(c) Temporary lay-off of not more than thirty days to promote recovery.

Noticeable enlargement, discomforts, beginning interference with urination. Small amount of pus or blood in urine that can be traced to this gland as its origin. An operation for prostatic disease within one year from date of examination.

Fourth class. Moderate disability. An extended lay off of more than thirty days, but where examiner feels usual treatment will allow individual to return to former or limited employment. Greatly enlarged prostate, very tender, considerable discomfort upon urination, with or without pus and blood in the urine traceable to disease of this gland.

Fifth class. Marked disability. Cancer, or any disease of the prostate, where examiner feels due treatment and rest will never enable examinee to return to further employment.

Medical literature on diseases of the prostate, cites that 75 per cent to 80 per cent of acute cases of prostatitis are venereal in origin. But there is no evidence to support the view that hypertrophy (overgrowth) of the prostate is due to acute or chronic prostatitis. One third of men who attain 55 years of life have enlarged prostates, but fortunately, not more than 5 per cent ever suffer symptoms. A rectal examination should be made on all suspicious cases of prostatic involvement, and all employees after the age of 40 years.

[7] MacCarty, W. C.: Ann. Surg., 76–9 (1922).

ABNORMALITIES

Abnormalities are of two kinds, congenital and acquired.

No attempt is made by the author to classify abnormalities. It is left up to the examiner to determine the relation of abnormalities to functional capacity, and thereby determine proper classification.

KIDNEYS

Ratings

First class. Negative to albumen.

Second class. Small amount of albumen and where no kidney or urinary pathology is in evidence.

Third class. Impairment.

(a) Usual occupation.

(b) Limited occupation.

(c) Temporary lay-off, requiring not more than thirty days for correction genito-urinary irregularities.

Microscopical examinations reveal the significance of the urinary irregularities and from it the examiner must determine the disposition of the employee, having first in mind the interest of the employee in preference to the employer.

Cystitis and mild nephritic involvements are included in this class.

Fourth class. Moderate disability.

Where microscopical examination reveals degeneration of the kidneys or urinary tract, and it is advisable to stop work, but with usual treatment will be able to again resume limited or usual occupation.

Acute nephritis and beginning Bright's disease are included in this class.

Fifth class. Marked disability.

Where the microscopical examination reveals degeneration of kidneys or urinary tract and the examiner feels that with usual treatment the employee will not be able to resume his work.

Chronic interstitial nephritis (Bright's disease), tuberculosis of the kidney, and inoperable tumors of kidneys or urinary tract are included in this class.

Urine analysis

The appearance of albumen in the urine may be due to one or more of many different causes. These may be classified as follows:[8]

1. A symptom of nephritis.
2. Accidental albuminuria.
   (a) Dietary (alimentary).
   (b) Chilling of the body.
   (c) Unexplained (frequent focal infections).
3. Accidental albuminuria:
   (a) Cold baths.
   (b) Menstruation.
   (c) Athletic or other physical strain.
   (d) Cardiac weakness.
   (e) Irritation in some part of the urinary tract.
   (f) Hypertension.
4. Orthostatic (lordotoc, cyclic, adolescent).

Give the usual test for albumen in the urine, with either the heat or nitric acid test, be sure that test used to eliminate phosphates with 5 per cent acetic acid is used. If albumen pres-

[8] Hand Book of Therapy, Osborne and Fishbein, American Medical Association, 1923.

ent use microscope and if possible determine cause.

Albumen is a finding in 5 per cent of healthy individuals. So Captain Hugh McLean[9] found in examinations of 50,000 recruits for the British army. Medical literature cites that 5 per cent of albumen found in urinary examinations is physiologically due to overeating, overexercising, etc.

Glycosuria (excess sugar in the urine)
Ratings

First class. Negative to test for sugar in urine.

Second class. Sugar in urine but of no pathological significance.

Third class. Beginning disability or degeneration.
(a) Usual occupation.
(b) Limited occupation.
(c) Temporary lay-off, requiring not more than thirty days for correction of the factors causing the glycosuria.
Beginning diabetes mellitus, and Nos. 3 and 4.

Fourth class. Moderate amount of disability. Advanced cases of Nos. 1, 3 and 4.

Fifth class. Advanced cases of Nos. 1, 3 and 4.

If examiner is under treatment of insulin a true test of functional pancreatic disturbance is impossible. Ascertain, how long under treatment and amount of insulin taken.

The finding of a positive test with Fehlings' or Haines' solutions does not necessarily denote diabetes mellitus. There are other factors causing an excess of sugar in the urine, when possibly a test for the amount of sugar in the blood aids materially in the diagnosis of the case.

Glycosuria, according to Dinmans' investigation, may be considered under the following heads:

1. Diabetic; increased amount of sugar in blood and urine.
2. Alimentary glycosuria follows sudden excesses of sugar digestion occurring in individuals of obese type where the liver is already over-stocked with glycogen. Usually transitory and of little significance.
3. Endocrine glycosuria, due to thyroid or pituitary disturbances.
4. Cerebral glycosuria, may also be endocrine affair because of trauma, tumor or hemorrhage affecting the pituitary gland.
5. Drugs; chloroform, chloral, amyl nitrate, caffein, and carbon monoxide.
6. Renal glycosuria, excess sugar in urine without excess sugar in blood, probably due to a congenital abnormality. A renal glycosuria must answer the following tests as stated by Joslin[10]
   (1) Blood sugar at .11 per cent or less when glycosuria is present.
   (2) Urine sugar independent of carbohydrate in the diet.
   (3) Non-progressive character as shown by observation for years rather than weeks or months.

[9] McLean, Captain Hugh: Brit. Med. JI. 1-94, 91919.

[10] Joslin, E. P.: Boston Med. and Surg. JI. 186-833 (1922).

FEMALE GENITALIA

In a woman no internal or external vaginal examination need be made unless there is a history of symptoms such as irregular or excessive menstrual flow, abnormal discharge from the vagina, marked dysmenorrhoea or uterine discomfort. These conditions may in some cases necessitate a visual and manual examination of the vaginal tract to determine the condition of the cervix and fundus of the uterus and of the adnexa. It is of interest to note that 85 per cent of a group of college girls suffered from dysmenorrhoea, irregular menses, menorrhagia or reflex disturbances such as sick headaches, while only 49 per cent of a group of department store employees were so afflicted.

In most industries where a great many women are employed a woman physician has charge of their health and can usually obtain better information as to female irregularities. The same careful examination should be made of the women as of the men, especially at the time of the pre-employment examination.

On the chart where classifications are recorded opposite the different organs Nos. 22 and 23 are left blank. An examiner may choose to utilize one of these blanks to record a certain common irregularity among women.

VI. Practical Applications of the Completed Chart

The Employee's Health Card is a suggestion that may be used to good advantage in many ways. It requires but little time on the part of the department to complete it. It gives to the employee either a certain amount of security and confidence pertaining to his clasification or gives him an incentive to "straighten his health line." He can carry the health card with him and it can be made use of as a means of introduction in seeking employment elsewhere and at the same time gives the employment manager an index as to his physical condition.

EMPLOYEE'S HEALTH CARD (front side)

ANNUAL HEALTH CARD

John Henry Richardson

Zanesville, Ohio. 20 4th St.

Age. 35 Wt. 156 Ht. 70 in.

Occupation. Mechanic

Classification. 2

(back side of card two times normal length)

	1	2	3a	3b	3c	4	5
Past history	✓						
Vision	✓	✓					
Hearing	✓						
Nose and sinuses	✓						
Teeth	✓	✓					
Tonsils	✓						
Thyroid	✓						
Lungs	✓						
Heart	✓						
Arteries and veins	✓						
Blood pressure		✓					
Abdomen	✓						
Genitalia	✓						
Nervous system	✓						
Lymphatic system	✓						
Hernia	✓						
Skin	✓						
Bony system	✓						
Rectum	✓						
Abnormalities	✓						
Laboratory, urine, etc							
Physical Rating	1	2	3a	3b	3c	4	5
Occupational Rating	1		2		3	4	

Remarks. R: 20/24; L: 20/50. Badly infected gums and teeth. Systolic 148, Diastolic 90

Signature John Henry Richardson

Dr. William A. Coe

Address: Philo, Ohio Date: 9/19/30

"Straighten your health line."

Name.....No.....

There is apparently evidence of impairment of.....

.....

.....

The Examiner suggests that you consult your (Physician, Dentist or Oculist). Within three months report to your foreman regarding efforts made in having corrections made as suggested above. If you have complied with the above give your foreman your doctors report.

Dr.....Date.....Sign.....

(Book of blank forms with original and two carbon copies. The original is given to the employee, one copy sent to the employment manager and one copy kept on file in the medical department.)

After completion of the examination the Examiner will have the employee sign the above, explaining to him its significance.