"THE SOLDIER'S HEART."

BY COLONEL R. J. S. SIMPSON, C.M.G.

What's this, good doctor, that you say I've got?—
An "intermittent pulse"? Lor! that sounds bad;
But what exactly is it? Kind of dot-
And-carry-one affair? I say, that's sad!
You mean it merely drops a beat or so,
A sort of syncopated pit-a-pat?
But, my dear fellow, surely you must know
That's good old rag-time! Oh, I don't mind that!

PUNCH.

(1) Rather more than three years ago, before the United Service's Medical Society, a discussion on "The Soldier's Heart" was opened by Dr. Pembrey and myself,¹ when the results were given of a series of observations on patients sent into the Queen Alexandra Military Hospital diagnosed D.A.H.² Our object then was to ascertain the general symptoms which resulted in this diagnosis, and to find out whether any basic lesion existed.

² D.A.H. is a contraction for Disordered Action of Heart.
"The Soldier's Heart"

(2) Soon after taking over charge of the Medical Division of the Royal Herbert Hospital, it became obvious that a favourable opportunity presented itself for further observations of the same type of disorder. But, instead of limiting observations to those cases which were already marked down as the subjects of cardiac disorder, the opportunity was taken to examine every case which presented symptoms which might possibly be attributed to cardiac disease, functional or organic. Experience soon showed that it was advisable to examine cases of certain acute diseases, especially during their convalescence, and also to pay more attention to other systems of the body than had previously been the case.

(3) As the material has been drawn almost exclusively from the garrison of Woolwich, certain characteristics must be referred to.

(a) The Distribution of the Strength by Age and Service.—Figures are only available up to 1906, when the strengths ceased to be given under these headings. Between 1890 and 1906 the distribution of the population was thus:

<table>
<thead>
<tr>
<th>Age Group</th>
<th>By age</th>
<th>By service</th>
</tr>
</thead>
<tbody>
<tr>
<td>Under 20</td>
<td>325</td>
<td>331</td>
</tr>
<tr>
<td>20–25</td>
<td>363</td>
<td></td>
</tr>
<tr>
<td>25–30</td>
<td>163</td>
<td>90</td>
</tr>
<tr>
<td>30–35</td>
<td>72</td>
<td>70</td>
</tr>
<tr>
<td>35–40</td>
<td>46</td>
<td>55</td>
</tr>
<tr>
<td>40 and over</td>
<td>23</td>
<td>125</td>
</tr>
</tbody>
</table>

That is: 70 per cent were under 25 years of age, and 76 per cent had under five years' service.

There is no reason to believe that any material change has occurred in these proportions, and one may, without much error, take them as representing a standard population. Of the cases to be compared with the strengths, sixteen years' records are concurrent with the strengths, it is only the last six years for which actual strengths are not available. It only remains to add that the age group "Under 20" includes a large proportion of lads from 14 upwards. The total strength of the garrison is rather over 5,000.

(b) Sore Throat and Tonsillitis are very prevalent: rheumatic fever is also prevalent, but not usually of a severe type.

From these two factors it follows that opportunity is given for studying not only the defects in recruits which originated before enlistment, or developed during their training, but also the after effects of the diseases mentioned.
R. J. S. Simpson

(4) **The Relative Incidence of Organic and Functional Disorders at Different Ages and Periods of Service.**

(a) **Actuals.**—The following table shows the actual number of invalids from the Woolwich garrison during the period 1890 to 1912 who were discharged with more than three months’ service. The number of invalids is a better criterion than the number of admissions; for one thing, all duplicate admissions are eliminated. To complete the record, the number of recruits discharged under three months’ service should also be added, but material was not available; few of these cases, if any, have contracted the disability in the Service.

<table>
<thead>
<tr>
<th>TABLE A.—Invalids from the Woolwich Garrison from 1890 to 1912, both inclusive.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>By Age.</strong></td>
</tr>
<tr>
<td>V.D.H.</td>
</tr>
<tr>
<td>D.A.H.</td>
</tr>
<tr>
<td><strong>Totals</strong></td>
</tr>
</tbody>
</table>

| **By Service.** | ... | ... | ... | ... | ... | ... | ... |
| V.D.H. | 94 | 53 | 31 | 19 | 14 | 28 | 16 | 14 | 5 | 274 |
| D.A.H. | 17 | 14 | 12 | 6 | 5 | 6 | 5 | 1 | 66 |
| **Totals** | 111 | 67 | 43 | 25 | 19 | 34 | 21 | 15 | 5 | 340 |

*V.D.H. is a contraction for Valvular Disease of the Heart.*

(b) **Ratios.**—The totals are hardly large enough, especially those of D.A.H., to give accurate results, hence, instead of giving the ratios per mille, it has seemed better to plot out the percentages of strength of the standard population and total cases by periods of service, as has been done in the diagram on page 4. This prevents too much stress being laid on inaccurate numerical ratios.

The diagram deals only with periods of service. In each section the dotted diagonal line shows what the incidence would be if there were no selective influence, if each service group was as liable to these disorders as any other. The crosses show the incidence in each group: vertical distance above the base shows the proportion of total cases, horizontal distance from the left margin shows that of total population. Hence crosses above the line show an increased relative incidence; below the line, a decrease.

Dealing first with V.D.H., it is obvious that selective influence is not very marked: in the first quinquennium, the second year of
service shows a smaller and the third a greater incidence than the other years. This last may be purely artificial: as Colonel Melville pointed out, the examination of men for foreign service at this time results in the detection of cases that have previously escaped. The second quinquennium shows a somewhat smaller incidence. But broadly, the figures do not suggest any important selective influence.

If we turn from the invaliding to the mortality, we find different conditions. The following table shows deaths against invalids for V.D.H., both by periods of service:

<table>
<thead>
<tr>
<th>Invalids</th>
<th>94</th>
<th>53</th>
<th>31</th>
<th>19</th>
<th>14</th>
<th>28</th>
<th>16</th>
<th>14</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Deaths</td>
<td>3</td>
<td>1</td>
<td>3</td>
<td>—</td>
<td>1</td>
<td>5</td>
<td>3</td>
<td>5</td>
<td>2</td>
</tr>
</tbody>
</table>

Here we have a very different picture: after the first quinquennium, the conditions diagnosed as V.D.H. are very much more important than at earlier periods. To complete the record two deaths from pericarditis have to be added to those in the first two years of service, one from malignant endocarditis in the group 5—10, five deaths in the group 15—20, and two in the group over 20, all from aneurism. The probable explanation is that the deaths in the earlier years are the direct and immediate result of acute cardiac disease complicating rheumatic fever, while those at later periods are less immediately related, if at all, to this particular infection.
Returning again to the diagram, D.A.H. shows a marked selective influence. Neglecting cases discharged under three months’ service, in the first two years of service it is low, in the third it is definitely higher. The actual number of cases (66) is so small that perhaps that is all that can be said. There is considerable doubt as to the accuracy of the rise shown in the third year, for reasons given above. But the question has to be considered. Two other factors may be effective, the training of the recruit and young soldier, and the influence of acute disease. These will be considered later.

(5) Method of Examination.

(i) Detailed record of the previous history and of subjective symptoms.

(ii) Record of pulse-rate and accommodation

\[ \begin{align*}
(a) & \quad \text{In bed, after resting some time.} \\
(b) & \quad \text{Standing.} \\
(c) & \quad \text{After a smart walk for two minutes.}
\end{align*} \]

Pulse recorded for every quarter minute.

(iii) Blood-pressure recorded in the same sequence and at the same time.

(iv) Examination of the cardiac area in the usual way, but auscultation carried out with the patient at rest and also erect.

(v) Radial and jugular tracings taken with Mackenzie’s small polygraph.

(vi) In some cases the patient is screened or photographed.

(i) History.—Facts to be recorded.

(a) Disease.

<table>
<thead>
<tr>
<th>Disease</th>
<th>A. Before.</th>
<th>B. After enlistment.</th>
</tr>
</thead>
<tbody>
<tr>
<td>None</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Acute</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Chronic</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

(b) Ability to work or play games.

<table>
<thead>
<tr>
<th>Ability</th>
<th>A. Before.</th>
<th>B. After enlistment.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Normal</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Diminished</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

It may be said at once that in a good many cases the history shows that the patient has never been able to do a good day’s work, and that in a certain number of cases this disability was the direct cause of the patient’s enlistment in the hope of finding an easier job. The history is important not only in relation to the

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1 The distribution of over 5,000 cases given by Lieutenant-Colonel R. J. C. Cotell (Journal of the Royal Army Medical Corps, vol. x, pp. 460 et seq.) shows much the same features as this local distribution.
causation of the disability from which the patient suffers, but as a help in deciding on the course to be pursued with the more doubtful cases. It also shows that much of the blame laid on the conditions under which the soldier works is unjust, as the disability existed before enlistment.

(ii) Pulse-rate.—The impossibility of fixing on a normal pulse-rate appears to be now generally recognized, and the tendency is to accept comparatively wide variations from the usual (70) as consistent with perfect health. A standard position, say erect, must be postulated. In the Journal of the Royal Army Medical Corps, January, 1907, Major (now Lieutenant-Colonel and Brevet-Colonel) F. Smith, D.S.O., gives pulse-rates for some 98 recruits in three series, which show some peculiarities in distribution.

<table>
<thead>
<tr>
<th>Pulse-rate</th>
<th>61—70</th>
<th>71—80</th>
<th>81—90</th>
<th>91—100</th>
<th>101—110</th>
<th>111—120</th>
<th>121—130</th>
<th>131 and over</th>
</tr>
</thead>
<tbody>
<tr>
<td>2nd Series</td>
<td>1</td>
<td>7</td>
<td>4</td>
<td>2</td>
<td>1</td>
<td>6</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>3rd ,,</td>
<td>3</td>
<td>10</td>
<td>12</td>
<td>12</td>
<td>3</td>
<td>5</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>4th ,,</td>
<td>5</td>
<td>8</td>
<td>6</td>
<td>—</td>
<td>1</td>
<td>4</td>
<td>1</td>
<td>—</td>
</tr>
<tr>
<td>Totals</td>
<td>9</td>
<td>25</td>
<td>22</td>
<td>14</td>
<td>5</td>
<td>16</td>
<td>4</td>
<td>4</td>
</tr>
</tbody>
</table>

Series 2 and 3 were recruits; series 4, recruits after six months' gymnastics.

As far as these figures go they show a preponderance of pulse-rates under 100. They suggest that a pulse-rate not over 100 may, under the conditions under which the recruit is examined, be accepted without any suspicion as to his fitness arising from that one fact. On the other hand, the cases outlined in abstract show that a slow pulse-rate does not exclude either functional or organic disease.

Absolute pulse-rates have been neglected in the series of cases under review, and as a matter of fact pulse-rates over 90 taken at rest have been exceedingly rare. What is much more useful than the actual pulse-rate, and always to be observed, is the degree of accommodation, the variations due to position or exercise, and the rapidity with which the original rate is reverted to. Here, again, it is the relation of the increase to the original rate that is important. A smart walk for two minutes affords a useful standard of work; in some cases it is enough to produce a definite effect on the respiration.

(iii) Blood-pressure observations have not been found as important in this series and have been less regularly made.

(iv) As regards clinical examinations, experience has shown that the primary examination at the inspection room is not infrequently imperfect. The failure to recognize the actual conditions arises usually from the mode of examination. It is not possible to get satisfactory results from the examination of a man erect, probably holding his shirt up, while his muscles are tense and his chest thrown forward. The man must be stripped and, in the first instance, recumbent before either auscultation or percussion can be carried out with any hope of accurate results. Auscultation in the erect position is also necessary, but care must be taken that the man is standing quite loosely, a matter that usually requires some special attention. In the clinical examination in the wards, there is certainly a tendency to rely too much on the results of auscultation and palpation alone, and the area of dullness is not systematically mapped out. Such a procedure must frequently lead to errors. Recent work shows that the real meaning of variations in the area of dullness is not, however, always as obvious as the older teaching led one to believe. Errors are usually in excess; that is, the severity of the case is more often over-estimated than not, except that it is surprising to find so many recruits passed with loud murmurs.

(v) A large collection of radial and jugular tracings has now been accumulated. To get these requires considerable patience and a good deal of time; their measurement also is a slow process. It is possible to obtain a jugular trace in nearly every case; naturally they vary in amplitude, but it is only rarely (even in healthy men) that it is not possible to get a tracing that can be read. From the type of case that has been most under observation it follows that the majority of these traces are broadly normal, the components and rhythm of the curves fall within the normal range; each case, however, is distinctly individual.

Certain precautions have to be taken before the trace can be accepted as valid evidence, and experience seems to show that, like some other methods of diagnosis, this is useful only where the observer has considerable practice in the manipulation of the instrument, and in reading the tracing.

It seems quite clear that all types of functional derangement of the heart's action, however diverse in origin, show one peculiarity in the jugular curve of maximum oscillation, which consists in an exaggeration of all positive and negative waves without any abnormality in the sequence of the components or in the rhythm. These variations in amplitude are quite independent of the
pulse-rate, and the condition is not associated with a similar exaggeration in the radial pulse curve; on the contrary, the radial pulse is more inclined to show only small oscillations as it tends to be small in volume, and care must be taken that the pressure on the vessels is not too great. In relation to the occurrence of these large pressure variations in the jugular trace, attention may be called to the article by Dr. A. M. Gossage (Proceedings of the Royal Society of Medicine, vol. i, Medical Section, p. 253) on "The Tone of Cardiac Muscle." He points out that in a dilated heart where relaxation is obviously greater than in the normal, excitability is increased, manifested by the increased pulse-rate, and contractility is also probably increased.

In practice this type of trace has only been found in cases where the symptoms and physical signs would lead to a diagnosis of functional derangement only, and if the observer has sufficient confidence in the accuracy of his results, it would appear to be a useful indication of the actual conditions.

Respiratory effects (sinus arrhythmia) may be so prominent as to necessitate a separate respiratory trace for comparison before forming an opinion.

It is, of course, not usually possible in our hospitals to make pressure observations or take tracings. But, however interesting these may be in relation to the true nature of the condition, they are not necessary for accurate diagnosis. Careful clinical examination on the lines indicated, together with a detailed history, will give quite enough information to enable an accurate diagnosis to be made. (See "Clinical Disorders of the Heart Beat," Dr. T. Lewis.)

Experience lasting now over five years has shown that the diagnosis of functional derangement is not to be made in a few minutes; a casual examination on one occasion will not permit of any opinion of value being formed as to the condition, and still less as to the causation.

(vi) X-ray examination with the screen is particularly useful in those cases where it is difficult to recognize the left border by percussion. It also reveals any tilting of the heart, and in thin chests the whole process of contraction of the different chambers can be observed.

(6) Symptoms.

There are three ways in which a man arrives in the hospital ward: (i) He reports sick of his own initiative; (ii) he is sent
sick from his unit because he is not able to carry out the prescribed exercises; (iii) some disability is discovered at medical inspection. These three modes correspond roughly to the degree of severity of the symptoms, but the first two overlap to some extent, as one man will try to carry on in spite of symptoms which send another sick at once. Further, young men with murmurs and perhaps some enlargement do not report sick; practically all the cases seen have been detected at some medical examination, that is, they have no symptoms.

(i) The man who reports sick of his own initiative usually complains of dyspnoea on exertion (almost universally), of "pain in the chest" (not frequent), or "round the heart" (more common). There is a distinction between these two sets of pains. "Pain in the chest" is not infrequently over the left upper lobe of the lung, or spreading downwards from above the left clavicle. The other common site is at the xiphoid notch, on the left side.

The etiology of these pains is obscure, but they are not always connected with any cardiac condition. Some are certainly associated with a slight bronchitis, others with dyspepsia. Somewhat late in the series of observations it was found necessary to pay considerable attention to chest expansion, and it was found that these pains in the chest were frequent in cases where chest expansion was difficult and deficient. It is quite possible that in some cases they are simply due to unaccustomed exercise.

Pains round the heart are described by Max Herz as distinctive of a cardiac neurosis (see later). In no case have they been found of any severity: they appear to be rather sensations of discomfort than actual pain. They do not keep the patient awake, and bear no constant relation to exercise: sometimes they are relieved, sometimes exaggerated; occasionally they are more distinct after food. They are more frequent in the cases of persistent functional derangement than in the milder type, and do not occur in the cases with loud murmurs which we call V.D.H. One man complained of a stabbing, stitch-like pain over the apex; in another there was, according to the patient's statements, a pseudo-angina. Dyspnoea on exertion is the most important symptom, both from its frequency, and as throwing some light on the etiology of certain conditions. We are now obsessed by the one idea of D.A.H., and so when a man complains of dyspnoea on exertion with a rapid pulse, we are inclined to the conclusion that the case is certainly of cardiac origin. But as a matter of fact, in many of these cases, if examined generally, it will be found that the upper part of the
chest is flat, almost immobile, with very limited expansion and
deficient air entry. It is very difficult to get these men to fill their
chests, they do not appear to have learned to breathe. Prof.
A. Keith has shown ("Further Advances in Physiology") that the
mechanism of respiration as affecting the upper lobes is quite
different from that in the lower lobes: the five upper ribs are alone
concerned in the former. It is then doubtful how far the expansion,
as measured by the usual method, is any indication of the
expansion over the upper lobes. In many cases there is fairly free
movement of the lower thorax in spite of the rigidity of the upper
part.

Now in some of these cases, this deficient expansion has been
found to be associated with chronic nasal obstruction, and there is
no reasonable doubt that the same condition existed in others of
the same type, though it was not definitely proved. Here, of
course, the dyspnoea is primary and respiratory in origin, the cardiac
symptoms are secondary. One has also to exclude early cases of
tubercle, and cases of a chronic fibroid condition of the apex.

In the more persistent cases, dyspnoea is not constant: it varies
from time to time like the cardiac symptoms generally. It appears
to be commoner after doubling than after any other form of
exercise, an example of the rule that different forms of exertion
have varying results on respiration and cardiac action. It may
also follow a mental, or rather psychical stimulus without physical
exertion.

_Sighing respiration_ is not infrequent, but the "catch of the
breath" described by Herz has only been observed in a few cases.

(ii) The man sent from his unit presents symptoms much of
the same type, but on the whole less severe: Cases of fainting, on
or off parade, also arrive in this way: they are of a different type.

(iii) The man sent from medical inspection is in many ways
more interesting. He may have been under observation on
account of the type of symptoms in (i) and (ii), or he may have
been detected at a routine examination without having made any
complaint of disability, or without being aware that anything was
abnormal in his condition. It is among these men that what we
are accustomed to call serious organic disease is found. Here, of
course, are excluded cases subsequent to recent rheumatic fever,
or among older men with failing hearts.

(7) The classification of cases by symptoms is almost impos-
sible, and no accurate division is possible. But there are two main
groups distinguished by their response to treatment.
Types of Irritable Hearts.

(A) Those which respond to treatment.
   (i) Within a few days.
   (ii) Within, say, three weeks.

(B) Those which do not respond.
   (iii) Apparently permanent, but without obvious organic lesion.
   (iv) Where some organic lesion exists.

(A) (i) These are cases, nearly always in lads of short service, of a purely temporary disturbance, usually in the direction of excited action alone, with loud sounds but without any other symptoms. Accommodation is good, and the jugular tracing is normal in rhythm and composition, though the pressure variations are usually exaggerated till the excited action has ceased. Sinus arrhythmia is common when the pulse slows down. These cases do not return to hospital. It is generally impossible to form any accurate idea of the cause; the history is usually good. Probably they are due to slight overstrain, and it must be remembered that between the ages of 14 and 21 the heart responds to very slight stimuli.

   It is now recognized that full cardiac, in proportion to bodily, development may not be complete before 20 years of age, and that in some cases the heart remains permanently small. The whole of the later work on the heart shows that the standard measurements which have been accepted for diagnostic purposes are in fact extremely variable, especially during adolescence. These physical variations can be met by careful management of each recruit during his training according to his capacity, a method which is now carried out at the better depots, and should be universal. It is also possible that the general effects of the change from civil to military life may play a part in the production of these conditions. One is apt to overlook the magnitude of this change. Two most important elements are the coming under discipline and the increased food, both most marked among the poorer classes.

(A) (ii) In these cases the symptoms are more marked; cardiac excitability is very distinct and more persistent; accommodation is not good. Dyspnoea may appear after a short walk. There may also be some dilatation of the left ventricle, with perhaps a soft blowing systolic murmur, which is either completely limited to the region of the apex beat (which may be diffused), or may be over the base, or again soft murmurs may appear at one valve after
another in quick succession on consecutive days. Most of these symptoms are included by Dr. James Mackenzie among the "Manifestations of a Healthy Heart in the Young frequently taken as Indications for Treatment" (British Medical Journal, December 21, 1912, p. 1697). The jugular trace shows well-marked pressure variations; sinus arrhythmia is common with the less rapid pulse-rate, and the radial trace may be small and indefinite in outline in the worst cases. Vasomotor symptoms are not infrequently prominent.

In this group the symptoms vary greatly in severity, and in the worst cases it is difficult to form a very decided opinion as to their ultimate fitness for service. The degree of response to treatment is, of course, most important, but the decisive element seems to be the history. If this shows an inability for steady work or for active games prior to enlistment (it is possible to distinguish between a disinclination and a disability), or if the patient has been sent back to duty and the symptoms return, it hardly seems worth while retaining him in the Service. This group merges at its greatest severity into group B.

This type is not at all uncommon during convalescence from tonsillitis and influenza, or even sore throat. There appears to be no relation between the severity of the original disease and of the consequent condition. Among invalids from abroad suffering from the effects of malaria, enteric, and especially Malta fever, disturbances of this type are not at all uncommon. But they do not then merit a special designation. It is also quite easy to produce this condition by retaining a patient in hospital on a full diet without exercise or effective distraction. More attention should be paid to the convalescence after sore throat and tonsillitis. A young recruit is hardly fit for his duties immediately after resolution of the local affection.

(B) (iii) Cases without obvious cardiac lesion which do not respond to treatment. In this group, though the cardiac condition is always present, the patient perhaps less frequently complains of pains in the chest and dyspnoea as predominant symptoms. As a rule he complains more of inability to do his work, of fatigue after slight exertion, and sometimes of palpitation. Giddiness or a feeling of faintness is occasionally present, but an actual faint has not been recorded. A careful examination into his previous history shows that he has, in nearly every case, never been able to continue at any work involving long hours or considerable bodily or mental strain. Often he has tried several kinds of work without any
improvement. He has given up any exercise he may have taken, or has never been able for it. The majority of these cases happen to have been in town-bred lads, but the same condition has been found among ploughmen, farm and other rural labourers. It is in this group almost without exception that the cases of irritable heart among the older men are found, and in some instances a definite beginning can be found, usually subsequent to harassing or excessive work.

In the observations made with Dr. Pembrey this type of case was dealt with, and, as was pointed out before the United Services Medical Society, there are certain typical symptoms which are predominantly vasomotor in origin. The variability in the pulse-rate and blood-pressure is also seen in the radial and jugular traces, but the actual shape of the wave does not repeat itself with that exactness from day to day which is found in the less severe cases; it is much more influenced by temporary, often psychical conditions, as seen very distinctly in one case where the patient was much affected by the sudden death of a patient in the same ward. It is in these cases that there is most variation in the symptoms from day to day; dyspnoea may be produced on one occasion by exercise that on another leaves the respiration normal; murmurs appear at the various valves and disappear with equal rapidity; there may be a dilatation of the left ventricle of short duration. Similarly the associated symptoms vary in intensity with equal frequency and irregularity.

In cases of this type the cardiac symptoms are only part of the general condition of nervous irritability, a condition which can be shown in many cases to have existed at least since the school age, and in others has first manifested itself where circumstances have depreciated the general health. In the older cases it is worth noting that bad teeth and extreme oral sepsis are usually to be observed.

This group of cases, not very large, is then incorrectly included among cardiac affections. They belong to the "X" disease of Dr. Mackenzie, perhaps more commonly termed neurasthenia. There are many references to these "cardiac neuroses." Max Herz (Wien. med. Woch., May 5, 1910) speaking of patients of 14 to 21 years of age, describes these cases as "phrenocardia," and points out that they depend on physical and psychical causes. Again (Wien. klin. Woch., No. 37) he calls attention to difficult, not rapid, respiration in these cases (due to hypertonus of the diaphragm) with sighing and a "catch in the breath," as
characteristic of "a sexual cardiac neurosis." Leo Hess (Wien. med. Woch., No. 27, 1911) points out that there are two types of cardiac neurosis, one recurrent during the course of any other neurosis, the other in which cardiac symptoms predominate and are persistent for years either at regular intervals or after exertion or excitement. These date back from childhood, or more frequently from between 15 to 20 years of age. Here, he states, there is a predisposition on the part of the heart and vasomotor system associated with late, or under development of the cardiac apparatus.

In English medical literature, on this question of neurosis, one may refer to Sir William Osler's "Medicine" among the textbooks, and to much that has appeared in the medical periodicals. One may, indeed, go back to Sir Thomas Watson, who, in his "Lectures on Physic" (Second Edition, 1845, vol. ii, p. 240), gives a very definite opinion that palpitation and irregularity may be mere functional disorders: "that they depend upon a peculiar and highly sensitive condition of the nervous system" . . . . "dependent, in general, upon a particular state of the vascular system."

All these cases require careful observation, not only as regards the nervous symptoms, but as regards the possible existence of true organic disease. Case 34 (among the Abstracts) is an example of this possibility. Among older men, nervous symptoms are not infrequently the earliest manifestation of organic disease.

In all these cases, the remote origin is an inherited neuropathic tendency; the determining cause may be strain, overwork, and other exhausting influences.

B (iv) Cases with supposed organic lesions.

Little need be said about these cases. The custom is to invalid men having murmurs, irrespective of the condition of the heart muscle, or the state of the ventricles. This naturally exaggerates the incidence of heart disease among soldiers, but the procedure is perhaps justifiable on the grounds that with a small army, there must be no suspicion of the fitness of every man; it, however, necessitates the rejection of men apparently capable of undergoing any exertion.

Here we are practically following the teaching of the older textbooks, whose formula is almost invariably murmur = disease, or at least, murmur plus dullness (greater than our standard) = disease. Our practice does not in fact differ from that which has obtained in civil life, but it has a definite result, either the rejection of a candidate or the invaliding of a soldier, and attention is therefore
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directed to these results. The only civil equivalents to these two are the rejection of an applicant for life insurance, or the weighting of the policy, and the rejection of candidates for certain services, and these results are seldom published. It would be interesting to know how many candidates rejected, or men invalided, on the grounds given above would be accepted by insurance companies as healthy lives. So far, it does not appear that modern doctrines have materially influenced the practice of the medical officers of insurance companies.

One point needs special mention, the disposal of men after an attack of rheumatic fever. It is now generally accepted that the cardiac muscle is involved in every attack of rheumatic fever, and indeed that in the young, a myocardial affection may occur without any marked symptom of rheumatic infection, perhaps only a temporary joint pain, growing pains, or a simple sore throat. In nearly all the cases of rheumatic fever observed here, dilatation occurred with a soft mitral murmur. The same was seen in a few cases of tonsillitis. In a good many of these cases, the condition clears up during early convalescence, and the patient is supposed to have made a good recovery. In a good many cases where this happy event did not occur, some patients otherwise in good health were ordered regular but graduated exercise while still in hospital; others were discharged to light work while reporting themselves periodically for examination. The result has been sufficiently good to suggest that it is worth while adopting some system of light work and supervision for these cases with residual symptoms, for a period sufficient to show whether they improve or not. In this way it is possible to save men who are now lost to the Service. Cases of definite endocarditis stand on a different footing.

(8) Notes on Some Symptoms.

During the last three years it has been possible to form some opinion on the views of the medical officers who first of all see these cases. Few seem to have any very definite ideas as to what constitutes an irregular pulse, or of its importance.

(a) Of the four common forms of irregular pulse, pulsus alternans has not been observed at all; that of auricular fibrillation only in one old civilian, not in Government employment. Those seen were (i) sinus arrhythmia, and (ii) extrasystoles.

(i) Sinus arrhythmia, or the "youthful variation" (Mackenzie), a variation in the length of diastole or in the amplitude of the
beats, usually associated with respiration, though not with any definite phase, can hardly be called pathological. It has been observed by Lieutenant-Colonel Deane in trained athletes (Journal of the Royal Army Medical Corps, vol. viii).

Dr. Mackenzie ("Diseases of the Heart") states that he has seen it in a considerable number of healthy individuals as well as in cases of "X" disease, and points out that after febrile conditions, especially in the young after recovery from rheumatic fever, it is of good omen, as it is never found where there is exhaustion of the heart muscle. Generally speaking, it is now accepted as a physiological phenomenon. It has been found frequently among the cases under review, and is common among young patients in hospital. Stress is laid here on this condition because experience has shown that it is frequently the only thing to be made out in patients sent up for irregular pulse. Its observation is therefore easy, and its nature should be recognized.

(ii) Extrasystoles: An occasional intercalated beat, often perceptible at the wrist, and always by auscultation. It is by no means uncommon, and of itself is of no significance. Dr. Lewis, however, points out that such irregularities should not be entirely neglected: that the case should be seen from time to time. It is most frequent in people in good health who never suffer from heart failure (Mackenzie). It can be produced with some regularity by recurrent dyspepsia, an involuntary experiment well described by Sir Thomas Watson in his "Lectures on Physic" (loc. cit.). Sometimes the subject is unaware of the abnormality. It has not been frequently observed among the younger cases. One interesting case, an old syphilitic patient with arteriosclerosis and tabes, showed persistent extrasystoles occurring every fourth beat, but disappearing when the pulse-rate rose as the result of large doses of potassium iodide. One senior N.C.O. was sent up for irregular pulse, which proved to be due to persistent extrasystoles, but nothing could be found wrong with his cardiac or arterial system. A third case is No. 33 in the Abstracts.

Dropped beats: Partial heart block has only been seen in one or two cases of acute rheumatism, where it was also measured in the jugular trace. It has also been noticed in at least one case of influenza during convalescence, but this was not confirmed by a jugular tracing.

(b) Fainting: Cases of fainting once or twice, usually in the morning, are not at all uncommon among lads. All the cases were carefully examined; none had any signs of even functional
disturbance. Heat, hunger, or overeating account for most of these cases.

Where there is a history of repeated attacks of fainting, often from boyhood, the case is different. In three cases the clinical history pointed to petit mal, and in two of these cases the signs of nervous instability, cardiac and general, were very marked. In one other case, the patient always fainted after any slight injury. In relation to these cases of repeated fainting fits, and indeed to the whole question of cardiac neurosis, attention is directed to an article by Dr. A. E. Russell (Proceedings of the Royal Society of Medicine, vol. i, Medical Section, p. 72) on the "Pathology of Epilepsy." He refers to "the hypersensitive vasomotor and cardio-regulatory apparatus" so characteristic of the worst type of functional irregularity, and to the importance of the condition of the skin and splanchnic area in relation to the circulation. The whole paper is extremely suggestive in relation to these functional derangements.

The "feeling of faintness" so often complained of by cases of the neurotic type appears to be definitely associated with some modification of the heart's action, but this change probably only expresses one result of the nervous strain which is expressed as a feeling of faintness. It was possible in one case to take a continuous trace from the apex beat (with the ink-writing polygraph), the patient standing up, while he became more and more tremulous, with cold and clammy hands, till he was compelled to sit down. The changes in rhythm and amplitude are very marked. The same thing has occurred in extreme cases while the patient was recumbent in bed. If one wishes to get the normal trace in such cases very careful handling is necessary; they must be physically and mentally at rest, and it is usually only after several attempts that a trace which may be accepted as characteristic can be obtained.

(9) Abstracts of Cases.

These cases have been selected as representative and classified as far as possible by the predominant symptoms. But it will be seen that the three common symptoms, precordial pain, dyspnoea, and excited action of the heart, occur in cases of very different history and arise under very varying conditions; this arrangement is therefore only for convenience. Cases of trivial temporary disturbances have not been included. The first words always show what symptoms the patient complained of, except where he was sent up after a routine medical examination.
"The Soldier's Heart"

(a) Pain in the Left Chest or "Around the Heart."

No. 1, aged 18. Service, three months. Pain of two weeks' duration, not felt before, in left chest over lower ribs. Active life, no illnesses. P. 75, with marked sinus variation. Early dyspnœa on doubling. Sounds loud and pure. Discharged to duty, N. A. D. (no appreciable disease), but reported sick again four days later with pain as before. Probably dyspeptic, and certainly very nervous about his heart, as his mother suffers from some cardiac disease. To duty.

No. 2, aged 18 years 9 months. Service, five months. Pain at edge of left lower costal cartilages. Heavy work since age of 14. No illnesses. Smokes a good deal. P. 66, B.P. 133 mm. at rest; P. 67, B.P. 115 mm. after two minutes' walk. Heart is absolutely normal. One of the two cases in which tobacco seemed to be a factor in production. To duty.

No. 3, aged 18. Five weeks' service. "Pains round the heart." Has not done any drill nor gymnastics. Has had the pain since he fell off a roof four months ago. P. 76, B.P. 124. Hands blue and mottled, stomach dilated. Returned to duty.

No. 4, aged 19. Service, one month. Pain round the heart. Had rheumatic fever about three years ago, severe, no recurrence. Fairly hard work. Had precordial pain and palpitation before enlistment and before his attack of rheumatic fever, but not enough to stop his working. Has done gymnastics. P. 61, accommodation good, B.P. 130 mm. An occasional extrasystole. Cardiac impulse and first sound forcible. Hands blue and cold. Vasomotor type. To duty: has not returned to hospital.

No. 5, aged 22. Service, one year nine months, plough boy. Could not complete a row without a rest on account of pain about the heart, therefore enlisted. Had also to give up football.

26.11.10 Pulse. Recumbent ... 23.21.20.20 = 84. B.P., 132 mm. Erect ... 28.29.28.29 = 114. " 115 "

Walked only twice round the ward.


Two minutes' walk ... 27.36.35.33 = 101. " 120 "

With a tight binder round the abdomen.

Recumbent ... 17.17.16.17 = 67. B.P., 126 mm. Erect ... 20.27.25.25 = 103. " 126 "

Two minutes' walk ... 30.27.26.29 = 111. " 120 "

After two minutes' walk (26.11.10), severe dyspnœa and flickering pulse, had to lie down. Sighing respiration, hands blue, cold and...
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clammy. Cardiac condition, no abnormalities. Vasomotor type. Invalided D.A.H.

No. 6, aged 17. Service, two months. Pain over pærcordia, began about six months before enlistment, worse after playing football. P. 81, accommodation fairly good. Cardiac impulse very broad and forcible: all sounds loud and roughened: sinus variation very marked. Poor physique: showed no improvement. Discharged on Army Form B. 204.

No. 7, aged 19. Service, two months. Pain like the pricking of a needle at the apex lasting about ten minutes after gymnastics, with a feeling of fatigue and palpitation, but no dyspnœa. In 1906 (five years ago), while in camp as a cadet, had the same symptoms and was laid up for a week. Chorea from about 7 to 15. Measles. Active, football, cycling (long distance).

Cardiac dullness 3 in. to left of middle line: impulse is broad and heaving. Sinus arrhythmia. A sharp systolic bruit, loudest at the apex, audible over the base and towards the axilla. Showed no improvement. Discharged on Army Form B. 204, largely on the history.


Cardiac dullness 3 in. to left of middle line: impulse is broad and heaving. Sinus arrhythmia. A sharp systolic bruit, loudest at the apex, audible over the base and towards the axilla. Showed no improvement. Discharged on Army Form B. 204, largely on the history.

No. 9, aged 28. Service, eight years. Pain in the side, "a funny feeling," beginning in the costal arch left side, and emerging over the left clavicle; worse in the early morning and about 6 p.m. Has specially noticed that no difference occurs in the heart's action at these times: no other symptoms. Drill instructor, fairly active. Impulse and sounds forcible, dullness normal; tongue furred and very tremulous: drinks very little and does not smoke. Reflexes increased. Probably not alcoholic. Improved and returned to duty.

(b) Dyspnœa.

No. 10, aged 20. Service, four months. Dyspnœa for the last three months. Palpitation and dyspnœa worse after doubling.
"The Soldier's Heart"

Rheumatic fever two years ago. Medium work, fairly active, but did not play games. Always fairly well, but not robust; soft and flabby; chest flattened under clavicles. Respirations rather feeble, no accompaniments. Pain at second left costal cartilage on deep inspiration; cardiac dullness left border 4½ in. from middle line, apex beat just inside it distinct, but not forcible. In bed has an apical systolic murmur—soft and not conducted—which disappears when he stands up; reflexes all increased. No improvement. Discharged on Army Form B. 204 (S.R.).

No. 11, aged 19. Service, three months. Dyspnoea, palpitation, debility. Heavy work before enlistment, suffered from dyspnoea then. Tonsilitis two years ago. Impulse diffused fourth and fifth spaces; apex beat forcible 4 in. from the middle line, first sound loud and forcible, no bruits, action regular. P. on enlistment 92. One of the few cases in which it was impossible to get a satisfactory jugular tracing. Three admissions with no change. Invalided.


P. Sitting ... 19.18.19.19 = 75. B.P., 97 mm.
Two minutes' walk ... 17.16.16.16 = 65. " 108 "

Respirations, 37. One trace shows five inspirations to six pulse beats. Cardiac dullness small. Chest flattened under the clavicles; expansion small, inspiration and breath sounds feeble; bases of lungs are more resonant than the upper lobes. Major G. A. Moore reported deflection of the nasal septum to the right, enlargement of both inferior turbinates—worse on the right side; enlarged tonsils and adenoids. Is extraordinarily sensitive to touch and flinches under moderate percussion. No improvement. Discharged on Army Form B. 204: "Nasal obstruction."

No. 13, aged 21. Service, four months. Dyspnoea; said to have spat up blood, but this is doubtful. No illnesses, could never run, no second wind. A little cough at times. Chest flattened under both clavicles, poor expansion, with deficient air entry; inferior turbinates much enlarged. Cardiac dullness to left nipple line, action rapid and excitable; variable bruits from day to day, not always at the same orifices. Refused operation. Invalided for nasal obstruction.

No. 14, aged 20. Service, two months. Dyspnoea on exertion, pain in left chest (apex). Chest very rigid, slight expansion only, and a general depreciation of the percussion note over the left upper lobe anteriorly and posteriorly, with feebleness of breath sounds. Pain about apex beat, dullness normal; sounds are forcible but pure,
the first at the apex is accompanied by a peculiarly sharp sound varying in intensity, of the nature of a rub and probably pleuritic. Discharged, Army Form B. 204: "Inflammation of lung."

No. 15, aged 17. Service, three years. Pain over the pærëcordia with dyspnæa; repeated attacks of bronchitis when a child; diphtheria at ten years of age, a good many attacks of sore throat and tonsillitis; symptoms come on after walking; is unable to blow a long trumpet call. On joining battery was well till he had to groom his horse. Left cardiac dullness 3\(\frac{1}{2}\) in. from middle line. Impulse diffuse, maximum in 4th space \(\frac{1}{5}\) in. internal to nipple. Sounds are loud but pure; harsh breathing at left apex. P. 70, accommodation good. Returned to duty after ten days in hospital; two months after admission the pain had almost gone and he could blow better, the chest had cleared up.

No. 16, aged 18. Service, two months. Pain in the left side of chest passing from under the clavicle through the nipple to about the apex: only on walking quickly or after gymnastics. No illnesses. Not active; gave up cycling on account of the pain, which first appeared when he began to take long walks. Began to smoke at 17 years of age, but the symptoms existed before that.

\[
\begin{array}{c|c|c|c|c|c}
P & \text{Recumbent} & 16.16.15.15 = 62 & B.P., 112 mm. \\
& \text{Erect} & 19.15.14.15 = 68 & " & 118 & "
\text{Two minutes' walk} & 16.15.14.15 = 60 & " & 122 & "
\end{array}
\]

Some dyspnæa; cardiac dullness and sounds normal. There is prolonged expiration above the left scapula with diminished V.R. and V.F. Blood count, r.b.c. 4,880,000; white, 8,800; Hb., 90 per cent. Returned to duty.

No. 17, aged 21. Service, two months. Dyspnæa, no pain in chest. Was in Great Ormond Street, aged 12, (?) paralysis. No other illness. Active; dyspnæa noticed when he began to double; sinus variation marked. P. 11.12.13.13 = 49 in bed. Dullness left nipple line, apex beat \(\frac{3}{4}\) in. inside it, rather diffuse. A mitral systolic at the apex, conducted to the axilla. Discharged, Army Form B. 204.

(c) Fainting.

No. 18, aged 22. Service, one year and seven months. Fainted on two occasions when under treatment for tonsillitis. Cardiac conditions absolutely normal. Duty.

No. 19, aged 18. Service, two months. Fainted on parade. P. 18.19.19.19 = 75. Cardiac condition normal. Returned to duty. Three weeks later he was readmitted with acute articular rheumatism and developed endocarditis. Was there any toxic affection of the myocardium at the time of his fainting?
"The Soldier's Heart"

No. 20, aged 24. Service, three years and six months. Faints after slight injuries. Feels done up after his day's work.

P. Recumbent ... 16.17.16.16 = 65. B.P., 138 mm.
Erect ... 19.17.18.19 = 73. 135
Two minutes' walk ... 21.20.21.19 = 81. 135

Cardiac conditions are normal; hands blue, cold, and rather clammy. To duty.

No. 21, aged 16 years 5 months. Service, one year and three months. Fainted at his work. History of a "fit" of the same kind five years ago when at school. Not subject to headaches. Rather dull expression.

P. Recumbent ... 19.19.19.20 = 77. B.P., 122 mm.
Erect ... 24.19.20.19 = 82. 130
Two minutes' walk ... 20.18.18.18 = 74. 105

Note the fall in pulse-rate and B.P. after exercise, characteristic of the vasomotor type. Returned to duty.

No. 22, aged 19. Service, two months. "Pain round the heart." Before or about 14 he began to have "fits." Had two while at school; about 16 was "ill," suffering from fainting fits. The last three or four years they have been more frequent; every two to three days he feels a little giddy, but "goes off" only about once a fortnight. Feels a little dazed and giddy and then becomes unconscious. Sometimes has heavy sweats without fainting; once or twice has passed urine during the attacks; no struggling. Has been under observation by a medical man for the last two and a half years, the last year definitely on account of the "fits." P. 81; B.P. 140 mm. Hands moist. Heart sounds are rough, but otherwise there is no abnormality. Discharged on Army Form B. 204, epilepsy.

No. 23, aged 19. Service, six months. Two faints since arrival at depot. Subject to "fainting attacks" since age of 12, as many as two a week, not at night. No aura, no bitten tongue. Frequent illnesses, pleurisy at 13, catches cold easily. Family history bad: father, aged 66, has "fits," mostly on one side; mother has heart trouble: two brothers and one sister ill, one sister dead; two brothers and one sister well. P. on enlistment 90.

P. Sitting ... 20.20.21.20 = 81. B.P., 135 mm.
Two minutes' walk 26.24.24.24 = 98. 138

Invalided, epilepsy.

No. 24, aged 20. Service, one month. Giddiness, pain in side and chest; could not "get his breath." Rheumatic fever five to six
months ago. "Hysterics" two or three times with dizziness and loss of consciousness, especially after overwork. Had to give up smoking on account of these attacks. First attack about time of leaving school. Eyes get dim, head goes round, loses consciousness; sometimes bites his tongue; has urinated during the attack once or twice. Was returned to duty for about a week and readmitted with the same symptoms. No cardiac abnormality. After the sudden death of a patient in the ward he had a sharp attack of tachycardia at 2 a.m. with a feeling of want of air, felt light-headed and dry at throat. Heart sounds rather faint, a very faint blowing systolic at the apex, no alteration in dullness. Discharged on Army Form B. 204, epilepsy.

(Note.—With the exception of No. 19, all the cases under this heading were definitely of the vasomotor type referred to by Dr. A. E. Russell in the article already mentioned. The last three were definitely epileptic, but without the history the true explanation would have been overlooked.)

(d) Cases Showing a Marked Nervous Element.

No. 25, aged 40. Service, fifteen years two months. Palpitation detected at examination for foreign service. Very tremulous, hands cold and clammy, pulse small, and tracings only obtained with difficulty owing to the tremor. India 1897-1907: malarial fever, no venereal. Much run down after cholera camp Mian Mir, 1903; had the same palpitation, which passed off and recurs when he gets run down. An irregular drinker, has a bout of a week or so from time to time. An old man for his years. P. 20.21.21.21 = 83; B.P. 165 mm. Vessels are rather hard: apex beat not well marked, situated in the nipple line just inside the left margin of dullness. Occasionally a trace of albumen in the urine. The radial trace is persistently flat topped. There is definite arteriosclerosis, and probably some neurosis also. To duty.


P. Recumbent .. .. 43.40 = 83. B.P., 125 mm.
Erect .. .. 43.42 = 85. " 125 "
Two minutes' walk .. 51.45 = 96. " 128 "

No cardiac abnormality. Anæmic. Hands very cold and trembling. Reflexes not exaggerated. Improved rapidly and returned to duty.

No. 27, aged 22. Service eight months. An officer. General malaise, fatigue, abdominal discomfort. Enteric fever two years
"The Soldier's Heart"

ago: overworked lately. Cardiac dullness \( \frac{1}{2} \) in. outside nipple line: a faint systolic murmur limited to the apex. Pulse rapid and very soft. Very nervous, reflexes increased. Improved with rest and sent on sick leave. Seen twice since, dullness in nipple line and no murmur, but general nervousness and all the stigmata of a neurasthenic remain. Duty.

No. 28, aged 19. Service, one week. Admitted with pleurisy. As a youth was not fit for heavy work on account of weakness and dyspnoea. Later was a tram conductor. Joined Special Reserve in 1909 and had no trouble with his wind.

Cardiac conditions normal: marked cardio-inspiratory systolic at apex. Hands blue and cold, feet also. Improved: to duty.

No. 29, aged 20. Service, two years six months. Sudden onset of dyspnoea when on furlough, indefinite pain, "could hardly breathe." Heavy work before enlistment; sore throat twice two and a half years ago. Apex beat localized fifth space: left dullness in nipple line. Respiration shallow, left apex does not expand well. Reflexes much increased. Improved greatly and returned to duty.

(e) Old-standing D.A.H.

No. 30, aged 30. Service, twelve years, is a N.C.O. Giddiness, pain over precordia, and (very doubtfully) radiating into the left arm. His Medical History Sheet shows the following admissions:

<table>
<thead>
<tr>
<th>Year</th>
<th>Days</th>
<th>Days</th>
<th>Days</th>
<th>Days</th>
<th>Diagnosis</th>
</tr>
</thead>
<tbody>
<tr>
<td>1908</td>
<td>7</td>
<td>19</td>
<td>9</td>
<td>D.A.H.</td>
<td></td>
</tr>
<tr>
<td>1909</td>
<td>7</td>
<td>11</td>
<td>D.A.H.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1910</td>
<td>17</td>
<td>Anæmia</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1911</td>
<td>3</td>
<td>? days</td>
<td>D.A.H.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

i.e., 8 previous admissions.

On admission he was under detention for absence without leave. Cardiac action excited: localized systolic murmur at the apex: dullness normal. Considerable general excitement probably due to alcohol. Pulse 74. Inquiry about pain said to radiate to left arm left great doubt as to its reality; there was no hyperesthetic skin area. After various incidents unusual in the career of a N.C.O., he arrived again at hospital in the same excited condition. Pulse 104, but less in his quiet periods. He professes to be ignorant of recent occurrences. His Corps history shows great
variability in conduct from time to time. A man of marked intelligence, without any moral sense, with mental and cardiac instability. Invalided.

No. 31, aged 23. Service, eight years three months. Admitted with bronchitis. No illnesses, light work before enlistment. Rejected (he says) three or four times for foreign service on account of palpitation. Rejection on account of D.A.H. recorded twice on his M.H.S. States he is very nervous: does not like to be alone, has been so since childhood. Very fastidious about food, rarely eats breakfast, and is easily put off his meals. No claustrophobia. Sleeps well as a rule. No pain, no headache. Smokes a little, but does not drink. Does not feel any palpitation except temporarily when he gets excited.

P. Sitting ... 23.24.24.23 = 94. B.P., 108 mm.
Two minutes' walk ... 23.22.22.23 = 90. " 112 "

No cardiac abnormality. Poor physique. Returned to duty. Examined again.

P. Sitting ... 19.18.19.18 = 74.
Two minutes' walk ... 23.23.19.20 = 84.

Marked improvement.

No. 32, aged 23. Service, seven years seven months. Rejected on examination for foreign service. M.H.S. shows the following entries:

Enlisted January, 1903; April to May, 1903, D.A.H. "soft blowing murmur over precordia." September, 1909, "aortic stenosis with dilatation."

Has been a long distance runner since 1907: third in cross-country race at brigade sports 1909. Recent history: Has been running five to six miles every morning (after some tea and cake) except Saturday and Sunday. Is employed in school about five hours daily. Pulse 23.22.24.23 = 92. B.P. 142 mm. Apex 4½ in. from the middle line, but no visible pulsation there; pulsation visible between left nipple and sternum. Left dullness just outside apex beat. A faint blowing systolic murmur at the apex and over the xiphoid; second accentuated; an occasional extrasystole. Erect, all sounds are loud and accentuated. Reflexes all much exaggerated. Hands blue and cold, very nervous. Later observations.

P. Recumbent ... 20.18.17.18 = 73. B.P., 140 mm.
Erect ... 40.41 = 81. " 140 "
Two minutes' walk ... 24.23.21.21 = 89. " 138 "
"The Soldier's Heart"

Again—

P. Recumbent ... 18.17.18.18 = 70. B.P., 130 mm.
Erect ... 19.19.19.23 = 80. 138
Two minutes' walk 24.22.21.22 = 89. 142

Ordered to drop his excessive exercise; returned to duty. Reported on a year later; apex in nipple line, left margin lost in emphysema; no bruit or thrill. Has played a little cricket and hockey, and seems perfectly well.

No. 33, aged 23. Service, four years two months. Precordial pain, dyspncea and palpitation on exertion. Attacks like angina by day or night. Irregularity of pulse and weakness and irregularity of heart sounds are recorded on his M.H.S.

M.H.S. Previous entries are for D.A.H. January and February, 1911, July and August, 1912. The traces show persistent extra-systoles about every third beat. They can be felt at the wrist, or heard on auscultation. There are no physical signs of any kind, and the patient appears perfectly healthy. Evidence as to the anginal attacks was hardly convincing, none occurred while he was in the Royal Herbert Hospital. Invalided.

No. 34, aged 23. Service, five years two months. Sudden pain at the heart and throat. Well on rising in the morning: attack came on while at field training; fell out, and pain gradually lessened, finally ceased, but palpitation continued, and has not ceased since: the heart steadies down but goes off again. Hard work before enlistment, diphtheria at age of 5, no other illnesses. Had been working in the gymnasium for amusement every day for about a year and felt quite fit. Thin, but says he has not lost weight. Married off the strength.

P. Sitting ... 23.22.22.22 = 89. B.P., 140 mm.
Standing ... 23.23.23.23 = 92. 142
Two minutes' walk 27.25.25.24 = 104. 146

Got very faint after examination and once or twice during the observations, tachycardia came on suddenly, but without any irregularity in the pulse-rate or in the composition of the jugular trace. Apex beat in fifth space in nipple line, diffuse: dullness never beyond nipple line, sounds at first normal. Had the typical general symptoms and the general facies of a vasomotor neurosis very well marked. Very emotional. He improved a little and was sent on sick furlough, but returned to hospital some months later, much worse with a well marked systolic bruit at the apex and some dilatation. The sudden onset is peculiar, as the whole of the symptoms were so characteristic of a cardiac neurosis. The jugular trace,
however, never showed the great pressure variations which seem to be typical of functional disturbances. It is of course common to find a general neurosis beginning with some history of slight injury or strain, and this may have been a case of cardiac strain, though with the history of steady exercise it is not likely.

No. 35, aged 26. Service, two years. An invalid from Mauritius for D.A.H. Reported sick on account of shortness of breath while at rest. Had been twenty-seven days in hospital with gonorrhoea. Felt the symptoms complained at first at Curepipe.

25.8.10. Recumbent ... 23.23.23.23 = 91. B.P., 140 mm.
Erect ... 43.40 = 88. " 144 "
Two minutes’ walk ... 24.22.24.20 = 90. " 135 "

Marked sinus variation. Dullness and sounds normal. Deep reflexes exaggerated. After five weeks at Eastbourne—

Recumbent ... 14.13.14.14 = 55. B.P., 125 mm.
Erect ... 19.18.18.18 = 73. " 130 "
Two minutes’ walk ... 19.19.20.21 = 79. " 136 "


No. 36, aged 23. Service, three years four months. An invalid from Sierra Leone for D.A.H. On arrival at Woolwich was quite well. Duty.

(Nos. 35 and 36 were not cases of D.A.H. but the sequelæ of some acute disease.)

(f) Subsequent to or associated with Sore Throat or Tonsillitis.

No. 37, aged 20. Service one year two months. Sore throat. Thirteen days after admission—

Recumbent ... 21.21.20.21 = 83. B.P., 153 mm.
Erect ... 25.24.26.26 = 101. " 162 "
Two minutes’ walk ... 28.24.25 = 101. " 173 "

Nervous, and readings probably in excess. Trace shows very large oscillations with over-sharp angles. No special symptoms; history good; did well at gymnasium and in riding school before attack. Recovered; duty.

No. 38, aged 21. Service, four years. Sent up for V.D.H. from routine examination. Two attacks of tonsillitis in 1906-7. No subjective symptoms. Apex beat not visible: is ¼ in. internal to nipple line. Left border of dullness in the nipple line. In bed, a systolic at the apex and strictly limited to it, of a peculiarly leathery twang. After walking upstairs, action rapid, a faint
double mitral murmur audible only over the apex beat; excited action quickly passes off and murmurs disappear.

P. Sitting ... 22.20.19.19 = 80.
   Erect ... 28.23.23.23 = 97.
   Two minutes' walk ... 32.27.24.22 = 105.

Deep reflexes much increased; hands blue and cold. Improved greatly and returned to duty.

No. 39, aged 18. Service, five months. Admitted with sore throat. No complaint of any cardiac symptom. Localized systolic murmur at the apex; faint blowing murmurs at tricuspid and base when in bed. None audible when erect. Impulse forcible on first examination and after walking round the ward, but rapidly becomes quieter. Sighing respiration. Reflexes exaggerated, very anaemic. Nervous. Improved very much and returned to duty.

No. 40, aged 23. Service, six months. Tonsillitis, acute, followed by influenza. Four days after its onset, patient's pulse fell to 32—36 mane, 36—34 vespere. Pain about the sternum, no other symptoms. Next morning P. was 34—44, very variable within these limits. B.P. 110, an occasional extrasystole. The rate gradually increased to 52—54. P. on enlistment 72. The jugular trace was unfortunately not very good. The a—c interval was lengthened, but there was no definite heart block. Invalided later on: the actual condition was not very definite.


The chief interest in this case was in the jugular trace, which was of the same type as in No. 38, but with a very deep fall after the ventricular systole and a very slowly filling auricle. Duty.

(g) Cases of V.D.H.

No. 42, aged 18 years 4 months. Service, three months. Dyspnoea after doubling; detected at gymnasium. No illnesses. Riding boy from 14—17. Physique very good. Has only noticed the dyspnoea for the last six months. P. 15.14.12.15 = 56 with three dropped beats. Impulse diffuse over an area 1 in. by ¼ in., maximum below 5th rib, ¼ in. internal to nipple line. Dullness in left nipple line: right edge of sternum. Loud systolic murmur at the apex conducted to axilla and audible over the base; loud systolic murmur over the aortic area conducted up the sternum and into great vessels of neck. Originated before enlistment. Discharged on Army Form B. 204.

No. 44, aged 20 years 2 months. Service, one year one month. Detected on examination for Reserve. History of severe exercise of all kinds since he went to school; the last year has been running up to 1½ miles and sprinting up to 220 yards, but has not raced. Has never felt any inconvenience. Measles at 6 years of age. Pulse very rapid; repeated extrasystoles; apex beat distinct ½ in. below nipple, left margin of dullness ill-defined, but not more than ½ in. outside nipple line; faint systolic at the apex, loud aortic. Invalided.

No. 45, aged 19. Service, five weeks. Admitted for constipation. Farm labourer, and has been to sea. Looks well and is of very good physique; no illnesses.

1.7.10. P. Recumbent ... 41.41 = 82. B.P., 110 mm.
   Erect ... 45.43 = 88. " 110 "
   Two minutes' walk ... 42.43 = 85. " 120 "

2.9.10. P. Recumbent ... 27.28 = 55. " 102 "
   Erect ... 33.32 = 65. " 105 "
   Two minutes' walk ... 30.31 = 61. " 110 "

Dullness normal; systolic murmur at apex not conducted, systolic murmur in aortic area conducted to the great vessels; no dyspnea. Returned to duty between July and September, and was doing the whole of his training as a driver, R.F.A., without any difficulty. Finally was invalided, solely because of the fact that he would be rejected at every routine examination that he comes up for. Is to return to work as a sailor.

No. 46, aged 17 years 9 months. Service, one month. Sent up by Medical Inspector of Recruits. No illnesses; looks well. Dullness 4 in., apex 5th space, 3 in. to left of middle line; systolic bruit in aortic area conducted to the great vessels; fainter mitral systolic. Discharged on Army Form B. 204.

No. 47, aged 20. Service, six weeks. Sent up after routine examination. No symptoms; well marked mitral disease. Discharged on Army Form B. 204.

No. 48, aged 18. Service, one month. Sent up by Medical Inspector of Recruits. No symptoms; measles when a child; well marked mitral disease. Discharged on Army Form B. 204.
No. 49. Aged 22. Service, one month. Detected at examination for gymnasium. No symptoms. **History of heart trouble when a child,** but for years has felt quite well. Well marked mitral disease. Discharged on Army Form B. 204.

(Nos. 42, and 45 to 49, evidently originated before enlistment, but there is no history of definite illness. The following cases have a definite history of rheumatic fever before enlistment.)

No. 50.—Aged 18 years 9 months. Service, one week. Detected when up for vaccination. **Rheumatic fever aged 15 in a children’s hospital,** and afterwards attended Westminster Hospital for six to seven months for heart trouble. Not active. No symptoms. Well-marked mitral disease. Discharged on Army Form B. 204.

No. 51.—Aged 18 years 3 months. Service, four days. Detected at examination on joining station. **Rheumatic fever three to four years ago.** In bed four and a half months afterwards at convalescent home. Fairly active; played football regularly. Well-marked mitral disease. Discharged on Army Form B. 204.

No. 52.—Aged 17 years 7 months. Service, one day. Detected on joining station. Measles when a child. **Rheumatic fever fifteen months ago:** three weeks in hospital. Has not worked since. Well marked mitral disease. Discharged on Army Form B. 204.

No. 53.—Aged 21. Service, three months. Admitted with rheumatic fever. **Had an attack of rheumatic fever two years ago.** Has well marked mitral disease. Remains in hospital at date of closing this record.

(Nos. 46 to 52 should not have been enlisted at all: the conditions were perfectly obvious.)

(10) **SUMMARY OF THE ABSTRACTS OF CASES.**

(a) **The Importance of Symptoms:**

Of cases 1—24: (excluding No. 18) i.e., 23 cases of pain, dyspnoea or fainting, **all reported sick on account of one or other of these symptoms.**

Of cases 25—53 (excluding 35 and 36, invalids) i.e., 27 cases of neuroses, old D.A.H., disturbances associated with tonsillitis, and V.D.H., only 6 reported sick with cardiac symptoms.

Of 12 cases diagnosed V.D.H. every one was detected at a routine examination or while in hospital for some other reason, and only in one case (42) was there any subjective symptom.

(b) **Time of Appearance of Symptoms:**

**Cases 1—24:** 16 appeared before, 8 after enlistment.
Of the 16 appearing before enlistment:

- Nasal obstruction accounted for 2
- Fibroid lung 
- Rheumatic fever 2
- Epilepsy 3
- Frequent illnesses 1
- No special illness—
  - Vasomotor type 4
  - Others 7

Of the 8 appearing after enlistment, 1 was of a vasomotor type: 7 presented no special features.

It should, however, be noted that temporary disturbances of short duration, of the nature of overstrain and not recurring, have not been included in the Abstracts.

Cases 25–34. In 5 cases the condition appears to have developed after enlistment: 4 of these cases were, however, of a vasomotor type.

Cases 37–41: 3 of a vasomotor type.

Cases 42–53. V.D.H: 6 cases had the clinical condition so well marked that the origin must have been before enlistment: 3 had one month's service: 2 between one and two months and I had four months: 4 had a definite history of rheumatic fever before enlistment; 2 had no history before enlistment.

That is:

- Of cases 1–24 16 originated before enlistment.
- " 25–34 5 "
- " 35–41 "
- " 42–53 10 "

Of 53 cases then, 31 originated before enlistment. This omits on the one hand the cases of cardiac neurosis occurring after enlistment but really the expression of a constitutional condition. On the other hand, as has been pointed out, the trivial cases have not been included in the list.

(11) Conditions following Rheumatic Fever.

No systematic observations were made on the whole series of cases of rheumatic fever admitted, but it may be said that endocarditis has been an infrequent complication. On the other hand, the usual dilatation, more or less temporary, with a systolic bruit, has been noted in most cases of rheumatic fever, and in some of tonsillitis. Of 11 cases of rheumatic fever in which special notes have been made, a true endocarditis has been noted in 4 cases. Two cases with dilatation, a systolic bruit and dyspnoea were invalidated after
prolonged observation. Five cases, in which dilatation and a bruit persisted for some time after the termination of the acute stage, eventually recovered and were sent to duty. They were kept under observation for some time while doing at first only part of their duty; they gradually improved, and were able to resume full work as apparently healthy men.

These numbers are too small to do more than suggest that it is not wise to hasten the invaliding of a trained soldier after an attack of rheumatic fever: time must be allowed for the recovery of the cardiac muscle, and this includes its training for hard work again.

(12) ETIOLOGY OF THE CONDITION KNOWN AS D.A.H.

There is sufficient evidence (of which these abstracts give some idea) to show that the symptom complex, pain—dyspncea, excited or excitable action—may be the expression of very varied conditions, and the elimination of the term D.A.H. from our nomenclature would assist in clearing up the confusion which now exists.

In relation to origin, one may classify the various types somewhat in this way:—

(a) Where there are Mechanical Difficulties in Respiration.—(1) In the upper air passages: nasal obstruction, adenoids, &c. (2) In the lung: the result of existing or antecedent disease. (3) In the mechanism of respiration: want of muscular development and rigidity of the chest wall. This is perhaps only secondary to the other conditions named in (1) and (2).

(b) The Results of Overstrain of the Cardiac Muscle, due to its excessive or unwonted use. This is entirely analogous to the results of similar use of any of the skeletal muscles, and is, in the healthy man, no more a pathological condition than the pain and stiffness the recruit suffers from when learning to ride. If proper opportunity for rest is given, the condition passes off, and the heart gradually becomes accustomed to what is demanded of it. The remedy is obvious: it cannot be too strongly impressed on all those concerned with the training of the young soldier that there are great individual differences in cardiac development as well as physical; cardiac development even in a healthy lad may lag behind. Again one recruit differs very much from another in his history; one may have come from a comfortable home, where he was well looked after, and well fed, while another may have been out of work and ill fed. The same method of training will not suit both cases.

We are apt to forget that this temporary overstrain is not
confined to the Army; it is common in any congregation of young lads or young men who take up any form of active exercise; schools, colleges, athletic clubs, all produce numerous cases of this temporary disability, and the cause is constant, relatively excessive exercise, with an untrained heart muscle.

Where there is a pre-existing disability, this overstrain may produce a condition which is more or less permanent. These antecedent conditions fall into one or other of the following groups:

(c) The Rheumatic Group.—Rheumatic fever has not been found commonly as an antecedent to functional disability. But having regard to the triviality of some of the manifestations of rheumatic infection in the young, we cannot exclude it on the ground that there is no definite history of rheumatic fever. Here the determining factor is some excessive use of the heart muscle which is not entirely healthy, possibly with some residual focal lesions. In this connexion, one may call attention to the discussion on fibrositis (Proceedings of the Royal Society of Medicine, vol. vi, Balneological and Climatological Section, pp. 27 et seq.), and especially to the remarks by Dr. James Mackenzie on rheumatic affections of the myocardium. He speaks of "heart complaints" "associated with muscular rheumatism, and it was only reasonable to infer that the heart muscle was affected in a manner similar to that affecting the skeletal muscles." The symptoms described by Dr. Mackenzie are of the type met with in our hospitals, but the delay in transmission and partial or complete heart block referred to by Dr. Mackenzie has only been observed in case No. 40, and in acute cases of rheumatic fever.

There is no doubt, however, that the convalescence of a patient who has suffered from even a mild infection of a rheumatic type must be watched, and a gradual progress to full exercise insisted on.

(d) Neuroses.—General or special.

(e) Epilepsy.

These may be considered together, because they present certain points of similarity.

(i) Heredity.—Epilepsy and a (general) neurosis appear to be interchangeable in a diseased stock. Functional heart trouble may be only one symptom of a general neurosis, or may be the sole representative of the hereditary tendency. The age of our cases must be taken into consideration. Except where the neuropathic tendency is well marked, symptoms do not show themselves until the individual is subjected to some physical or mental strain; this
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usually first happens about puberty, which coincides in the working class with the time of leaving school. The few years after puberty form a period of great mental instability, and again coincide with the final development of the heart to its adult condition. So that we catch most of our recruits at the time when they are most likely to show signs of the changes going on, and we cannot be surprised that a proportion of them manifest their mental and physical instability by the symptoms which we term D.A.H.

Cases associated with a general neurosis are more common among the older men with greater responsibilities, a longer history of excessive work (which, it may be noted, is usually not physically hard), and, it may be said, with a longer history of oral sepsis and alimentary toxemia.

(i) The Time of Appearance.—This is the same in both, about the age of puberty.

(ii) The Vaso-motor and Cardio-regulatory Systems are Unstable.—The instability of the cardio-regulatory system is very marked in nearly all cases of functional disability, its importance depends largely on the age of the patient. Below twenty, the response to slight stimuli may not always be pathological, and we must then be guided by the condition of the "peripheral heart": alternate asphyxia and congestion, sudden and considerable variations in blood-pressure and especially the effect of exercise. There seems little doubt that in many of the cases, especially where there is a general neurosis, there is considerable arterial spasm; anything which will dilate the capillaries produces a marked improvement in the symptoms for the time being.

Some of the cases abstracted, in which persistent fainting was the prominent symptom, were definitely epileptic. In many of the other cases, the condition was, as has been said already, a neuropathic inheritance, perhaps a mutation in an epileptic stock. It is regretted that special inquiry on this point was not made.

(f) Tobacco.—Only two cases have come under observation in which tobacco was probably the cause. One was definitely a case of tobacco poisoning, from smoking a very large number of cigarettes within a short time. Some cases may probably have been aggravated by cigarette smoking, and a few observations were made on blood-pressure after smoking, with the usual result, a considerable rise. But it was difficult to eliminate the psychological effect, and part of the rise was probably due to the fact that the lads were the subject of an experiment. It is quite certain that tobacco is not an important element in the production of these
disabilities, and probably it only accentuates the pre-existing disposition to vasomotor irregularity.

(g) Tea.—Barrack room tea is usually boiled, and sometimes is used to excess; it may act directly or through an induced dyspepsia. It was the cause of the extrasystoles in the case noted by Sir Thomas Watson (vide supra).

Among the older men, syphilis and alcohol are no doubt effective.

(13) Prevention.

If the conclusions as to the etiology arrived at are correct, a large proportion of cases are beyond our control: we are a generation too late. But something may be done.

(i) Training.—The present system of physical training as carried out at its best appears to meet all our needs. There is a satisfactory gradation of the exercises, and individual treatment of the recruit.

(ii) Convalescence after Acute Disease.—Already referred to.

(iii) Care of the Teeth and Dental Treatment.—Oral sepsis appears nowadays to be almost inevitable, but proper care will retard its appearance and delay its progress.

(iv) Free Respiration and a Healthy Nasopharynx.—Unfortunately in some of the cases the effects of obstruction on the development of the chest have made it almost impossible to render the recruit efficient.

In practice, it is not possible to eliminate many of these cases at the recruiting office. The true nature of the case cannot be recognized without a careful examination on more than one occasion, and the conditions under which recruiting must be done introduce a very disturbing element. A full examination is rather a slow process, and one must not hustle the patient at all if any satisfactory result is desired.

Prevention has a statistical aspect. Our returns show a prevalence of functional disease far greater than the actual incidence; many cases are diagnosed D.A.H., which on examination show some definite cause for the symptoms. Others are convalescents from acute disease, who should be returned under the head of the original disease.

(14) Prognosis of the Individual Case.

The important question is: how far does the disability affect the man's fitness for service? As a general rule, if the history shows an inability to work; if there are repeated attacks; if there is no
proper response to treatment, then it is not likely that the man will ever be useful as a soldier. But each case needs individual consideration, and it is not always possible to express in words the aggregate of minor indications leading to a decision to invalid a case.

(15) TREATMENT.

Its aim is the training of the myocardium. It is possible to make two statements as to treatment which apply to nearly all these cases of functional disability: first, that bed is the worst place for them, and secondly, that drugs are of little value in the treatment of the special condition. Patients must, of course be in hospital, at least at the beginning, for supervision. The first essential is the treatment of any definite condition, dyspepsia, constipation, oral sepsis, as far as possible, in fact the removal of any source of peripheral irritation, and the improvement of the general health. Following, or associated with this, comes graduated walking exercise. Most of the cases under review were kept in bed twenty-four to forty-eight hours, for examination after a sufficient interval to give a basis for further observations. Then gradual walking exercise, from fifteen minutes twice a day in the worst cases, gradually increasing till the patient could do 5 to 6 miles without difficulty. The effect on the pulse-rate must be watched, and the amount of exercise regulated accordingly, but it is rarely necessary to stop all exercises.

Drugs with a specific cardiac action have not been found necessary, nor in those few cases in which they were used temporarily did any improvement result. While working with Dr. Pembrey at Millbank, several cases of the vasomotor type were given electric baths, and the temperature was raised till the soles of their feet sweated. These certainly did good; the blood-pressure fell and remained down for twenty-four to thirty-six hours, while the general symptoms were less marked. At the Royal Herbert Hospital, ordinary hot baths were given to several cases. Some improved temporarily, others felt faint and sick afterwards. A case which is likely to do well should show marked improvement after regular exercise for ten days or a fortnight; most of the slighter cases improve much earlier.

(16) IMPROVEMENT OF INVALIDS FOR D.A.H. AND V.D.H. AFTER RETURN TO CIVIL LIFE.

Attention was called to this point by Lieut-Col. R. J. C. Cottell (Journal of the Royal Army Medical Corps, vol. x, pp. 460 et seq.) in an article which deserves to be read with attention.
Many of the cases invalided as V.D.H. (without a rheumatic history) have more or less persistent murmurs, but no symptoms. They are usually kept in hospital, often in bed, for a comparatively long time, their exercise is limited, they eat well, smoke a good deal, and get completely bored by their surroundings. Finally they appear before an invaliding board, the murmurs probably more distinct than on their first admission. These men do not report sick, they are detected at some routine examination. They are naturally alarmed on hearing they have heart disease, and experience has shown that a man who has been told that there is something the matter with his heart, and that he must be careful, is particularly circumspect in carrying out that recommendation. When the man returns to civil life, after invaliding, he finds he has to work or starve; most of them prefer to work if they can get employment. He is now responsible for all his actions and his needs, and he is not inspected at frequent intervals. He finds soon that he cannot afford to have heart disease, and that, as a matter of fact, it does not make any difference to him. Meanwhile he has been doing hard work, usually as a general labourer, his heart muscle has gained tone and his symptoms have diminished if not entirely passed off.

Shortly, one might say that a good many of our cases of V.D.H. are manufactured out of trivial murmurs by our excessive care, and the improvement after return to civil life is due to the impossibility of continuing the same unfortunate procedure. But until we get some general recognition throughout the Service that a large proportion of cases with minor irregularities or murmurs are of no importance, as on the other hand that the absence of murmurs is no criterion of a healthy heart, we shall continue to invalid these men solely because a man with a murmur is put back at every routine medical examination to which he is subjected.

(17) CONCLUSIONS.

(i) The term “the soldier’s heart” implies that which is false. The condition is not peculiar to the soldier: it is not due to his training or duties.

(ii) The causes of the symptom complex—pain, dyspnoea, irregular action—are various, some are certainly unconnected with the cardio-vascular mechanism, and probably in the majority of cases the symptoms are really secondary.
(iii) The importance of these symptoms is exaggerated, and the conditions are not improved by the remedial measures usually adopted.

(iv) The only specific treatment for the condition which gives any good result is a system of graduated exercises. Some cases will never improve.

(v) Many of the cases invalided as V.D.H. have no cardiac lesion and are physically fit for duty.

(vi) The true incidence of all forms of heart disease in the Army is obscured, and the apparent incidence exaggerated by the inclusion of cases diagnosed on isolated symptoms.

(vii) The systematic examination of every recruit immediately on his joining a station would eliminate a good many cases which cannot be detected under ordinary conditions of recruiting.

No attempt has been made to refer to many useful contributions by various officers which have appeared in the Journal. But some of the points mentioned above have already received attention from various observers, especially the origin of many of these conditions before enlistment, and the harmlessness of many symptoms. Modern methods have increased the accuracy of the diagnosis of cardiac disorders, but at the same time many of our old standards have been modified, and diagnosis is not as yet much easier, for indeed we have not yet assimilated all that is being worked out from day to day.