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## THE BLOT IN RECRUIT TRAINING.

By Lieut.-Colonel F. A. DAVY, M.D., late R.A.M.G.

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On Wednesday, 30th January, 1907.

Surgeon-General Sir T. J. GALLWEY, K.C.M.G., C.B., M.D. (Principal Medical Officer, Aldershot Army Corps), in the Chair.

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FROM this place, over 40 years ago, Professor Maclean, then of Netley, delivered an address at a meeting of the Royal United Service Institution, in which he called attention to the losses sustained by the Army, owing to invaliding for one class of diseases. He did so in the following words, which I quote because it is important to show, at the outset, that it has long been recognised that some undiscovered cause has been at work to account for these losses, and for the disability under which the Army labours in the matter of the physical inefficiency of so large a proportion of the men. He said:—"I had not been long in the position I have the honour to fill in the public service before I became profoundly impressed with the vast losses sustained by the prevalence in the Army of consumption and diseases of the circulatory system; that is, of the heart and great vessels. Within the last three years—excluding those who die in regimental and depôt hospitals, and those of the Household troops, and excluding also those invalided in Ireland, of whom we at Netley see nothing—no less than 1,344 men have been lost to the Service from consumption alone. . . . From the date of my assuming charge of the Medical Division at Fort Pitt, in April, 1861, to the end of last year, no less than 883 cases of disease of the circulatory system—a number equal to the strength of a battalion—have passed under my observation, and been lost to the Service from this one class of disease: the great bulk of the cases being young men returned to the civil population (that is, cast upon their parishes), and incapable of earning their bread at any active employment. The pension allowed to such short service men is but a pittance, and is granted only for a limited period. Let me remind you again that in the figures I have given, the invalids of the Royal Artillery, the Guards, and the troops serving in Ireland, are not included: *they* were discharged without being seen by us at all. Surely, gentlemen," he continued, "you will agree with me, after hearing a statement so startling, that it behoves us to look narrowly into a question involving such an amount of suffering, costly invaliding, and inefficiency, with a view to the adoption of a remedial measure."

Now, in those long-ago days it had not occurred to anybody that the setting-up drill might be to blame. Nor was suspicion likely to arise. For chest expansion—although it involved grievous interference with normal breathing—was deemed a good thing. It was meant, of course, to benefit the men; it was, therefore, thought it *must* benefit

them. As I have said, suspicion that a thing is evil is not likely to arise if it be done in the name of good. But the difficulty remained. Numbers of men who were carefully examined, and passed, and enlisted, as likely to become efficient soldiers, were found unfit after a few months, and discharged for palpitation of the heart, and breathlessness on slight exertion. Indeed, it would be little exaggeration to say that, when I was at Netley, in 1868, Professors Maclean and Parkes were wringing their hands over the waste of the Army, and a prize was instituted for the best essay on the causation of the trouble. A medical officer of the Guards, who wrote the prize essay, laid the blame on a variety of causes, but mainly on the tightness of the clothing and accoutrements of the men. This was accepted; for the other causes alleged would operate among civilians as among soldiers; and the expression "soldier's heart" would thus find a sort of explanation. But, when desirable changes were made in the clothing and accoutrements of the soldier, the waste of young men was practically undiminished, and enlarged, hypertrophied hearts, and palpitation, continued to occur in large proportion among men trained in a loose serge frock. Still, the chest-swelling—the strained attitude of the soldier at attention (involving, as it does, interference with natural breathing)—continued unsuspected, for the reason I have mentioned. I submitted a paper to the Army Medical Department in 1877, attributing the waste of the Army, in this regard, to the orders of the drill-sergeant—*alleging that in obedience to him mechanical obstruction and strain are imposed on organs (especially on the heart), the integrity of which it should be the object of all training to preserve.* That paper was published in the A.M. Blue Book for 1876, which was late in appearing.

I shall now have the honour of presenting to you a summary of the argument there given. But before doing so, I should like to say this: that while military officers quite allow that the losses by invaliding and desertion are very great—they have, indeed, been aptly likened to pouring water on a sieve—their contention is, that these losses are owing to the defective quality of the recruits rather than to any fault in the system of training them; that, if good men do not come forward in sufficient numbers, the medical examiners necessarily pass men who are defective, and who, therefore, break down. Suppose, for a moment, we grant all that. Is it not an argument in favour of a thoroughly scientific training—a training rigidly excluding anything that can be shown to be unscientific? There *should* not be anything in a military training that will not benefit even a defective man. But the system we have, if faithfully followed out, must prove injurious to the strongest men—those men who best obey the orders being those who suffer most. But great care is taken in the medical examination, and even after the preliminary weeding out by the recruiting-sergeants, who have a very good eye for the class of man who will pass the doctor, some 50 per cent. are rejected. The medical contention, therefore, is, that the breakdown of recruits and young soldiers is brought about by something wrong in the training. Proceeding, now, to the argument, I will only add that the writer of the prize essay alluded to, said in it, that he had "often seen recruits (in the Guards) perfectly exhausted after their morning's drill." But no explanation of this exhaustion was given. Training ought not to result in exhaustion. If it does it is bad training. It is training with a blot in it.

Let us now approach a body of recruits as they are being drilled, and examine one of them. The first thing to be noticed is, that there is the great elevation of the ribs of full inspiration, even the scaleni muscles being in action. There is also great depression of the diaphragm, and the sternum is thrown forward. Our eyes are just being attracted to the abnormal character of the heart's impulse, when we mark with surprise that this distended condition of the lungs does not give place to a properly-performed expiration; that little descent of the ribs occurs, or adequate elevation (that is to say, relaxation) of the diaphragm; in other words, that the act of expiration is, to a great extent, in abeyance. This, because the recruit knows that, discomfort notwithstanding, he must keep his chest expanded. Now, what consequences must certainly follow when this so-called training is persisted in day after day? I shall not speak of the heart just now. The consequences to it of this training are direct and immediate, as well as indirect. We know how inter-dependent the heart and lungs are; how influences affecting the heart soon affect the lungs, and *vice versa*. But it must at once occur to the mind that not only will the forces by which the important act of expiration is to a large extent accomplished in health—the elastic recoil of the lungs and of the chest walls—be, by repetition of this training, gradually diminished in power, but that, as the man stands before you, the blood in his lungs must be undergoing a deficient aëration. For, as the diminution in size which takes place in the chest, when expiration is properly performed, does not occur, it must follow that the air in the lungs, charged with carbonic acid, is not expelled to the usual extent, to be replaced by new air from without. Now, in active exercise of any kind, it is of the last importance that expiration should be efficiently performed. Under these circumstances a greatly increased quantity of carbonic acid having to be got rid of by the lungs, the respired, or charged, air needs to be expelled by strong expiratory movements, and fresh air inspired. In other words, the elastic power of recoil of the lungs and of the chest walls needs to be unimpaired. In very few soldiers have I found it so. The drill which the man before us is undergoing cannot be described as active exercise, and that is the only reason why the position is tolerable at all. Further reasons, showing that the chemical functions of the lungs are impeded by the maintenance of this chest-expanded attitude will appear when the effect of it on the heart is being considered. Before proceeding to the latter, I must add that in the gradual weakening of the forces by which expiration is normally performed, the over-stretching to which the abdominal muscles are subjected by the training is a very important factor. In normal expiration the contraction of these muscles diminishes the cavity of the chest by pressing the abdominal viscera against the passive diaphragm, and so elevating it. In the artificial condition imposed by the attitude of the soldier they are not only weakened by over-stretching for this work, but their action is antagonised by the diaphragm being kept depressed.

I think it will be admitted from the foregoing account (which I might extend by a fuller review of the mechanism of normal respiration if time allowed) that the physiological conditions—under which the act of expiration is performed in health—are gravely altered by the artificial chest expansion ordered for the recruit. This alteration cannot take place with impunity. Pathological states commence when physiological conditions are departed from. As concerning the result

to the lungs, the word pathological may not be admitted by all. For myself, I am convinced that vesicular emphysema, to some extent, occurs in nearly all the men—during the period of this training—from the continued and excessive distension of the air vesicles. Hypertrophy of the elastic parenchyma of the lungs might be expected to occur on the "*ubi stimulus ibi fluxus*" principle; but, if it does, it will not be compensatory and tending to the restitution of expiratory power, but will cause pressure upon, stretching of, and partial obliteration of the functional blood vessels—the pulmonary capillaries. I conclude, then, that you may increase the measurement of the recruit's chest in this way, *but that you do so at the expense of its mobility, at the expense of vital capacity, and that the recruit is thereby more or less unfitted for active exertion*—one reason for which I have already given.

Sooner or later the drill becomes distressing to the obedient recruit. He is distressed but uncomplaining. It will be right now to inquire why it should so distress him. If good reason can be shown why it *must* distress him, and in some cases even "exhaust" him, it being always admitted that exhausting or even distressing drill cannot commend itself to any well-regulated mind, then I consider that a claim will have been established to have this injurious drill discontinued. We noticed when inspecting the recruit at his drill that the cardiac impulse was abnormal. We must now see more minutely what is taking place. We cannot hear his heart beat as we stand before him—I daresay he hears it himself, and feels it too—but we can learn a great deal by watching the cardiac region narrowly. The organ, as I said, suffers early; and even before the man thinks of complaining a pathological condition has commenced.

I propose, then, first to describe the abnormal manner in which the heart acts in the dilated chest; second, to give the causes of its abnormal behaviour; third, to state why both one and the other (that is, the effect and its causes combined) produce exhaustion, or distress, or discomfort, or a mere feeling of irksomeness, as the case may be. Lastly, to consider the pathological states of the organ which may be induced.

Now, I shall be excused undertaking for a few moments this task, in order that I may disclaim any intention of exaggerating the consequences of this "training." A cause loses much by being over-stated—more especially a cause like this, with tradition, prevalent mistaken notions of what "*physique*" means, military views, popular ideas, all against it. And I beg, gentlemen, that you will remember that the order for chest expansion is an order that is by no means equally obeyed. I press it, also, that pathological processes of great importance may proceed very quietly, and attract at first little attention on the part of the sufferer.

Let us say the average recruit—speaking of those who withstand it best—would describe his dilating drill as merely irksome, or he might call it discomfort; I do not think he would often call it distress, at least in the earlier days. Some find themselves much distressed. And these are they, gentlemen, who take the order most literally and who best obey it. Further, I would not be understood as saying that in a short time the men who suffer break down utterly, and become unfit for duty of any kind. This is the result to many of them; but I am sure that in the great majority of heart complaints invalidated—other than those brought about by rheumatism, Bright's disease, etc.,

of which the history is to hand—the early link in the pathological chain was forged on the drill-ground. There has preceded the date of appearance at hospital a long period of uncomplained-of discomfort, often distress, consisting of breathlessness on slight exertion, headache, and heart-beating. Now exertion has become unbearable. A man who never knew he had a heart—an expression many a soldier has used to me—becomes aware of his possession after a few months' dilating drill. He blames his recently-donned pack or valise for his trouble, forgetting that as a civilian he could have carried it manfully across country for ten or fifteen miles. Now, has this man been enlisted by mistake? Or have we made him what he is?

This has proved more of a digression than I intended. To return: We find, then, firstly, that in the distended chest the cardiac impulse is lower down and nearer to the middle line than it ought to be, the site of impulse often varying in successive beats; its area appears to be increased; it can be even *seen* to be abrupt and jerky, and in many cases there is marked epigastric pulsation. On placing the right hand firmly on the cardiac region and the left on the back, we find the cardiac systole to be much more powerful than is natural, so much so sometimes that it shakes the body visibly. We are surprised at this, *for the man has been only standing*; and this excited action exceeds what would be expected even during active exercise. The condition of the walls and floor of the chest is maintained as before described, the respiration (shallow, and therefore increased in frequency) being performed by deficient elevation of the diaphragm—complete relaxation of it being prohibited—and very slight descent of the ribs, followed by the only further enlargement (by way of inspiration) that can take place, and this is very small, for lateral expansion has already been attained almost to the uttermost limit. The heart contracts about 110 times in the minute, its rhythm being irregular both in time and force in many cases. The right ventricle is found to be acting unduly. The respirations average 40 in the minute. There is a curious mixture of anxiety and resolution visible in the recruit's countenance. The man before us may have no hypertrophy as yet, and no murmurs indicating valvular inefficiency can be heard.

Now, secondly, the state of heart just described points to impediment, to obstruction, to the circulation. We shall now see how the obstruction comes about. Tight clothing, etc., may well be a cause of obstruction from without. I shall show that the attitude which the recruit is compelled to assume and maintain (for here lies the mischief) is a cause, more powerful, of obstruction from within. Let it be remembered that "as the thorax is a closed cavity, in which a partial vacuum is produced by the act of inspiration, while its contents are compressed by the act of expiration, the former state will favour the movement of blood from the large veins on the exterior of the cavity towards the heart, whilst the latter condition will retard it." The quotation is from Carpenter's *Physiology*. This author then proceeds to detail an experiment (to quote again) "showing the suction power of the inspiratory movement and the expellant force of the expiratory act." And he adds: "On the other hand, the expiratory movement, while it directly tends to cause accumulation in the veins, will assist the heart in propelling the blood in the arteries." Can anyone question the importance of these or of any other physiological laws? What then, if the act of expiration be to a great extent in abeyance? *A disturbance of the balance, which exists in health,*

*between the pulmonary and the systemic circulations.* This is the inevitable result, as we shall see. Here, gentlemen, is the blot in recruit training—that it brings about a disturbance of the balance which exists in health between the pulmonary and the systemic circulations. If I thus repeat the phrase it is because it lays down the essential evil of chest expansion as required of recruits. But will not the balance be restored when the recruit, off parade, is allowed to breathe as nature would dictate? Yes; the balance will be gradually restored, and the heart will become quieter, only to be disturbed again at the next drill-hour. This is the manner in which we produce “physique”—the synonym for looking formidable on parade and being useless for work, or else for doing the work in a condition of discomfort, distress, or exhaustion, as the case may be. Gentlemen, the British soldier is very plucky, and no man likes to “give in” less than he does. It is pitiful to see him trained to break down; for he will still go on, bathed with the cold dews of exhaustion, rather than fall out of the ranks. Considering that he is selected for being likely to prove efficient, I hold that, in time of peace at all events, the chances as regards heart and lung diseases are in his favour, rather than in favour of the civilian. I cannot now discuss this point. I am confining myself to the question of the artificial dilatation of the chest, and just now to the manner in which the balance of the two circulations is disturbed by it. But I commend it to you as being a tenable position, if only we would allow the soldier to breathe at all times physiologically as the civilian does, tight clothing and weight carrying in both cases notwithstanding.

The inspiration, then, a deep one, which the recruit takes at the word of command, produces physiologically an acceleration of the movement of blood from the large veins on the exterior of the chest, which movement of blood towards the heart *had been retarded by the previously occurring and duly performed expiration.* Now, as expiration is not, after the word of command, again duly performed, and as the position of the thorax is one of deep inspiration and remains so, does it not follow that in a given time, a larger quantity of venous blood will have passed into the right side of the heart than would have passed if the check or retardation which the expiratory movement properly performed exercises had been imposed? I do not quite contend for a “*vis a fronte*”; if that were established for a moment it would soon be disestablished. The right ventricle contracts vigorously, but the blood it drives forward for aëration cannot part with as much carbonic acid or receive as much oxygen as if respiratory movements were normally succeeding each other all the time. The degree in which the exhalation of carbonic acid suffers hindrance is in direct proportion to the impurity of the air in the ultimate air-vesicles. This air is only changed (if it can be spoken of as being changed) by the law of diffusion of gases; but in the absence of efficient expiratory movements this law is at a considerable disadvantage for the purpose required. If the recruit be now required to double, the breathlessness is quite urgent. The right ventricle is much embarrassed. Breathlessness in the recruits’ drill field means obstruction to the circulation, and obstruction to the circulation means excessive strain on the heart. This, again, means pathological changes in the shape of hypertrophy with or without dilatation; and this, further, may mean—though, perhaps, it rarely does—inefficiency of the valves, for, if the orifices increase in size, the valves which should close them do not.

Now, the systemic circulation is also injuriously affected; for the engorgement of the lungs arising as described, must, however slight, result in a retardation of the current of blood in the pulmonary veins, which is taking place towards the left heart; and not only so, but the arterial blood reaches the left ventricle insufficiently oxygenated, and also in deficient quantity. For, not only is the lining membrane of the pulmonary veins extremely sensitive to the passage of impure blood, but a most important movement—which is, perhaps, one of the chiefest aids to the advance of the arterialised blood towards the left auricle, the expiratory movement—is being held in check. The force of the right ventricle may be said to be expended in sending the venous blood to the pulmonary capillaries, and as some obstruction is already there, the pressure exercised normally on the pulmonary veins in expiration is much needed to maintain the circulation in them. The right ventricle does all it can, and hypertrophies that it may do more by-and-bye. The left ventricle receiving blood deficient in quantity and in degree of aëration, the wants of the system are not duly supplied; and the muscular and nervous structures of the heart itself must suffer. But the contraction of a deficiently-filled ventricle is mischievous to the ventricle, as is also that of an over-distended one. And distension of one side, with an insufficiently-filled state of the other, constitute, it must be admitted, a disturbance of the balance of the two circulations. Can we wonder, then, that when examining the recruit at his drill, we found his heart in the condition described? Is there not ample cause for it? The fact is that expiration is forgotten—what does the drill-sergeant know about it?—and the erroneous idea prevails that the man with the dilated chest is a fine, able, soldierly fellow, although he cannot compare in staying power with a man of much less chest-measurement who knows nothing of the injurious practice of chest-swelling.

We shall see, on a little further inquiry, that the chest-swelling ordered by the drill-sergeant is totally indefensible, and nothing but evil can follow it. It should be recognised that the full power of expansion of the lungs should never be exerted by an effort of the will—except under special circumstances. For instance, the singer—in anticipation, not of the requirements of the system, but in order that he may have the requisite amount of air to expire for the execution of a passage which would suffer in effect if broken by a fresh inspiration—expands his chest to the full extent to contract it again gradually, *but immediately*, by a correspondingly deep expiration. We take the same precaution in reading aloud, to avoid drawing our breath in the wrong place. It is for such requirements as these that the respiratory movements are placed so much, in the human subject, under the control of the will. But who will show that the breathing of the soldier on parade, marching, or doubling, should be conducted otherwise than automatically? The chest movements ought to vary in extent in accordance with the amount of blood sent into the lungs for aëration, which amount of blood, again, ought to be regulated by the natural forces which accomplish the movement of blood in the veins; but they ought not to be impeded by attention being in any way directed to them. Much less should they be grievously hampered in the way I have described. The movements of inspiration and expiration (to put it more plainly) increase in depth when the body passes from a state of rest into one of activity, for two reasons. Firstly, because the blood reaching the pulmonary



capillaries is now flowing towards them more rapidly, owing to the pressure exercised by the muscles on the veins throughout the body. Secondly, because the demand for oxygen by the system is increased owing to the increased chemical changes which take place as a consequence of muscular contraction. Now, the degree of chest-expansion, which the recruit, as he stands to be drilled, is made to assume, is greater not only than would be automatically dictated by the conditions in which he is placed, but is even greater than that occurring as the physiological consequence of active exercise—a degree of expansion, indeed, which *ought* to imply that vigorous muscular aid to the circulation was obtaining, and that, too, accompanied by movement of (as against a stationary state of) the body.

We come, thirdly, to the manner in which the recruits' distress is brought about. I find that under the previous headings I have, unavoidably, shown that dyspnœa is a certain consequence of the respiratory movements being impeded. I need not now repeat how, but I will say once more that expiration is as important as inspiration, and that that important act is interfered with for the recruit. Dyspnœa, then, according to its degree, involves exhaustion, distress, discomfort, or a mere feeling of irksomeness, as the case may be. I have said that those who most accurately carry out the orders suffer most. Now, some men can attain, owing to their figure in general assisting the effect, a degree of thoracic prominence sufficient to please the military eye without any very great hyper-distension of the lungs. Even for these the word "irksomeness" would but feebly express their sensations. There are other men who, being less shapely, can escape rebuke only by distending the lungs with air to such an extent as speedily induces almost a doubling of the pulse rate: of which result the deficient supply of blood to the left ventricle is the explanation. These men are distressed urgently in a few minutes. An order to "stand easy" has not yet restored the disturbed balance of the pulmonary and systemic circulations, when this unphysiological, injurious, process is commenced anew. This is obstruction to the circulation from within. It is worse than that (of tight uniforms or accoutrements) from without. For, in the latter case the cause of the mischief is apparent to the sufferer—he can, and does, in the fight, remove it. But he does not know, and he cannot remove, the disability inflicted on him in the drill-field; the existence of which it only required a little extra work and weight-carrying to make manifest. The results of acute rheumatism to the valves we know; the palpitation and irregularity of heart's action due to anæmia, general debility, or hysteria, we also know; but what is this? It is the result of the recruits being "perfectly exhausted after their morning's drill"—to repeat the quotation from the essay I have alluded to. Even if it could not be shown to be injurious, does not common-sense disavow such a mode of training?

Fourthly, and lastly, what pathological changes may be induced by the setting-up-drill?

It is too much the habit to say that cardiac affections are merely functional when we do not happen to hear cardiac murmurs. Functional disturbances of cardiac action may be, and often are, accompanied by murmurs; but when do we see such a case in the soldier? The fact is that, examine as we may, we cannot find the organ, or decide upon the condition—say, of anæmia or plethora—which is to blame for this so-called "functional" disturbance in the

soldier. The case, at first sight, looks much less urgent, less serious, than functional derangement properly so called. Look, then, for organic disease. What other name can you give to hypertrophy? This is not to say that you cannot have a case of irritable, or "soldier's heart" without manifest hypertrophy; but neither is it to say that "soldier's heart" does not result from organic changes in the heart structures. Hypertrophy is very common in the Army. Now, we saw that the blood reaching the left side of the heart was deficient, not only in degree of aëration, but in quantity, during the drill. We also saw that the expiratory act is a powerful aid to ventricular contraction. The conditions of healthy ventricular contraction are thus gravely altered, for the coronary arteries convey more or less impure blood in deficient quantity, to the muscular and nervous tissues of the heart. We cannot wonder, therefore, at the frequency of hypertrophy, or of dilatation, or the rhythmical irregularity so frequently associated with heart dilatation, or at the palpitation on slight exertion, with breathlessness and distress, for which so many young men are invalided. There are pathological changes induced that account for these things. For it is antecedently probable that a disturbance of the balance existing in health, between the pulmonary and the systemic circulations, will lead to a disturbance of the balance of power between the pneumo-gastric and the cardiac ganglia.

Gentlemen, I have curtailed the statement I wished to submit to you; but I trust you will let me say that I have shown that the mode of dealing with the recruit's chest is artificial, being in contravention of physiological laws; that it is injurious, and *that* to the most important organs of the body; that the causes of the visible embarrassment of the recruit's heart under training have not been sufficiently considered; that the embarrassment of the heart itself, which the training infallibly induces, has not been suspected of a significance that its continuance for many months for several hours daily might induce organic disease. In a word, that the recruit is the victim of the drill sergeant's ignorance and superstition. And the evil is all the greater because it is done in the name of good. It is difficult to root out errors that have long prevailed, and the Army is very conservative; but this matter ought to be attended to. The remedy is quite a simple one. If adopted, the men will work well, look well, because they will feel well; they will go through thrice the amount of actual exercise, and return to their barrack-rooms undistressed, unexhausted. For, were they not selected only the other day as in all respects eligible? This point does not receive the attention it deserves. We ought not to treat it as inevitable, or say, in an off-hand manner, "better invalid him," when we find a young soldier, who has yet had none of the vicissitudes, but rather the pleasant side of military life; never abroad, perhaps; better off in the Service than ever he was out of it, suffering from hypertrophy or dilatation, or both, or these combined with and causing valvular insufficiency. There has been no rheumatism or Bright's disease. Why is his heart hypertrophied? Why is he breathless except when at rest? Because he has been a man of war (without seeing war) for a year or so? What would have been the chances against his finding himself in his present plight if he had remained a civilian? Shall we put it all down to the tight tunic and accoutrements, or shall we pay any attention to what has preceded the wearing of them, namely, the distress and "exhaustion" of recruits' drill—the departure from the

physiological conditions of the circulation and of respiration which I have shown that drill to entail? What shall we assign as the cause of hypertrophy already developed in recruits not yet "dismissed drill," and who have been "trained" in a loose serge frock? Will it be admitted that a case is made out for the recruit? or are we to fall back on tobacco, alcohol, excesses of any kind—except excess in military chest making—for causes of this most common disability? We are aware what a striking contrast would appear if the state of heart of, say, 50 civilians were compared with that of 50 soldiers, taking those who have never been known to complain of cardiac trouble, and taking any civilian men, haphazard, of about the soldier's age. The soldier ought to have the advantage here; but he has not, though he is a carefully selected man. The civilian can accomplish the distance and carry the weight with less distress than the soldier. Why? Because the soldier has been trained. For, gentlemen, the position I have tried to maintain is that the recruit is compelled to outrage physiological laws, and that he must—and so must the Service for making him—pay the penalty.

Gentlemen, I now leave technicalities, but I beg your permission to add a few general considerations. A well-known newspaper correspondent, who was a witness of the performances of the men lately under Colonel Pollock at Hounslow, wrote his impressions concerning them. You understand of course, that military training does not enter into my calculation at all, nor am I propounding any system of physical training. I am pointing out a blot in the existing system, of the value of which, in other respects, it is for military, not for medical, men to judge. The thing that most struck this correspondent in Colonel Pollock's men was their "abounding energy," their "enthusiasm," their "keenness," their readiness to do more work than was required of them, gymnastic or other, and that was not a little. What a different tale is this from that of the medical officer of the Guards, who had often seen recruits, as I have, "perfectly exhausted after their morning's drill." Now, in what respect did Colonel Pollock's training—physical training—differ from the usual method? I approached him before he began his work, and he felt, after what I said, that it would be well to abandon interference with natural breathing; and he wrote to me undertaking to exclude breathing exercises. He wrote: "I will do more than you have asked me to do" (I had asked him to exempt, for purposes of comparison, 25 of his 100 men); "I will undertake that no breathing exercises whatever shall be performed. I freely admit that, but for your letter, I should have used the breathing exercises, not because I am an ardent believer in them, but because they form a part of the regulation system." You will, perhaps, think that the fact that Colonel Pollock had no invalids and no deserters—and you know that desertions are most frequent among soldiers of under three months' service—does not prove anything. And I do not say it proves much; the number of men was small. But is there not encouragement to try how the waste of the Army might be affected by training the next 10,000 recruits without chest-expansion, and comparing the numbers of invalids and deserters from their ranks with the number from the ranks of men whose setting-up drill has been conducted on the time-honoured plan? Is there not encouragement to hope that the keenness, enthusiasm, and abounding energy displayed by men whose breathing was left to Nature, might be displayed by the 10,000 upon

whom I suggest a similar freedom should be conferred? I hope the influence of this Institution will be brought to bear. I believe that our interference with natural breathing produces deserters as well as invalids, and these do not give a good name to the Army. They influence recruiting prejudicially. Surely a young man's inclination is to stick to the calling in life which he has taken up if only he be physically comfortable in it. The average soldier is better off after than he was before enlistment. Why desert? Is it the restraint of discipline he objects to? He cannot earn a living at *anything* without some kind of rules and regulations and discipline. I suggest to you that he is made physically uncomfortable, breathless, and palpitating by the injurious process I condemn, and within three months a high percentage of these youths desert. It can be positively settled in the way I suggest, and with the advantage Colonel Pollock's men received by their training, whether the inevitable discomfort of chest expansion is responsible for desertion from the ranks; and the claim is a reasonable one: that a natural function be left to Nature.

Then I suggest to you that the staying power which Colonel Pollock's men displayed—the power of doubling for a mile and a half without a break—could not have been arrived at under chest-swelling. Can you imagine an Oxford or Cambridge crew doing setting-up drill as a preliminary to boat-race practice?

Now I daresay many of those present are asking themselves: "Can the manly, soldierly bearing or presence which the soldier must have be attained without prejudice to his well-being?" The question has been answered by the men trained by Colonel Pollock. It has been more than answered. Military men may be inclined to contend that by the abandonment of chest swelling there would be loss in the matter of appearance. Not only will there be no loss, there will be, on the contrary, gain. For if a position or attitude be unnatural, even if it were not injurious—as things unnatural invariably are—it cannot be honestly described as manly, elegant, beautiful, or by any other fine adjective. I have shown it to be unnatural. It may be striking, but it is a deformity, and, as I have shown, an actively injurious one, which cannot be said of most deformities; and the idea that it is not a deformity, but the reverse, will be given up. What is often called "fine physique" in the Army is, in reality, deformity; and the breakdown under training proves that this is so. On the ground of appearance, then, this puppet-like attitude should be abandoned. We have seen men whose military appearance leaves nothing to be desired, trained without chest swelling, covering a mile in 8 minutes and doubling a mile and a half without a break. What soldier goes in for chest swelling in stress of battle? Is it not his duty to take every tiny bit of cover, from behind which (having made himself as small as he can) to fire on his enemy, who he knows is doing likewise? But I want to say that this making oneself small is a safe process in every sense. I recommend no interference with natural breathing. The soldier should be told *nothing* about this automatic act; but full expiration is sure to be followed by inspiration to the necessary or physiological extent, and no effort of the will can prevent it, whereas the reverse of this proposition is not true; the will *has* power to hold the act of expiration in abeyance, and this, unfortunately, is what our men are told to do. If it were desirable, which it is not, to direct a man's attention to his breathing at all, it would be safer, for the reason given, to advise him to keep his chest unexpanded rather than

expanded. But Nature has not left the integrity of the heart and lungs, and the due performance of their functions, dependent on anyone's knowledge. We breathe correctly asleep or awake, quite unconscious that we are doing so. Indeed, to be conscious of breathing almost means interfering with it. When I put these views (as to chest swelling) forward some 30 years ago the medical Press said: "It was not in this way that the old Roman soldier was taught how to endure the hardships of war, and the Roman legions to obtain the mastery of the world. There was no standing 'bolt upright,' keeping their chests in an artificial state of distension. Military exercises, observes Gibbon, were the important and unremitted object of their discipline. The recruits and soldiers were constantly trained both morning and evening, and care was taken that the arms destined for this imitation of war should be of greater weight than those for use in real action. Their exercises comprehended whatever could add strength to the body, activity to the limbs, or grace to the motions. We might certainly take a lesson from them, and replace the unhealthy drill of the present day by some of those practices which brought the Roman soldiery to such a state of physical perfection." Surely, gentlemen, the attitude of an individual conscious of his strength is not that which the soldier is taught to assume. It is a most unstable attitude. When ever did painter delineate, or sculptor model, the figure of an athlete or warrior in any attitude even remotely approaching that of a soldier at attention? I regret that time does not allow of my laying before you the argument, founded in anatomy and physiology, against the order which directs that, in the attitude of "attention," the weight of the body is to be on the fore part of the feet. But I believe you will hold me absolved when I tell you that in adopting for use in elementary schools the military model of the attitude of attention, including both chest expansion and the order I have named for the disposition of the weight of the body, the compilers of the syllabus of physical exercises append the following note of warning: "It should be remembered that the position of *Attention* is one of strain, and scholars should, therefore, never be kept in this position for more than half a minute at a time." Is the comment necessary that it is training we want—not straining? An attitude of strain, gentlemen, insupportable without injury for longer than half a minute! Common-sense disavows these foolishnesses, and practical soldiering should have none of them. Find the Zulu, the Boer, or the Japanese who would adopt them.

It only remains to say that while nobody has attempted to question the validity of the argument which I have had the honour of putting before you, I am able to bring—and I think I owe it to you to bring—to your notice some of the support which that argument has received. And first I shall quote from a long letter from Professor Keith, the Lecturer on Anatomy at the London Hospital Medical College, who permits me to do so. After stating his agreement in my view, he writes: "I found some three years ago, when giving a lecture at Toynbee Hall, that the 'models' which had been provided for me from the Army Medical Corps could not take an abdominal breath; they had absolutely lost the normal manner of breathing. They were emphysematous, although young; the elastic tissues of their lungs, so essential for a free pulmonary circulation, was more or less destroyed, and all the conditions of cardiac hypertrophy you describe were present. . . . I found the two models were typical of what is produced

by 'training'—poor devils, they are maimed, not trained. Pulmonary phthisis ought to be common in the Army." I cannot quote the whole of this letter. It will be of interest to many here that a form of phthisis—the fibroid form—is common in the Army (a form often quite independent of tuberculosis, but leading to destructive lung lesions). Dr. Aitken, Professor of Pathology, many years ago, at Netley, described it in his work.

Then the late Dr. Walshe, of Hyde Park Square, a writer on heart disease of European reputation, wrote: "I thank you much for putting me in possession of your views on this subject, founded as they are on careful direct observation, and supported by common-sense and physiological argument. It seems to me indubitable that the chest-dilating process *must* produce the evils you so graphically describe."

From the late Dr. Hilton-Fagge's work on medicine, I must make a quotation also. Referring to a paper by Professor Veale on hypertrophy and palpitation, he says that Professor Veale (in A.M. Report XXII.) assigns these disabilities "to no fewer than seventeen more or less distinct causes; but," he continues, "it seems to me far more likely that some one cause is really responsible, and I am very much disposed to think that the real solution of the difficulty has been found by Surgeon F. A. Davy, who (in Army Med. Report XVIII.) refers it mainly to the setting-up drill, in which recruits are compelled to 'swell the chest,' so as artificially to expand it. . . . Dr. Davy shows that in consequence of free expiration being prevented, the functions of the heart and of the lungs must be very seriously interfered with. . . . It is surprising to me that Dr. Veale does not allude to this view of the matter, which appears worthy of the most serious consideration of the military authorities."

The *British Medical Journal* took the same view, and said: "If the drill be to blame—and it appears to be so—then the sooner it is reformed the better."

The late Professor Maclean, of Netley, gave his adhesion also, and published a long review of a pamphlet of mine on this subject in the *British Medical Journal*. In it he pressed the importance of the matter, and said: "Great will be the responsibility of the military authorities if they turn a deaf ear to these representations."

The independent opinions I have given you, gentlemen, show that this matter should be looked into; that it is urgent; that it concerns the contentment, the efficiency, the popularity even, of the Army. Shall the reproach continue, that there is a grave blot in our training? Who will contend that our system is so good that it cannot be improved? Are we to progress in everything but recruit training? Can anyone advance a sound reason why chest swelling should be persisted in? Is it not abundantly plain that it is contributing largely to the waste of the Army? There is the unnecessary suffering of the men, the avoidable heavy cost to the State. Every consideration of the case, of expense, of efficiency, of humanity, suggests the necessity of reform, and that urgently. And then think of how easily the reform can be accomplished. Advice on the matter resolves itself into this: That we abstain from certain evil things, namely:—

- a. Chest dilatation.
- b. From the order directing that the fore part of the feet is to bear the weight of the body.
- c. From movements for "opening" the chest. We have seen to what *that* amounts.

Start from a basis of real military necessity, making the men practice only such work and exercises as are required for fighting efficiency. Abandon the false idea of human perfection of figure, as it is now supposed to be exemplified by what is called "the first position of the soldier," and instruct the drill-sergeant to improve the faulty symmetry of awkward-looking men by directing their attention not to their chests, but to the fault, whether unequal height of shoulders, head held too much forward—whatever the fault may be.

Corrections of the above kind to be made not alone when men are standing, but when they are doing military movements and evolutions; for thus the great disadvantage will be got over of keeping men long standing still—a far more important thing than officers realise.

As the soldier is a man whom we select as fit for hard work and are bound to further prepare for it, let us give him hard work of the kind soldiers must be able to do: marching, running, weight carrying, the special exercises of the weapons he must learn to handle. He will be content to do work which he can see to be real work and useful work, that will healthily fatigue him, not uselessly exhaust him. As a military horse can be trained to staying power and accuracy of movement, it being impossible to interfere with its respiratory organs so let the man be trained. Let interference with the soldier's breathing be thought equally impossible; and, once again I say, let military movement take the place of military standing still. Even the attitude of so-called ease, if prolonged, fidgets and irritates.

In conclusion, gentlemen, contentment, the sense of well-being in the ranks, and the presence or absence of enthusiasm for the soldier's work are necessarily dependent on the details of soldiering. Can there be a more important detail than that we have been considering? The British soldier has otherwise little cause for complaint; certainly none if we compare his surroundings and terms of service with those of other Armies. Steps are being taken to secure his spiritual welfare. Considering what I have put before you, is it too much to ask that the dictates of science and reason should be heard for his physical welfare? All of us acknowledge real military necessity; it is because I have been able to show that the practices I have brought to your notice cannot be properly described by that name that I have undertaken to condemn them as false, unnatural, and injurious.

Is it not due to the soldier, the Service, and the public that the necessary changes should be made without delay?

Colonel S. P. ROLL, Inspector of Gymnasia:—As Inspector of Gymnasia, and, therefore, directly responsible for the training of the instructors and the supervision of the training of our recruits, I should like to be allowed to make a few comments on Colonel Davy's most interesting and instructive lecture. I think he has rather misinterpreted some of the regulations. He says, "The recruit knows that notwithstanding the discomfort, he must keep his chest expanded," and he explains that the recruit consequently maintains his chest in the position of full inspiration and thereby restricts his breathing. Now, I do not say that such a thing has never been done, but I do say that there is no justification for it whatever in the existing regulations. Certainly not under the position of "Attention," nor is it in accordance with any of the principles of physical training which have been in force in the Service for the last eighteen years. The "deep breathing" exercise, as it stands to-day in the Training Manual, is practically never performed as a "chest-swelling"

exercise, as Colonel Davy calls it. If the recruit, however, has assumed these injurious attitudes, as no doubt has been frequently the case, it points to the necessity for more "expert" supervision of the drill training. The ideal state would be for every officer and N.C.O. to have a thorough knowledge of the principles of physical training just as every schoolmaster and schoolmistress in our elementary schools should, and in future will, I believe, have the same knowledge. Such a knowledge cannot be gained in a few days by reading a few regulations and instructions; and until we approach very much nearer to the ideal than we are at present, I feel that the actual physical training of recruits should be kept in the hands of "experts." By "experts" I mean officers and non-commissioned officers who thoroughly understand the physiological considerations and principles of systematic and gradual progression, and endeavours must be made to promote a better knowledge of these considerations amongst those responsible for the drill. I make a distinction between the physical training and the drill on the barrack square. Again he says, "Are we to progress in every respect except in recruit training?" I do not think he is quite up to date as regards what we have been doing in the Physical Training Departments of the Army lately, and it may interest him to know something about it. For the last year at Aldershot we have been at work drawing up a system of physical training that we can apply to our recruits. This system is based on that which has been in use in Sweden for nearly a hundred years, and which has been adopted in its entirety by many other nations with the full approval and support of the medical profession. We are compiling a Manual embodying this system, which will, I hope, very shortly be ready, and judging from Colonel Davy's expressed opinion I think he will be in full agreement with the principles enunciated therein. It is also the intention of the authorities to alter the drill manuals in accordance with the same physiological considerations. A committee composed of some of our leading medical men, both military and civilian, appointed last autumn by the Army Council, is devoting its earnest attention to the matter. The Danish Government has lent us the services of an officer possessed of highly expert knowledge in physical training, who has been with us since last August, and will probably remain with us one or two years to lend us his assistance in conjunction with our medical officers. From the above outline Colonel Davy will, I think, admit that far from neglecting the all important subject of recruit training, we have fully realised where that training requires improvement. Colonel Davy refers to the training of Colonel Pollock's Company at Hounslow. I should like you to hear from Major Moore, who is present, and who is the superintendent of the Gymnasia, his opinion of the comparison with our own recruits.

Colonel G. MALCOLM FOX, H.M. Inspector of Physical Training (Board of Education):—Although I have listened with careful attention to the lecturer's address, I must admit that I find it difficult to answer, as I cannot trace through it any logical sequence of thought. From start to finish, the past is ever present. Any data that are given are valueless or misleading owing to a glorious absence of detail. The address opens with a reference to a paper read by Professor Maclean over 40 years ago, dealing with Army conditions prior and up to the year 1867. That paper evidently dealt with the wastage in the Army by invaliding, and I have no doubt the remarks then made were of high value, but can we take them—as evidently Colonel Davy desires—as being applicable to the present year, 1907? Is the drill and training of the Army of



40 years ago the same as that of to-day? Are the conditions of the soldiers' life as regards food, dress, barrack-room accommodation and general hygienic surroundings the same as in the year 1867? If the conditions of the Army as regards these essentials of a soldier's life have not changed since that date, then all that can be said is "God help the Service!" because it has remained stationary when every other profession and science has advanced. Now, Colonel Davy begins with his own experience of the Service, starting in the year 1861 and terminating in 1906—a period of 45 years. During these 45 years he is personally aware of the discharge of 833 men from the Service due to heart trouble. He remarks that this statement is startling, and so it is, but the startling element is, that one is left in profound darkness as to the distribution of these 833 cases during the 45 years. From anything written or inferred, the whole 833 may have occurred in the first year. For such a statement to be of the slightest value or to be used as an argument, the number of such cases discharged each year, or even in periods of five years, must be given to permit of comparison. What would be the value of any medical treatise dealing with, say the death rate of diphtheria during the last 45 years, if only the sum total were given for that period, and not the proportion assigned to each year of the 45? Such a method would render it impossible to show the reduction in the last few years due to modern methods of treatment. I must confess to being startled at such a hopelessly unscientific basis on which to found an article. Colonel Davy now comes to times a little more up to date, and he gives us a summary of the arguments used in a paper written in the year 1867, and published in the A.M. Blue Book of that year—just 40 years ago. With these it is not necessary to deal, as the arguments of 40 years ago are now really of little value. Again, there is a big jump from 1867 to the present year, 1907—at least, I must infer so, because the paragraph begins, "Let us now approach a body of recruits as they are being drilled, etc., etc." Is the body of recruits standing at attention, standing at ease, or what? I think, however, that one may infer that they are standing at attention; at least that is the impression derived by myself. Having approached the recruits, Colonel Davy notes certain defects—Elevation of the ribs, Scapular muscles in action, great depression of the Diaphragm, etc. Were these recruits stripped to the waist? He does not say so. If they were not, these observations are scientifically as valueless as his data of the discharged heart cases. It is to the position of attention, however, that most of Colonel Davy's objections are directed. Let us look at what the position of attention really is. It is simply a starting position, namely, a position of alertness of mind and body for immediate action. The main directions for it are:—"Shoulders and body square to the front"; "Arms hanging easily from the shoulders"; "Hips drawn back"; "Chest advanced *without constraint*"; "Feet at an angle of 45°"; "Weight of body on the fore part of the feet"; "Head erect"; "Chin drawn *slightly* in." Please note "*Easily*," "*Without constraint*," "*Slightly*." Now, what are the effects produced on the body by these directions properly carried out? Muscular action is called into play and the Spinal Column (composed of a series of superimposed bones jointed together) is brought more into a straight line, thus causing the dorsal backward curve of the spine to be reduced, and the ribs attached to the spine in that region are carried forward with the spine, hence shewing a greater forward prominence of the chest. Not the distended, puffed-out chest of Colonel Davy, but the chest with its diameters but slightly increased and without restraint, transferred from rear to front. What is the chest? It is the case which protects the lungs. Made up of the spine at the back,

breast bone in front, and the ribs attaching the spine to the breast bone. All the ribs are attached to the back bone, but the six upper ones are directly attached to the breast bone and the seventh indirectly. The five lower ribs are not attached to the breast bone, hence it stands to reason that the upper part of the chest is much more rigid, forming practically a box; whereas the lower ribs, being unattached in front, have a much freer range of movement and hence have an infinitely freer range of movement during the act of respiration. In the chest we have the lungs, composed mainly of air cells; the diaphragm, which is a strong muscular partition forming the floor of the chest. It is cone-shaped with the apex upwards. During inspiration it becomes flattened downwards, and as it flattens there is a gradual filling out at the foot of the breast bone. Now, the proper position of attention, instead of impeding the act of respiration, is of the greatest aid to it, because the slight bending back of the chin and the drawing back and down of the shoulders helps to fix the upper comparatively immobile part of the chest, and for the purpose of breathing we must look on the chest as divided into two parts: upper ribs attached to breast bone—comparatively immobile; lower part ribs, unattached—mobile, and in conjunction with the diaphragm, acts as a bellows and is constantly varying its movements and capacity, and this is aided by the fixation of the upper part of the chest. So, as regards the proper position of attention, I find myself quite at variance with Colonel Davy. I look upon it as a position which aids the act of breathing, and hence tends to improve the physique of the recruit. It is not the heart-hypertrophy producer and consumption maker that he would wish us to believe. To those who dislike a maze of technicalities—"sternum, diaphragm," etc., etc., I would ask for a simple experiment. Strip in front of a looking glass, place yourself in the proper position of attention, remembering "Easily," "Without Restraint," "Slightly." In that position draw in a deep breath and note in the glass the rise and mobility of the lower mobile part of the chest. Then drop the head and slouch the shoulders and again draw in a deep breath. I ask no more—no less. Anyone can compare for himself. Return for a moment to my statement that attention is simply a starting position—one of bodily and mental alertness. Alertness of the body is what? All the muscles in a state of slight tonic ready to act. Now surely no one in their sober senses would ever think of keeping recruits in a starting position for an indefinite time. Of course this starting position must be acquired by gradual and progressive physical training, but once acquired the position of the chest becomes habitual and natural to the subject, and why not, when we know that this position of the chest means increased mobility of the lower breathing half of the chest and increased lung capacity, and hence improved health to the subject. Does not every trade leave its imprint on the tradesman? The collier, with his cramped slouching gait? The cobbler with his contracted chest? Why not the soldier with his chest advanced in the right position—NOT SWELLED or DISTENDED—an object lesson to all who wish to give their lungs the freest play? Colonel Davy has referred to the Oxford and Cambridge boat crews. He asks, "Would they be benefited by 'setting up drills'?" Ask any one of either crew, who have ever rowed in this classic race, if it is not essential that the chest must be kept forward, and that they must sit back on the bones of their pelvis. Is it not a crime to tuck in the belly or contract the chest anyhow in a forward direction? Why? Because it interferes with the mobile lower part of the chest. Still further, our Volunteer forces who attend drill after a long day's work in civil life, do they complain of this position? Do we hear grumbling from our schools? In

Sweden (the best physically trained nation in the world) this position is strictly insisted on because of its beneficial effects on ordinary respiration. Do we hear from them an alarmist outcry? Again, look to our ablest elocution teachers. The position they use as regards the carriage of the chest is exactly that of attention. Why? Because they practically knew that that is the position of free and easy breathing. So it is with the sprinter and long-distance runner, who at the finish of the race "breasts the tape," head up, chest forward. Last, but not least, to bolster up an unscientific argument, Colonel Davy calls in support the recommendation in the Elementary School Syllabus: that the position of attention is one of strain and must never be used for more than 30 seconds. Surely, had he given this even a passing thought, he must have grasped the fact that this code was prepared for little boys and girls from the age of seven years, a distinct proportion of whom were well known to be either underfed or of poor physique. A careful perusal of the introduction to this code would have clearly shown that the strain there referred to is not heart or lung strain, but the neuro-muscular effort involved in keeping children (many of feeble physique) in a more or less fixed position for an unduly long time. It is surprising to find this warning given to our board school teachers against neuro-muscular strain, interpreted as an argument in favour of the heart-hypertrophy and lung distending effect of the position of attention in the case of the recruit—a young man, selected after careful medical examination, because of his physical fitness. It vividly recalls to me that noted "memorial" out of which King Charles's head could never be kept. This brings us now to the deep breathing exercises against which Colonel Davy comments most adversely. His adverse comments are wise if he thinks that the objects of these exercises are to distend or swell the chest. If that is the object, it would indeed be wiser to train our recruits to all become Bassoon players, and to thus produce the pathological condition of Emphysema (over distended air cells), and a consequent permanent chest swelling. That is not the idea at all of properly carried out deep breathing exercises, the object of which is the healthy functioning of the lungs by long deep inspirations, followed immediately by long deep expirations; both of these acts calling into play, outside muscles to aid, as far as is reasonable, these efforts. These exaggerated efforts bring to the lungs a greater supply of oxygen and carry away an increased amount of carbonic acid; but, further, they hasten the interchange of oxygen and carbonic acid between the reserve air of the lungs and the ordinary atmosphere breathed—a condition which does not occur in ordinary respiration—hence, it is needless to say, that such exercises done with the idea of chest-swelling are stupid and unscientific, and it again points out that the error is in the execution and not in the system. These breathing exercises are part of the daily routine of our school-children, and the medical officers in charge of our schools not only recommend, but, in many cases, insist on their daily execution. The Swedes insist on them many times daily, and always after bodily exertion. In our Sanatoria for Consumption, in early cases they are known to be of much benefit. Ortel of Munich, 20 years ago, laid stress on their advantage, combined with hill climbing, in many forms of heart disease. If the Army delete these exercises from their system, they will be taking this step against the scientific opinion of the civilised world. If it is reasonable to train the muscles of the arms and legs, is it not equally reasonable to train and develop scientifically the muscles of respiration, thus producing a supple chest capable of expansion and contraction in response to the respiratory wants when called upon by violent or prolonged exertion? Is not the strength of a chain that of its weakest link? To say the least, before departing from these exercises, one

would certainly require rather stronger evidence than 833 heart cases in 45 years. I do think Colonel Davy is basing his present opinions too much on the past, and that his impressions are like the soldiers' chests of the year 1861—too fixed. His arguments are too much based on his own paper of 1877. He has never made any reference to any changes that have taken place in the drill of recruits in recent years. He has made no reference to the most recent innovations of free gymnastics on the Swedish basis. Any soldier who has served ten years will tell you that the drill of to-day for the recruit is freer, easier and lighter than it was when he joined. The old ramrod, drain-pipe positions are dying out quickly, if not already vanished. The old methods of recruit-training are altering steadily and day by day—the same is occurring in civil life. In what civilian or Army gymnasium are to be found the old heavy dumb-bells? The whole tendency now is not to the formation of masses of muscle, but towards quickness and liteness and activity. Yet any one studying Colonel Davy's paper is left with the fixed idea that the whole system of training is the same in the Service as it was when he took over charge of Fort Pitt in the year 1861. That is not the case. It is not the Service that has stood still. Lieut.-Colonel Davy has failed to grasp or appreciate the steady advance of modern methods as regards the training of recruits. Is it not the case that the Navy have, with the aid of a Swedish expert, adopted, some two years ago, a system of physical training based on the Ling system, and has not the Army, after gradually introducing similar methods, finally introduced the same system in its entirety, aided by a Danish officer of great experience? If these two facts are true, might they not have been to the gallant Colonel a "rift in the lute," or a silver lining to his darkest cloud? Apparently he is either ignorant of the facts, or possibly he prefers the gloom and depression of the past to the dawn of brighter and happier days in the future.

Dr. H. E. DEANE (late Lieut.-Colonel, R.A.M.C.) :—There are a few controversial points in Colonel Davy's paper which need not, however, be gone into at this meeting. I differ from him on one or two technical points, and one is this: He says there is a great depression of the diaphragm, that the inspiration taken at "Attention" by the recruit is a deep one, and that the attitude imposes an over-stretching of the abdominal muscles. The inspiration taken by the recruit when he is called to attention is, I maintain, not a deep one. The diaphragm does not descend, but is kept in an expiratory position. That I have verified by watching a drill sergeant standing in the position of attention in front of a fluorescent screen. It was done by Dr. Bruce, who has charge of the X-Ray Department at Charing Cross Hospital. That is a thing which can be verified by any of you who choose to see it done. The diaphragm is kept in an expiratory position, and instead of descending freely, as it does in the normal standing upright position, its movement is very limited. The man's ribs were fixed, illustrating beautifully Colonel Davy's statement that it interferes with natural easy respiration. A point on which I absolutely disagree with Colonel Davy—of course, I do not do it unpleasantly—is his remark about the drill sergeant. He says that the soldier is the victim of the drill sergeant's ignorance and superstition, but he is not. Who instructs the drill sergeant? The drill sergeant obtains his orders from the drill book, which is written by that impalpable thing known as "By authority." If the recruit is a victim of anyone, he is the victim of the very highest authorities that control the regulations of the movements of the recruit, and the chief of those who are at fault I put down as the Medical Depart-

ment, who, since the days of Maclean and Parke and Riordan, have never paid the slightest attention or taken any interest in this abominable perversion of the human attitude. To illustrate my defence of the drill sergeant, I may tell you that some years ago—I am glad to say it is some years ago—I saw put up in a building connected with recruits, that when a man stood in the position of attention, a plumb-line dropped from the most prominent part of his chest was to strike the ground several inches in front of his toes! Will any gentleman present try and get into that position, and find out how impossible it is? After I left the Service and had more opportunities of going into this subject—which has been a pet hobby of mine for many years—I proceeded to further investigate the effect of this position on the recruits, and I read a paper in May, 1905, before the Royal Society of Preventive Medicine, and in that I suggested the remedy which Colonel Davy has hinted at, and which I must say at once has been anticipated by Colonel Rolt. I arrived at the suggestion he has made quite independently of him; I had no idea that he was going to make it. I wish to make just a few general remarks with regard to the men who are taken into the Army. I will take the weedy man referred to by Colonel Fox, who is squeezed into our Army as a special—at all events, he is passed as likely to be an efficient soldier. Will you tell me this: Who is the man most likely to profit by good food, good air, good housing, good hygienic conditions, plenty of leisure, some work and physical training, than the weedy individual? And yet you break him down. The improvement of the faulty attitude or the slouching position of the recruit is a gradual process. The correction of a faulty attitude and the proportionate development of the growing frame can only take place through the muscles, where important metabolic processes of our bodies go on, and the development of the muscles (and by that I do not mean simply bulk; I mean the general tone and stretching and elasticity of the muscles), and the consequent action upon the skeleton is a gradual one and must be spread over a very considerable time. The great blot in the physical training of our recruits, in addition to the one of which we have heard to-day, is the frantic, hysterical hurry that the man suffers from at every turn. He is hurried and hustled here and there. Those of you who have been in the Service know that when a man is wanted to do anything outside, the first thing that gets the go-by is the gymnasium. The attempt to do things in a hurry simply leads to inefficient results in too many cases. The point of suddenly trying to correct the shape, or rather deform the shape, of a recruit into the abominable position of attention was specially emphasised by Colonel Riordan in his book on "Heart Disease in the Army," which is the best book on the subject, to my mind, that has ever been written. The time given for all-round, efficient, physical training of the recruit—and I think some of the military gentlemen are agreed with me in this—is lamentably insufficient; and I go further and say that the requisite amount of good will not be done until that point, after receiving very careful attention, is altered. Now, introducing a remedy for this position is simple up to a certain point, but a danger has to be avoided. I agree with Colonel Davy absolutely when he says, "Draw a man's attention to his breathing and he will do something wrong." In 1893 I attended a lecture in this theatre dealing with the same subject, when I had the privilege of making some remarks, and I then said that "in about fifteen years from now something may be done." It is just about fifteen years since that time, and something is now being done. I will go further than Colonel Davy, and say that if you draw attention to a man's arms and shoulders, he will at once do something wrong. What I mean is this: When you have got the man's trunk properly balanced over the arches of his feet, his head properly balanced on the top of his spine.

his chest at once comes into its natural position, which is not one, as Colonel Fox has been trying to explain to us, of expansion. It is a natural easy position, and not one of expansion, but one admitting of expansion. Colonel Fox's remarks show very definitely the danger of talking about things without a clear idea of defining first the term used. Expansion of the chest is not the term applied to the natural position of the ribs when the spine is properly balanced. The chest comes into its natural position, the shoulders also come into their natural position, and the arms hang from the shoulders as they are meant to hang. The appendages of the trunk follow the movements of the trunk; the trunk does not follow the movements of the appendages. Tell a man to draw his shoulders downwards, or backwards, or in any way you like, beyond its natural position, and it will at once induce rigidity, and that rigidity will be at once felt in the respiratory tract. I hope you will afterwards try to do that; I am constantly demonstrating it. All these things can be demonstrated by X-Ray photographs, and a knowledge of the human frame is necessary to understand the subject. The natural erect position of a man is one of alertness without rigidity, which seems to apply to the soldier too. Just to give you an illustration of my contention, I may mention that many years ago I was trying to explain the balancing mechanism of the human skeleton to an officer, and I failed dismally. He turned round to me at once and said, "That may be all very well for the human being, but it does not apply to a soldier." So that whoever has the business of rewriting the position of attention will find it very difficult indeed to meet the requirements of Nature, and to satisfy military traditions at the same time. Now comes the remedy. Before a man can train a recruit he must thoroughly understand first of all the simple elementary principles dealing with that recruit. At present the officers do not know, because they are not taught; they are left to pick it up anyhow, and well many of them do pick it up. But the whole question of physical education in this country is in the hands mostly—and I say it advisedly—of a lot of amateur faddists, who are simply commercial men making a business out of it. As soon as you become hide-bound to a system of exercise you immediately become liable to indulge in the unqualified statements of a quack. My idea of the remedy is this: Let us either have the drill sergeants instructed as to the requirements of the recruit, or what I think is better still, place the recruit during the whole of his preliminary physical training into the hands of the Army Gymnastic Staff, and have that staff properly instructed as to the requirements, which should be carried out by, or under the supervision of, the Medical Department. For the last two years I have been experimenting on this subject of the effects of exertion on the body. We want to train our recruit for the work he is going to do. When I began to go into the subject of soldier's heart and the rapidity of the pulse, I was faced with a difficulty, namely: What was the effect of exercise on the pulse normally and under different conditions? I found that nobody knew. I could get no information in the literature of the subject; I applied to some men who I thought might know, and they said they did not know. I then set to work to find out for myself. For the last two years I have been making experiments by taking simultaneous, respiratory and pulse curves of all sorts of people, amateurs and professionals, under all sorts of different conditions of exercise, and by the kindness and courtesy of Colonel Rolt—whom I should like to publicly thank for his kindness—I have hundreds of tracings of the men at Aldershot, showing how the pulse settles down under ordinary conditions and how it settled down under deep, but not forced, breathing. The results are startling. I have submitted these tracings to the greatest authority in England on the respira-

tory changes in the pulse, and he says, "I have been looking for these things for twenty years, and now I have got them I cannot explain them." Nobody knows the effect of this deep breathing introduced here, there, and everywhere. Taking a man down and putting him to do deep breathing in the middle of a day's work has a disturbing influence on his pulse and heart, which, though it may not do him any harm, can do him no good. I have some graphic records to show the effect of deep breathing which will very materially alter the physiology which is taught in the books of the medical schools at the present day.

Major CHAS. MOORE, R. Berks Regt. (Superintendent of Gymnasia, Eastern Command) :—Colonel Davy has explained certain physiological facts which are well known to experts in physical training, but which are not known to those who have not studied the subject. It is, however, very desirable that those whom one might call "non-experts," in whose hands the drill and technical instruction of the soldier is placed, should understand some of these main physiological considerations, so that they may be aware of the dangers to avoid. There is no doubt that the "non-experts" above referred to (no disparagement is meant by the term), have frequently misunderstood and misapplied the instructions contained in the official text books, not from any fault for which they, as individuals, are responsible, but owing to a want of knowledge of physiology and the principles which should govern all training of a physical nature. The recruit has, heretofore, often been allowed, and even encouraged, to assume positions which were never intended by the regulations, and which resulted in high tension of the nerves and muscles and restriction of the breathing—positions and conditions which were well known by the expert to be wrong and to be foreign to the intention of the regulations. The lecturer contends that the diseases of the circulatory system among soldiers are due to such faulty positions. One fully realises that Colonel Davy's object is the same as that of those whose attention is devoted to the practical improvement of the training of the soldier. But some of the statements he makes in support of his contention do not altogether bear out his conclusions. As regards Colonel Pollock's experimental company, it is impossible to compare these men for a moment with our Army recruits. I was fortunate enough to have an opportunity of seeing these men and of judging for myself. I also understood from Colonel Pollock that 500 men answered his advertisement for 100 (he had advertised in the papers for 100 men), and that the whole of the 500 were a better class socially, intellectually, and physically than the Army recruit. The 100 men taken were picked as the best of these, and were thus, in every sense of the word, picked men. They were also a good deal older. Most of them were men who would not present themselves for enlistment. Colonel Davy also refers to the Army recruits as being "carefully selected men," and, therefore, at an advantage over the civilian. They are, it is true, selected, inasmuch as the best of those who present themselves for enlistment are selected; but, although our recruits have improved during the last few years (certainly they have in the cavalry and artillery), taking them as a whole one can hardly say we get physically anything like the best of the civilian population, or even that they compare favourably with the class from which they come; and to compare these men with Colonel Pollock's splendid material is most misleading, and no conclusion can be drawn from such a comparison which will in any way support the lecturer's contention. Again, as regards Professor Keith's letter which Colonel Davy quoted with reference to the emphysematous condition of the "models" provided by the Army Medical Corps, I would point out that the men

of this Corps are very little under the influence of the drill instructor, probably less than any other branch of the service, including the other departmental corps, and it can hardly, therefore, be argued from them that it is the *drill* which was to blame for their condition. The drill that the men of this Corps do is so little that it can hardly be taken into account. Colonel Davy also refers to the conditions of "soldier's heart," etc., as prevailing very markedly thirty or forty years ago. The position of attention and the whole of the drill was in those days very much more rigid than it is now, and the drill instructor far more insistent on rigidity. It hardly, therefore, follows that the present comparatively easy position of attention, etc. (even thought at times wrongly taken), are the sole, or even the principal causes of the irritable heart and emphysematous condition of the lungs of the present day. Colonel Davy very rightly condemns the holding of the breath and the fixing of the walls of the thorax. Amongst other remedies for this is the judicious employment of breathing exercises under expert supervision. It is only a few years ago that some medical authorities in this country recommended that, when performing breathing exercises, the breath should be held for a few seconds with the lungs inflated to the fullest extent. This is now admitted by all who have studied the subject to have been an error, and a grave one. But because there has been an error in the method of performing these exercises it will, I think, be granted that it is no argument against the correct employment of breathing exercises when occasion arises for their use. The singer takes what is nothing more or less than a correct breathing exercise when, in the words of the lecturer, he "expands his chest to the full extent to contract it again gradually, but immediately, by a correspondingly deep expiration." The good health and vital capacity of the singer is proverbial, and singing is recommended strongly by many medical men for the use of soldiers as well as civilians for the purpose of encouraging full and deep respiration. The Pipers of a Highland regiment are admittedly the men of best physique and greatest staying power, and they, as a rule, have spent some considerable time in every day of their lives from childhood, in taking full inspirations followed by immediate and equally full expirations. It is, too, a mistake to think that the athlete does not practise breathing exercises. Very many athletes practise these exercises as a regular part of their training, and I may mention that at the last Olympic games at Athens it was particularly noticeable that the Swedish athletes (brought up on the Swedish system of physical training, which includes the daily practise of breathing exercises) showed far less signs of distress and recovered themselves far more quickly after the various races in which they took part, than was the case with competitors of other nations. It is, I think, agreed that a mobile thorax is all important. Breathing exercises, performed, as they should be, with full, but not forced inspiration, followed immediately by equally full, but not forced expiration taken in the normal rhythm of breathing according to the individual, improve the mobility of the walls of the thorax more than any other exercise, and put a man into a better state to exchange the carbonic acid in the system for oxygen when occasion requires. As regards such properly regulated breathing exercises, we have the experience of nearly a hundred years in Sweden to justify their employment, besides that of many other Continental nations, and the opinion of a very large proportion of the medical profession in this and other countries. I think that there are many who are not satisfied that the real "blot" on the training is exactly where Colonel Davy would put it, and might I suggest for the consideration of the medical profession, whether the real root of the evil is not the desire to hurry a man's training too much, and to put him to sudden strain and expect



too much of him too soon, and before what should be his careful and progressive training for such work has been properly completed. The cramming of too much work into too short a time, and the sudden calls which are made from time to time on a soldier's endurance before he is fully trained, are an undoubted strain on the immature lad that we so generally get as soldiers. We want, of course, to put our soldiers in the best possible condition of health to undergo the ordinary wear and tear of their life, and the strains of active service, and to derive the fullest benefit from their technical training. And if sufficient time is not given for getting them into this condition, or the work is commenced too suddenly, harmful results are sure to follow. It is certain that a more widely extended knowledge of physiological considerations, as advocated by Colonel Rolt, would very greatly improve the conditions under which men are trained, and it is, I urge, worthy of consideration whether the tending to hurry and interrupt the training before its completion is not responsible for some of the harm.

Colonel G. G. A. EGERTON, C.B., Commandant School of Musketry, Hythe :—I do not wish, for various reasons, to join at any length in this discussion. I should like to say a good deal, but I am prevented from doing so. I will, however, venture to offer this contribution. I sent this lecture to one of the leading physiologists in Great Britain, and he returned it to me to-day with this reply :—"I thank you for sending the proof, which I have read with interest. The general contention that respiration is self-regulating has always been maintained by physiologists and the best experts." I take that to mean that he agrees that deep breathing should be self-regulating.

Commander H. D. R. WATSON, R.N., Superintendent of Naval Physical Training :—My excuse for making any remarks is that I occupy the position of Superintendent of Physical Training in the Navy, and I think it may interest the meeting to know what we are doing in relation to the matter. The question of gymnastics or physical training in the Navy first received special attention in 1902, after training aloft was dispensed with. It was decided that the Swedish system formed the most logical progressive system, in other words, that it fulfilled the desiderata that Major Moore referred to. This was adopted; but during the past year the Admiralty have not been content with merely adopting a system from a nation; they have decided that it was desirable to enlist the interest and sympathy of the medical officers in the Navy, and with that view they have appointed a surgeon who has personally gone through a practical course of Swedish gymnastics. It is now intended that he shall go round the various training establishments that we have for cadets and boy-ratings, and also endeavour to collect statistics on the lines that Lieut.-Colonel Deane has done. I mention this point because I desire the meeting to understand that the Navy thoroughly realises the imperative necessity of medical officers assisting in the supervision of this work. I venture to think, with Colonel Rolt, that the lecturer has, perhaps, dealt with what was happening three or four years ago, and that the remarks he has made do not apply to either Service in the degree that they did. In conclusion, I would like to tell the meeting that, as regards the system of exercises employed, we do not consider ourselves bound to any nation or system. If the medical officers of my staff, after due experience, recommend a change from the Swedish system, or any other system, it would be carried out, because I do not consider we ought to be bound by what others say, but only by what is sound and applicable to Naval requirements. I would like

to point out, finally, that the two Services are in line as regards the system they have adopted, and that if their medical officers cannot thrash out what is best, I very much doubt if anybody else can.

Lieut.-Colonel F. N. MAUDE, C.B., Hampshire R.E. (Vols.), late R.E. :—The remarks I intended to make have been largely anticipated by the previous speakers. I would like to ask Colonel Davy, however, whether he can give us in his paper, when it is printed, the date of the order referring to "chest swelling?" I went through all the old drill books in the library upstairs, and I cannot trace such an Order anywhere. I have been in the Service for thirty years, and I cannot remember the order being given. The next point I should like to refer to is, that whilst I was going through these drill books, I also went through the Army Medical Returns, and I found that, going back particularly to twenty or thirty years ago, when the rigidity of the soldier's attitude was carried perhaps to an extreme, in nearly every medical report attention was drawn to the comparative health of the troops in England and the health of the civilians in the country. It was stated that the health of the troops was not worse than that of the average members of the population. That would mean that it was a good deal better than the health of the class from which they were taken, because the average British soldier, when he comes to us, does not come from a well-nourished class, and the death-rate is rather high. It is very difficult to get correct figures on that point; but, judging from the men employed in dockyards and big works, where the work is hard and the exposure is considerable, I think you will find that, on the whole, we do not invalid more men in England between the ages of eighteen and twenty-four, than civilians in the same class of life under equal conditions. I think if we could get statistics with regard to that particular point it would be of enormous help to all the armies of the world. With regard to the question of breathing exercises, Colonel Fox and Major Moore have covered the ground so completely that I have very little to add. Nevertheless, I go so far as to say that the men who introduced drill into the Army, and who laid down the drill practices and the reason for them, never thought, and did not care about the health of the individual. What they thought of was the spirit of the men—whether they were training men to fight who would be able to go in and win. It was not a question of whether the man suffered from heart disease; his life was so short, in the days when they took a battalion into action and, as a general rule, a third were left on the field, that they did not trouble about such elaborate investigations. They thought only of the means by which you could fix the will of a man, and make that will carry along the man in the face of danger and death; and that they did succeed in that there can be no doubt at all. The old British line used to be called at "Attention" as soon as it came under fire, and stand in that position not for the matter of half a minute, but a good deal longer. Even Napoleon's troops, who were not always looked upon as highly disciplined, if they misbehaved themselves were taken out the next time and were ordered to stand under fire as a lesson and a disciplinary punishment. In the same way, quite recently, the Japanese adopted the same principle. I remember in one instance one of their battalions did not distinguish itself quite as much as it might have done; it left an officer behind on the field. They subsequently buried the officer where he fell, and they made that regiment march past the officer's funeral monument every day on its way to duty in the trenches. That is a different kind of spirit altogether to the physiological one we have been discussing. Even if drill does all the harm we are told it does to the physique of the recruit, as long as it will give us men who are physically fit to stand the

strain of the battlefield, that is the vital matter for the nation, and it is for the survival of the nation, not for the survival of the individual that we, as soldiers, are primarily concerned.

Major-General Sir JOHN MOODY, late R.M.L.I. :—I have listened with the greatest interest to the lecture given by Colonel Davy, from which I have learned a great deal. It has also been a privilege to hear Colonel Rolt, Colonel Malcolm Fox and Commander Watson, and the other experts who have taken part in the discussion. I know something about recruiting for the Services generally, but particularly recruiting for the Royal Marines. I recollect that when we measured the men's chests we did not take the maximum and the minimum measurements, but we took the normal. If a man was inclined to expand his chest for the purpose of getting through, the sergeant generally gave him a slap in the stomach, and that brought his chest down at once. So far as our old system of recruit setting-up drill is concerned, I never knew a man who has suffered from it. I was Instructor in Naval Gunnery for nearly three years, and, personally, during which time I carefully noticed the classes of recruits as they came fresh from infantry drill at our Dépôt, I never recollect a man who suffered from the effects of the setting-up drill, nor can I call to mind any serious invaliding, yet the only physical drill they had was the old extension motions. I cordially agree with Commander Watson that the more medical officers are associated with the Executive in the training and the development of the recruit, both in the Navy and Army, the better it will be for the Services. There is a point I should like to urge, that in the land forces we take our recruits too young: In many instances lads are accepted on their solemn declaration that they are eighteen years of age, while, certainly in the infantry, the majority of them are not more than sixteen. Such a system is vicious and mischievous, yet it would be easy to ensure that the age on the attestation paper was correct if a birth certificate was obligatory as in the case of large civil employers of labour. The Army Council, being the largest employers of labour in the Kingdom, might follow the civilian example. If the real age was known, as it must with birth certificates, the training would be suited to the real age. The proposal would, if adopted, stop all fraudulent enlistment and materially reduce desertion. We have heard a good deal about the excellence of the new methods of training—including the Swedish drill. I think we should take to heart what Commander Watson urged, namely, that we should not stick to any particular nation's methods; whatever is found to be best for England should be adopted. But if we do adopt Swedish drill it would be only fair to have a Swedish expert at the head of the movement. The lecture has been an exceedingly interesting and instructive one, and the discussion by the previous speakers has been equally so.

Lieut.-Colonel F. A. DAVY, in reply, said:—I am very much afraid that any extempore remarks I shall endeavour to make will fall rather flat after the expert opinion we have been hearing. Necessarily almost, I suppose, the discussion wandered from the point that I raised into mentioning various systems, especially the Swedish. I think I guarded myself against recommending any system; in fact I was not dealing with any system of physical training at all. I was merely anxious to point out a fault in the Army system, and that it was essential not to interfere with normal breathing. Colonel Egerton read a letter from an eminent physiologist, whose views he sought. These exactly fit in with my own, namely, that the less you interfere with normal breathing the better, and that breathing exercises are injurious. May I mention a little more particularly what I should have insisted upon more when I was reading the

paper—that you can train a military horse to do all that you require of it in the way of covering a distance, in the way of increasing its staying and weight-carrying powers, and in teaching it how to do various military movements that you require, without reference to its breathing. You cannot go to a horse and say, “You have got to do this or that with your chest.” So let it be with the man. I say that you will improve the powers of both heart and lungs, by judicious general bodily exercise, without any interference, in the case of the man, with his breathing at all. Some remarks have been made to the effect that the military authorities did not authorise any such attitude as that I have been condemning! This book, which I hold in my hand, is an improvement on the Drill Book. But, although it is, I should like to read you what the position of attention is according to this “Syllabus of physical exercises for public elementary schools” in this country. Military matters, in this regard, are supposed to be so well regulated that the education authorities in the country follow the military example. What have we here as regards the position of attention? This: “The body and head must be held erect, chin slightly drawn in, chest expanded.” My point has reference to the words “chest expanded.” What construction does the drill sergeant put upon the words “chest expanded?” The authorities, in giving these instructions to him, commit the recruit to the discretion of the drill sergeant. Is the drill sergeant always discreet? The only other objectionable part in this position of “Attention” is the direction that the weight of the body must be on the fore part of the feet. That was well dealt with by one of the speakers, who gave a most admirable account of his researches and study with regard to the matter. The point I have been endeavouring to insist upon is this, that the attitude of “Attention” is an attitude of *strain*. Nobody recognises more than I do that military officers cannot address men, much less put them in motion, if they are standing anyhow; there must be attention and uniformity; you cannot have an officer addressing a mob. But you can (as with sailors) have an attitude of due attention without the slightest strain upon the men. That there is strain is acknowledged in this book, where it says, “It should be remembered that the position of attention is one of strain, and scholars should never be kept in it for more than half a minute at a time.” In *The Nineteenth Century* of May last, there was an article on the physique of girls, and the author dwelt upon the injury done to girls by the Army drill sergeants employed to drill them. The words were, “Many suffered severely in health, so that the attention of more than one member of Parliament was called to the matter. Finally, Dr. Macnamara, M.P., by a timely expostulation in the House of Commons, was made responsible for the appointment of a Committee on Drill, which resulted in the withdrawal of the Military Drill Book.” Have we made things better for the soldier? Not a bit. The same position of strain is insisted on, in spite of this statement that “the position of attention is one of strain and should not be kept up more than half a minute at a time,” so bad is it. I say that the order for expansion of the chest, combined with that requiring that the fore part of the feet shall bear the principal part of the weight of the body, tends to make men further swell the chest in order to make it appear as if the fore part of the feet were bearing the weight of the body. Why should that strain be put upon them? I think one of the speakers pointed out that in one corps a plumb-line was used for the purpose of showing how far the chest projected in front of the feet! That is a bad and wrong state of things. The truth lies in the statement made by one of the speakers who adopted my view, that breathing ought not to be interfered with—that it

ought to be left alone. You get full inspiration and expiration when required by exercise without calling the recruit's attention to his breathing at all. It is still the fact that the invaliding returns of the Army shows the circulatory diseases at the head of the list, 739 men having been finally discharged in 1905, as unfit for service on the ground of these complaints alone. Of course, I do not say for a moment that setting-up-drill is the sole cause. I say the waste in the Army is so great that no stone should be left unturned. We should look up every possible cause, and that is why we are here to-day. I wish to insist upon it that cardiac disturbance and emphysema of the lungs are induced inevitably by the means which are adopted, and which are supported in this book—a book which is constructed upon the model of the Military Drill Book. It is an important matter quite apart from the Army, for we largely follow the military model for physical culture throughout the country. In 1904 there were 23,000 recruits, but it appears, from a statement made in Parliament, that 9,000 all but 16, that is about one-third, had disappeared within the year. With a wastage like that, I think the question of how the men are trained, together with the fact that we have a large amount of heart trouble, ought to be considered. Everybody is acquainted with the expression "soldier's heart." Why should soldiers have more heart trouble than other people? I do not see why they should. I was spoken of as being probably not up-to-date in regard to changes in recruit-training at Aldershot, and that is why I thought I would mention to you that this book from which I have quoted is quite a recent edition of the "Syllabus of Physical Exercises," which has been founded on the military model. With regard to Colonel Pollock, it has been said that his material was very much better than the material—or *personnel* would be the right word, I suppose—that we get in the Army.

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NOTE.—In the discussion Major Moore objected to the inference I desired to be drawn from the "abounding-energy" and high degree of physical fitness of Colonel Pollock's men. While I attributed this result to the fact that Colonel Pollock decided, on my recommendation, to leave the breathing of his men to Nature, Major Moore contended that the Spectator Experimental Company was a *corps d'élite* with which no ordinary company of Army recruits ought to be compared, the latter being, he said, inferior to the former in physique and intelligence. I had insisted that the physical discomfort and distress of chest-swelling led both to invaliding, desertion, and the purchase of discharge; and said that Colonel Pollock had neither invalids nor deserters. Major Moore's contention is that these good results are due to the original fine physique of Colonel Pollock's men. In order to prove to Major Moore that, no matter how fine the recruit is at enlistment, he can be damaged by chest-swelling and converted into an invalid or a deserter (rather than endure the distress), I point him to the Foot-Guards. These specially fine men (at enlistment) furnish the highest invaliding returns for cardiac and pulmonary diseases. Their original fine physique does not save them from the consequences of an evil practice, which is more insisted on in the Guards than it is in the line generally. Surely the inference to be drawn is obvious. If Colonel Pollock's men had been chest-swelled the "abounding energy and "readiness to do more work than was required of them" would not have been there. I asked for a comparative trial, a severe practical test of powers of physical endurance, when Colonel Pollock's men were at Aldershot. It was not thought well to institute it. But let any doubter do chest-swelling for himself, holding, as far as he can, the act of expiration in abeyance as recruits are taught to do (in order to increase their chest-measurement) and he will soon get rid of his doubts.

That does not alter the fact in the slightest degree that Colonel Pollock could have spoiled his material, by continuing instead of discontinuing (as he did) the breathing exercises. It has been plainly pointed out that if you teach a man to interfere with his breathing (a thing we do naturally, properly, unconsciously, and automatically) you interfere with the heart and lungs. The best test of a man's power of undergoing physical exertion is to be found in the condition of his heart and lungs under that exertion; in the condition of the circulation. One cannot judge of a man's power by simply looking at him. How often do we find that these men who look all right have this heart hypertrophy! I have been very much struck by a thing I have noticed in the newspapers a good deal, namely, the remarks made by coroners when addressing juries in cases of sudden death. They state that when a man has been certified to have died suddenly from the bursting of an aortic aneurism, it nearly always turns out that that man has been known to have served in the Army. These things point to the importance of the question, and the necessity of taking steps, which I am happy to think, from what Colonel Rolt has said are to be taken for the purpose of remedying this evil. It was most cheering to me to hear what he said about the way the matter is now being taken up. If Colonel Pollock, instead of doing the best thing, had done the second best thing, if he had only, say, exempted fifty men instead of exempting the whole from breathing exercises, then a comparison would have been possible between the one fifty and the other fifty. I suggested the exemption of twenty-five because I did not like to ask too much. When Colonel Pollock's men went to Aldershot I was in hopes that something would have been done—that a comparative trial would have been made—but it was not thought necessary. I am sure, however, that if you follow the suggestion in my paper, namely, that the next ten thousand recruits shall be trained without chest swelling, that they shall never be stuck up in this attitude which requires them to interfere with normal breathing, you will find that, if you compare them with the same number of men who have not been so exempted, you will see that the powers of endurance of the former will be very much greater than those of the latter. I took down several other points for reply, but I am afraid you have been kept here very late already. Exercise will bring about due expansion of the

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I should like to add that I do not think Colonel Malcolm Fox's criticism of myself is quite fair, nor is he quite accurate in his facts. To give an instance, he says that "during 45 years I was personally aware of the discharge of 833 men from the Service due to heart trouble." Why, that figure would not represent a fraction of the losses for one year. Wishing, it appears so at least, to prove me antiquated, he credits me with holding an important medical appointment at Fort Pitt in 1861, when I was about 14 years of age! But the one important point in the whole matter he does not allude to at all—namely, that 100 men have been recently trained to be soldiers *without breathing exercises*, and were, therefore, capable of work which men trained on the chest-expansion plan are quite unable to accomplish. He seems to think that I have not moved with the times, and makes much of the fact that "breathing exercises are part of the daily routine of our school-children," oblivious of the fact that the abolition of these exercises is the very first essential of the modern method—now to be adopted for the Army, and, as a certain consequence, for the schools later. These things take time. The point of the whole argument is that in trying to improve the powers of recruits, we have, instead, been manufacturing wasters by means of injurious methods. It is most difficult to rout out a long prevalent error. I have only succeeded after 30 years.

lungs and improve the physique of the soldier, without his being called upon to stand in an attitude which is shown, and admitted, to be one of strain. We have it officially admitted here in this book that it is an attitude of strain, and all I contend is that we ought to make it an attitude which is not one of strain. I thank you, ladies and gentlemen, for the kind and patient way in which you have listened to me, and I hope and believe that the discussion will have some good results.

The CHAIRMAN (Surgeon-General Sir T. J. Gallwey, K.C.M.G., C.B.) :— This matter has been so thoroughly discussed, both in the lecture, which has been most interesting, and by certain officers here this evening, more especially the officers belonging to the Gymnastic School at Aldershot and by Commander Watson from the Portsmouth Naval College, that I do not think there is any necessity for me to go into the question of breathing exercises. I think we are nearly all agreed that paying great attention to breathing exercises is a mistake. I have visited the Gymnasium at Aldershot recently several times, and they have a system in operation there by means of which the soldiers do not know when they are being exercised in breathing exercises. They are not asked to breathe; they are asked to move their arms, and that is the Swedish system. We have never studied the subject in this country until quite recently, while in foreign countries, where they have the pick of the population for their Army, they have developed it enormously. They have in those countries, with the help of their officers and physiologists, laid down a certain system of training, and a modified system of breathing exercises has been introduced into their training, adopted by the deliberate decision of the foreign experts. Coming to a consideration of the British Army, it must be remembered, in the first place, that we are working with a very immature recruit. The majority of the men who join us are not in good health and they are badly developed. A very striking thing was told me the other day by an expert in this work, because I must take the officials belonging to the gymnastic organisation of the British Army as what you call practical experts: they are practical experts in the same sense that a trainer of a horse is a practical expert in the training of a horse. He said, "The training now being introduced is for the gradual development of the poor class of recruit, and not in any way the training which would be undertaken to make a strong man—the pick of the population—into a football player or a runner." We must be very careful that the physiologist, who lays down the law according to theory, and the practical expert are brought into contact, and that one will not say, "You must not do this," while the other says, "It will be a very good thing." We must discuss this question in committee and test it by experiment, and then probably we will arrive at a good result. The physiologists of this country have never properly considered this question, and it has only been quite recently taken up by Lieut.-Colonel Deane and a few others, while Lieut.-Colonel Davy tell us, in his interesting lecture, that he has been considering it for thirty years. But he has never made himself properly heard. I do not think the blot is on the recruit training, because we are gradually developing a better system of recruit training, but the blot is that continuity of military medical thought is being constantly broken. We take the thing up in snatches only. I hope now that the Army are very much interested in the matter we shall see the subject through, and trust we will be able to develop it thoroughly by the aid of the experts and a Scientific Committee now sitting. I am quite certain that there is at the present moment under the existing system of training a great improvement in the training of the recruit. I have only a few more words to say. The question that