ACKNOWLEDGMENTS

My thanks are due to Dr. Felix for repeating certain of the Weil-Felix tests and for his advice; to Dr. Gray for the information on the pre-war years; to Dr. Audy for making available the results of his entomological researches; to the laboratory staff of 33 General Hospital for technical assistance; and to my colleagues, especially Captain G. A. K. Missen, for their co-operation. I am indebted to the Director of Pathology for permission to publish this article.

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AN INVESTIGATION OF FOOT AILMENTS IN INFANTRY RECRUITS

BY

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The foot troubles of the soldier have become proverbial and, in war-time conditions particularly, they present an appreciable military problem. Melville (1909), for example, stated that thirty thousand German soldiers were incapacitated by foot ailments during the Franco-German war, whilst reports by Bingham (1944), Burkitt (1941), Burnham (1944), and Schmier (1946) emphasized that the problem was still one of considerable magnitude during the 1939-1945 war. Recent surveys of troops in home stations by Matthews (1946), Hopkins et al. (1947), and Davies (1952), who studied fungus infections of the feet, and by Kark (1944) and Berkman (1944), who studied forefoot pain and foot strain in patients attending surgical and orthopedic clinics, demonstrated that a large number of these soldiers suffered from foot complaints. In tropical climates, of
course, fungus infections are very prevalent and cause serious manpower loss. The Canadian army foot survey (1947) drew attention to the importance of foot ailments in recruits and reported that 25.8 per cent. of infantry recruits became foot casualties during their sixteen weeks of training. The actual percentage of foot casualties may have been even higher than this, as a proportion of the recruits were only studied in the first eight weeks of training.

Several factors are responsible for this disturbing incidence of foot ailments. Structural abnormalities of the feet, many of which give rise to symptoms for the first time when subjected to the stresses and strains of service conditions, are known to be very important. The Canadian army foot survey (1947) recorded that, of the recruits who became foot casualties, more than 50 per cent. had foot defects prior to enlistment which, on clinical and radiological grounds, were considered liable to give rise to symptoms. Ill-fitting boots (found in 14 per cent. of Canadian recruits), poor foot hygiene, and undarned, badly darned, or dirty socks are believed also to be factors contributing to foot ailments in the Service.

It appears important to discover:

(a) What percentage of British soldiers would develop foot ailments if all these factors were, as far as possible, eliminated.

(b) What type of foot trouble would arise under these circumstances.

The results of seven months' experience in the basic training unit of an infantry regiment in the United Kingdom are presented in an attempt to give an answer to these questions, in relation to infantry recruits.

Scope of the Investigation

During a period of seven months, January to July, 1952, inclusive, 623 recruits passed through a basic training unit undergoing a six weeks' programme of infantry training. All except 39 had previously been manual workers. Their ages ranged from 17½ to 23 years. They had all been examined by a Ministry of Labour Medical Board before enlistment and were carefully re-examined by the unit medical officer on their first day in the Army. All doubtful cases were referred for special investigation and for the opinion of the appropriate specialist. Recruits with any defect, including any foot condition which appeared likely to cause trouble when subjected to the rigours of military service, were not accepted for infantry training, but were either transferred to another arm of the Service or discharged on medical grounds. When this assessment was being made, far more attention was given to the function of the feet than to their shape or anatomical variations. It should be added that recruits were also tested and interviewed by the personnel selection officer and referred to a psychiatrist if considered necessary, in order to exclude men with gross psychiatric disorders and men in low mental categories.

Every effort was made to see that the recruits received satisfactory boots in accordance with the instructions contained in Clothing Regulations (1943). Soon after arrival, the recruits were given hygiene lectures in which the impor-
Foot Ailments in Infantry Recruits

tance of personal cleanliness and care of the feet was emphasized. Moreover, the ablutions and the laudering and drying facilities were good, and unit hygiene regulations were strictly enforced. The cookhouse was clean and well-run; the barrack rooms were attractive and comfortable; regimental pride was strong and morale good. In the last week of training every recruit was called upon to pass the standard P.T. tests which include a five-mile quick march, and after the completion of these tests, each underwent a further medical examination.

RESULTS

A record was kept of every patient seen by the unit medical officer. If a recruit attended the unit medical centre more than once with the same complaint, the second and subsequent attendances were disregarded for the purpose of this study; but if he presented again with an entirely different complaint, he was regarded as a new patient. During the period of study 359 new patients were seen and their complaints were classified into the groups shown in Table I. The foot and ankle conditions were further analysed into the subgroups shown in Table II.

<table>
<thead>
<tr>
<th>Table I</th>
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<tbody>
<tr>
<td>1. Foot and ankle conditions</td>
</tr>
<tr>
<td>2. Respiratory infections and diseases including coryza, &quot;sore throat,&quot; rubella, and pneumonia</td>
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<tr>
<td>3. Complaints following vaccination and T.A.B. inoculation</td>
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<tr>
<td>4. Miscellaneous painful conditions: tenosynovitis, &quot;rheumatic&quot; pains, etc. (excluding conditions recorded in (1))</td>
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<tr>
<td>5. All injuries due to direct and sudden trauma, sudden strains, falls, etc. (except foot injury)</td>
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<tr>
<td>6. Gastro-intestinal disorders</td>
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<td>7. Dental complaints</td>
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<td>8. Staphylococcal infections: boils, septic hands and fingers, styes, etc.</td>
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<tr>
<td>9. Skin conditions (excluding conditions recorded in (1) and (8))</td>
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<tr>
<td>10. Ear, nose and throat conditions (excluding conditions recorded in (2))</td>
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<tr>
<td>11. Eye conditions (excluding styes)</td>
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<tr>
<td>12. Psychiatric conditions</td>
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<tr>
<td>13. Other</td>
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| Total | 359 |

<table>
<thead>
<tr>
<th>Table II</th>
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<tbody>
<tr>
<td>A. Painful heel</td>
</tr>
<tr>
<td>B. Blistered and sore feet</td>
</tr>
<tr>
<td>C. All injuries from direct and sudden trauma, sudden strain, etc.</td>
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<tr>
<td>D. Lesions of tendo calcaneus and neighbouring structures—peritendinitis, post-calcaneal bursitis (superficial or deep), etc.</td>
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<tr>
<td>E. Fungus infections</td>
</tr>
<tr>
<td>F. Corns and callouses</td>
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<tr>
<td>G. Symptomatic structural defects (pes planus, etc.)</td>
</tr>
<tr>
<td>H. Undiagnosed pain of arch or ball of foot</td>
</tr>
<tr>
<td>I. Miscellaneous</td>
</tr>
</tbody>
</table>

| Total | 69 |
DISCUSSION

It may appear surprising at first sight that as many as 359 complaints should arise in these recruits, in view of the selection factors described, the high standard of hygiene, and excellent morale. However, such a number was to be expected in recruits who were adapting themselves to the unaccustomed rigours of infantry training, living for the first time as members of a barrack-room community, with all the increased possibilities of infection, and being subjected to the standard immunological procedures. Nevertheless, it is noteworthy that foot and ankle ailments formed easily the largest group and occurred in approximately 11 per cent. of these recruits during their basic training.

The preventive measures outlined above were carried out conscientiously and efficiently. The fitting of boots was very satisfactory and in only one patient (who had blisters) could ill-fitting boots be regarded as responsible for the foot ailment. The feet of the recruits were found to be clean, whether examined on the sick parade or during surprise inspections, though in the case of two patients a note was made that the socks needed washing. The importance of efficient pre-selection of recruits was also demonstrated. Burkitt (1941) and Kark (1944) have emphasized the high incidence of foot-strain, painful flat foot, and other forefoot disabilities in the British army, but in this survey only two patients (subgroup G) had this type of foot trouble. In each case, the symptoms were due to a structural defect of the foot which had previously been noted but considered unlikely to give rise to symptoms during training. The four patients in subgroup F experienced no further symptoms after treatment by a chiropodist, whilst the three patients in subgroup H, who were thought to have minor strains, were all back in full training within four days and completed the training programme without further trouble. Structural defects of the feet were not, however, present in any of these seven patients.

The three most important subgroups of foot ailments, as regards incidence, were blistered and sore feet (B), injuries from direct and sudden trauma or sudden strain (C), and painful conditions of the heel (A and D).

Fifteen patients were seen with blistered and sore feet (subgroup B; acute conditions produced by friction or pressure upon the skin of the foot and ankle). These represent by no means all the sore feet which occurred, since small lesions, without blistering and causing little discomfort, were treated by the recruits themselves with the help and advice of the unit foot orderly. (Interdigital lesions, where the only complaint was the cracking and softening of the skin in one or two interdigital spaces, were also treated in this way.) The Canadian army foot survey (1947) found 27 patients with blisters amongst 970 infantry men in training and drew attention to poorly-fitting boots, dirty socks, wet feet, and malformations of the foot as important factors in blister production. In this present investigation the main factor was thought to be the combined effect of new boots and unaccustomed “foot slogging.”

Injuries of the foot and ankle (subgroup C), including eight ankle sprains, need no special comment. They were due to direct and sudden trauma, sudden
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strain, etc., and included injuries sustained whilst off duty and whilst on the sports field, as well as those sustained during training.

Painful conditions of the heel (subgroups A and D) can be classified as follows:

(i) Traumatic.
(ii) Pathological.
(iii) Static (Tower, 1938).

(i) The “traumatic” conditions (subgroup D) include peritendinitis of the tendo calcaneus, enlargement and inflammation of the subcalcaneal and postcalcaneal bursae, march fracture of the calcaneum, and periostitis at the insertion of the tendo calcaneus. Seven patients suffered from complaints of this group. Peritendinitis crepitans of the tendo calcaneus is common in the army (Volk, 1944; Johnson, 1945). Volk (1944) attributes the condition to oft-repeated minor strains acting upon a structure accustomed to a relatively sedentary régime, but it is sometimes caused by the lower end of gaiter which produces a crease in the boot and thereby presses upon the tendon (Williams, 1941). The bursal enlargements and inflammations are also caused by repeated minor injuries or pressure (Hentzler, 1926; Roberts, 1929).

(ii) The pathological group consists of disorders such as tuberculosis, pyogenic infections and spurs of the calcaneum. No cases were seen in this present series.

(iii) The static group (subgroup A in this investigation) is composed of a number of painful conditions of the heel which are characterized by the absence of visible signs. They are often associated with a change of habit to a more active life, and according to Munson (1912) they are not uncommon in policemen, letter carriers, and soldiers. The fifteen patients in subgroup A (“painful heel”) presented with pain and tenderness beneath and at the sides of the heel. The pain was aggravated by marching or stamping the heel on the ground as in coming to attention or standing at ease, and the left heel, which is stamped in these manoeuvres, was more often involved. There was no bruising or positive X-ray findings in any of these patients, and only three had any history of injury, such as falling on to the heel. Some of them recovered without loss of training time, but the majority of the soldiers needed to rest the heel for a few days. All except one were back in full training within seven days. One patient took six weeks before eventual recovery, but he was “sick on leave” for part of this time. There were no examples of the chronic refractory type of painful heel, variously attributed to neurosis, fibrositis, Dercum’s disease, etc. (Cozen, 1939; Tower, 1938). The underlying pathology of painful heel is believed to be a mild traumatic periostitis. The fibro-fatty pad and the overlying callous skin have not had time to respond to the excessive “hammering” of the heel with increased thickness and density, and the buffering mechanism is inefficient (Tower, 1938). Ashley (1939) and Kuhns (1949) give a detailed description of this fibro-fatty cushion and its reaction to injury and disease.

Trauma, therefore, appeared to play the major part in the production of
foot ailments in these infantry recruits. In subgroup C the trauma or strain was
direct and sudden, but in subgroups A, B and D the action of the stresses and
strains which are associated with infantry training, upon structures which have
not had time to become adapted to them, was held to be responsible. In spite
of the efficient measures to exclude recruits with foot defects and to maintain a
high standard of boot fitting and of foot and sock hygiene, 11 per cent. of these
recruits developed foot complaints during their basic training. This constitutes
an important problem and it must be much more serious in units where the
preventive measures are less thorough. Further investigation, upon a bigger
scale, into the incidence, causation, and prevention of foot ailments (especially
those produced by trauma) in British army recruits, appears to be merited.*

SUMMARY

1. A report based on the records of 623 infantry recruits during their six
weeks' basic training is presented.
2. Every recruit, before being accepted for infantry training, had passed
through careful medical and personnel selection procedures.
3. Throughout the period of this investigation, a high standard of boot
fitting and of hygiene was maintained amongst these recruits and morale was
good.
4. A total of 359 new patients was seen and 69 of these, forming easily the
largest group, had foot complaints.
5. The most important subgroups of foot ailments, numerically, were
blistered and sore feet, injuries due to direct and sudden trauma or sudden
strain, and painful conditions of the heel.
6. The implications of these findings are discussed.

It is a pleasure to express my gratitude to the Commanding Officer and
staff of the Regimental Depot, The Green Howards, for their helpful co-operation;
to Mr. R. P. Jepson, F.R.C.S., for his helpful suggestions; and to the
Director of Army Health and the Superintendent, A.O.R.G., for permission to
publish this paper.

REFERENCES


* It is understood that since this paper was received for publication such an investigation has
been begun.—Ed.
A SHORT HISTORY OF THE DEVELOPMENT OF THE ARMY EMERGENCY RESERVE, THE TERRITORIAL ARMY AND THEIR MEDICAL SERVICES

BY

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(Continued from page 24, January issue)

MEDICAL SERVICES OF THE MILITIA

In the Crimean War, medical officers of the Militia, on embodiment, carried out their work in exactly the same way as Regular medical officers, i.e., working in the small water-tight compartments of the regimental hospitals with no facilities for evacuation of the wounded. Little recognition was given for their services. Evidence given before a commission held in November, 1888, shows that these surgeons, at the end of the war, represented to the House of Commons that they should either be permanently employed or compensated for their loss of practice. The Government took swift and effective action in response to such a reasonable request and ceased to appoint surgeons to Militia regiments!

The Territorial and Auxiliary Forces Act of 1907 sanctioned the split which had already taken place between the medical services of the Militia on the one hand and those of the Volunteers and Yeomanry on the other. By this Act and by Army Order 271 of 1908 it was decided, among many other enactments, to create:

(a) A Special Reserve of Officers for the R.A.M.C. under conditions similar to those of the Army Reserve of Officers.