

Section of Physical Medicine

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[October 11, 1944]

Training in Physical Medicine—Looking Ahead

PRESIDENT'S ADDRESS

By L. DANYERS BAILEY, C.B.

Abstract (Full Paper appeared in *Brit. J. phys. Med.*, 1944, N.S. 7, 162)

THE President discussed the future training of medical graduates in Physical Medicine and mentioned that in July 1943 the first examination for the Diploma in Physical Medicine was held by the Examining Board of the Royal College of Physicians and the Royal College of Surgeons.

He then went on to quote Professor L. S. P. Davidson of the University of Edinburgh (see *Brit. J. phys. Med.*, 1944, N.S. 7, 98) as follows: "When an individual is placed on the roster of accredited specialists in physical medicine, this should indicate . . . that he has had the necessary education in the fundamental sciences and had devoted the requisite time to learning the practice of physiotherapy under skilled direction."

The President then alluded to the Syllabus, dealing particularly with Section 5B which lays down special training in physics and in theoretical and practical instruction in a Physical Medicine Department. He mentioned that Part I of the Syllabus dealt with Anatomy, Physiology and Physics and Part II with the diagnosis and pathology of diseases in which physical methods are employed, and the last portion included Therapeutics which was divided into preventive and remedial methods of treatment.

The President considered that the Syllabus was incomplete without the inclusion of Psychiatry and Balneotherapy. He pointed out too that the co-operation of the Chartered Society of Physiotherapy and the Association of Occupational Therapists was necessary for successful training.

He outlined a detailed programme for Postgraduate training in Physical Medicine lasting one year, which could be used as a basis for further discussion.

Finally the importance of after-care of patients was stressed. At one hospital, a Re-settlement Officer, not a medical man, had been appointed. He was doing excellent work as liaison officer between possible employers and the patients, and if the scheme proved satisfactory it would be worthy of vast extension in the future.

Throughout the Address the President stressed the necessity of enthusiasm and unity among the Members of the Section without which nothing great could ever be achieved.

[November 8, 1944]

The Physical Preparation of Commandos

By Surgeon Commander G. MURRAY LEVICK, R.N.

THE conditions of modern warfare produce a demand for certain special methods in the physical training of troops as a whole but especially of Commando and Airborne Troops. For active operations the last two categories are not provided with tents and must be prepared to sleep without shelter in any weather.

More and more is this a possibility in the case of other troops also, especially in the Infantry, because battles may last for weeks, the combatants having to bivouac wherever they may happen to be and whatever the weather.

These conditions impose the necessity for a form of physical training quite distinct from the "athletic" training to which our attention has hitherto been so much devoted and when we begin to study this we find in it a scientific subject which must surely take its place as a factor in Military training.

The intention here is to explain the scientific groundwork on which we may base advice on this special aspect of training.

Men who are in the athletic sense hard and fit, may be and often are, soft in their

resistance to exposure. It has been noticed that many of these men, who in the course of their training have been required to sleep in the open in the cold weather, have been unable to sleep and have spent the night tossing about and shivering, while a certain number have slept quite well. Obviously there has been some physiological difference between the bodies of those who could sleep and those who could not, and I shall endeavour to explain this difference as far as possible and to point out the lines on which training may be carried out so as to convert the "soft" man into a "hard" man. The importance of the subject is manifest. The fact that the soft man is uncomfortable in the cold does not so much matter. The fact that he cannot sleep matters very much indeed.

The town dweller who has lived a soft life can maintain a normal temperature only within the narrow limits of the temperature changes to which he has been accustomed because his heat centre is subnormally developed and so is the rest of his heat mechanism. Therefore it takes a long time to acclimatize such a man to bivouacking in cold weather and the reasons are easily understood.

The main sources of heat in the body are the muscles and the organs, chiefly the digestive organs, while they are actively working, but the muscles are at most times by far the largest heat producers, through their combustion of fuel food in the form of glucose in order to obtain their energy for movement; the extent of this combustion being in accordance with the demand for kinetic energy and heat.

As we lie asleep, our muscles, excepting the heart and the respiratory muscles, are motionless but still producing heat by their tone. So long as we are digesting our last meal, the heat produced by the tone of our muscles and our organs is about equal when we are lying still.

The main reason we are apt to awake cold in the early hours of the morning is because we have finished digesting our last meal and are relying chiefly on our muscular tone for our heat and this may be inadequate.

In the Antarctic when on sledging journeys in very low temperatures (a time when sensibility to such matters is at a high level) the warming effects of the morning and evening meals are particularly noticeable. Those who have to bivouac should, therefore, be specially advised to keep enough of their daily ration for a good meal at night.

Supposing now that as we sleep our temperature is falling, our heat centre may act in three ways:

(1) Muscular tone is increased throughout the body to increase combustion. The increase in heat output is thus very great because the chief weight of our bodies is in our muscles.

(2) Our blood is kept away from our radiator which is the surface of our body, by constriction of the superficial arteries.

(3) Should our temperatures still be subnormal we are made to shiver to increase output of heat by muscular work.

To explain the rationale of measures advocated in a later part of this paper, I must remind you of the reverse action of our heat centre in reducing a supranormal temperature.

(1) The superficial arteries are dilated.

(2) Muscle tone is reduced.

(3) The sweat glands are activated. Here I ask you to bear in mind the quantity of heat required for evaporation of water (i.e. 239 calories per pint), because this also has a bearing on certain advice when I discuss the bivouac later on.

This general picture of the activities of our heat centre and mechanism enables us to detect the causes of softness.

It is clear that the efficient working of the heat mechanism depends upon the bringing of a variety of structures into complete co-ordination with the brain centre as well as upon their state of nutrition, but the latter is important.

For example, the insulation of the body surface depends largely on the development of the involuntary arterial muscles. When these are weak, vasoconstriction is feeble and inefficient. Thus a soft man going out into cold air loses a lot of heat, whereas a hard man, with well-developed and practised arterial muscles, loses much less.

Confirmation of this theory is found by observing the reactions of various men to very cold weather. I have noticed that the faces of some men turn blue, while simultaneously others blanch, and that it is the well-"weathered" men who blanch while it is usually the softer who go blue, the white skin resulting from complete, the blue skin from incomplete, occlusion of the arterioles.

Bivouacking in a north-easterly wind with soaking rain may impose a much greater test of a man's heat mechanism than a much colder temperature without rain, owing to the evaporation of rain water from skin and clothing which negatives the effect of the dried-up sweat glands.

My first instruction to each batch on arrival at the training quarters was in the form of two lectures, the first devoted entirely to an explanation of the processes I have outlined.

The men were invariably attentive and interested and when their co-operation had been enlisted in this way they were very ready to carry out the measures advocated for hardening themselves against exposure for which they now understood the reasons. Without such co-operation it is quite impossible to get instructions conscientiously carried out.

Further teaching then came under two headings: (1) The training of the body to resist exposure in the open. (2) The application of science to the art of bivouacking under adverse conditions.

This last subject should be accomplished by practical instruction so that men can be shown how to secure as much comfort as possible while bivouacking under really bad conditions. For such instruction there is surely no better or tougher school than the Scottish Highlands.

To begin with, it is well to impress combatant Officers and N.C.O.s, and in Training Establishments especially, the Chief Instructors with the importance of not unduly hurrying the hardening of raw troops. It takes much longer to acclimatize the average recruit to sleeping in the open in bad weather than it takes to get him into athletic training. If you proceed too quickly you upset his health and set him back in his training. For example, if you have to train a battalion in soft condition for some operation on which they will be exposed to hardship and you have only a short time to do it in, it is useless to progress any more quickly than you would if you had ample time at your disposal. In other words, you can only reach a certain degree of hardening in a certain length of time and you must be content with that.

The next axiom is that a desirable degree of hardness for warfare can only be reached by men adapting most of their habits of life to that end. It cannot be attained by relying on certain periods of active training and spoiling that effect by interludes of softness. That is why it is so important to get the co-operation of rank and file from the word "go". The contrast between sleeping out without shelter in cold wind and rain and sleeping in a Nissen hut without heating and with doors and windows open and only one blanket, is quite appreciable. The latter would be a luxury compared with the former conditions.

But the contrast between sleeping in a hut with the doors and windows closed and perhaps a stove on in the winter and the bivouac under the usual weather conditions is far too great, and men who sleep in huts under those conditions are asking for a bad time in the "open". This should be explained to all concerned.

Moreover, just as in training for athletics if a man gets perfectly fit, runs his race and then takes little exercise for a couple of weeks, he gets out of training and has to start again, so in exposure hardening, a man may get quite hard but rapidly become soft again if he goes back to a period of comfortable conditions.

One of the chief items which I have constantly impressed on the trainees is the softening effect of our overclothing, advising that during the cold seasons they should, during their training, endeavour to wear just sufficient underclothing to keep them mostly just off the shiver with perhaps occasional slight shivering, this being just the point when they are, without over-chilling, calling upon their heat centre to increase heat production and with its mechanism to retain the heat in the body. At night they should use only just sufficient covering on their beds to enable them to sleep, which they can ascertain by experiment. If this is done intelligently, they will find that as time goes by they need less and less covering, thus approaching the desired immunity to exposure.

It is interesting to realize the extent to which the human heat mechanism can be developed by the stimulus of a perfectly natural mode of life.

Darwin, in his book "The Voyage of the Beagle" states that this ship with Darwin on board, anchored one day in the winter off the Coast of Terra del Fuego. This country, in the sub-Antarctic regions, has a cold winter and Darwin tells us that the natives came off in canoes stark naked in the freezing air, with the sleet beating on their skins, showing no signs of feeling cold. From birth, these people, probably the hardest the world has ever produced, had never worn clothes and showed the extent of hardening which such natural development of the heat centre and mechanism can produce in the human body.

Nowadays the Terra del Fuegians are softer and degenerating because they are adopting civilized ideas of life and clothing. Nothing but lifelong exposure can produce such an effect, but I think Lawrence of Arabia was a fair example of what can be accomplished in our civilization by a man who sets his mind to it at an early age. No one who has read the "Seven Pillars of Wisdom" with any understanding, can fail to realize the extent to which Lawrence had succeeded in hardening his body, not only against fatigue but against exposure to both heat and cold. He tells us that in boyhood he began to cultivate hardness and had done this all his life.

We can now see that our first step in training should be to secure by gradual stages a "stiffening up" of the barrack or camp hygiene, the later stages to be concurrent with the first experience of bivouacking. With the exception of really warm weather, this latter experience should not be begun when the men are much fatigued. A march of two or three miles to a selected spot is therefore enough. The time when the test becomes really serious is in cold and wet winter weather, and in wartime this training must go on throughout the year so it may be of the utmost importance to give instruction in the art of bivouacking under these conditions before they set out for the first exercise. A good plan is to take the men out to some selected ground, first demonstrating a suitable method by actually constructing the bivouac, then setting the men to make others for themselves.

Very often, when out on a "scheme" in the West Highlands everyone was wet by night-fall and the boots and socks certainly soaking wet. It is advisable above all other measures to impress the importance of keeping religiously a special pair of dry socks for sleeping in, and, on turning out in the morning, to take them off (whatever the temptation to keep them on) and to place them inside the battledress blouses to dry off during the day. It is difficult to get to sleep in cold weather with wet socks in wet boots owing to the amount of heat conducted from the feet through the wet socks and wet boots for the evaporation going on from the surface of the boots. The chilling of the feet is then such as to keep one awake and on wartime training men must sleep in their boots in bivouac for very good reasons. But with dry socks in wet boots the feet keep surprisingly warm. For one thing, the leather does not hold much water and it may be long before the inside of the socks become damp and by that time we are asleep. There may be another explanation: Sir Leonard Hill pointed out that if you put on a dry cotton vest for some considerable time it actually warms up through heat given off by the condensation in the cotton of water vapour evaporating from the body, the latent heat of the water vapour being thus liberated. The same thing may happen in the dry socks in wet boots.

There is a portion of the body from which heat escapes perpetually and copiously even when conditions call urgently for its retention. If this is not carefully explained to the men they may not realize the importance of guarding against it when becoming chilled in bivouac. Every breath of cold air inhaled is heated by conduction in the lungs to close on body temperature and, through evaporation, quite saturated with water vapour. The consequent loss of heat is very great (especially from the evaporation), and completely lost from the body at each expiration. The heat centre has no control here. Without this explanation, men do not realize how much of this loss can be prevented by merely covering the mouth with a woollen scarf, corner of the blanket or any other woollen fabric. Thus, much of the heat is left behind on expiration in the fabric which is also moistened by condensation of the water vapour. In consequence, the air inspired through the fabric is partially warmed and with relative humidity raised enough appreciably to reduce the pulmonary evaporation.

Some care was needed to prevent many of the young Commandos from letting their enthusiasm for getting hard carry them too far. The promulgation of the necessary knowledge among the training staffs is not a difficult matter, and having recently been for that purpose on a lengthy tour of training establishments I found everywhere a surprising keenness among the personnel to learn all about it. One of the most important things to learn by experience is how far the hardening process can be carried with advantage to the trainee. For instance, if certain troops were being trained for a particular operation on which they had to stand for an hour up to their waists in cold water, one would not go as far as that in the course of their training because it would do them harm instead of good. The fact that training must always keep within physiological limits must never be overlooked. The actual details of the training depend very much on local conditions. The main idea must be by gradual stages to provoke and strengthen the reaction of the entire heat mechanism.

This form of training is concurrent with other subjects and it may be that schemes lasting several days over such country as the Western Highlands, with the shelter of trees hard to find, have to be carried out by troops whose hardening has not yet gone very far. Here one can only, as far as possible, temper the wind for lambs not shorn but in denim battledress and with only one blanket.

To endure successfully severe exposure in the field, a man must be able to fend for himself and learn ingenuity in devising methods to meet contingencies as they arise. This he cannot do without simple scientific instruction. The subject is one which cannot fail to interest the medical branches of the combatant Services and by keeping to the essential and easily understood factors I have outlined, thus talking to, but not down to, the rank and file, they can impart to them much valuable information.