Clinical and other Notes

(5) When the fomentations are omitted, eusol or saline soaks may be used, but if there is a return of colour and odour, treatment by fomentations must be resumed.

(6) A bacteriological examination of the pus should be made every two or three days as a guide to treatment. Cases in which the clinical signs of the infection are absent but the organism is found on bacteriological examination are probably harmless; but it is wise in these cases to continue the eusol fomentations for a long period.

PYODERMIA OF PARASITIC ORIGIN.1
BY CAPTAINS H. C. SEMON AND H. W. BARBER.
Royal Army Medical Corps.

It is impossible to work for any length of time at a military hospital for diseases of the skin without being impressed by the large preponderance of cases of pyogenic infection. Thus, out of a total number of 669 patients admitted under our personal care between April 1 and May 9, 1917, 631, i.e., 94.3 per cent. were cases of this nature.

Among soldiers, pyoderma of the scalp, face and neck, is usually associated with the seborrhoeic diathesis (Darier’s “kerose”), whereas, when it occurs on the trunk and limbs it is, in our opinion, almost invariably the result of a concomitant or preceding parasitic infection, viz., scabies or pediculosis.

It is the object of this paper to establish the parasitic etiology of pyoderma of the trunk and limbs, to emphasize the striking differences in the clinical pictures produced by the acarus and the louse, and to describe briefly the therapeutic measures which, in our hands, have yielded the best results.

There is seldom any difficulty in recognizing pyoderma due to scabies, even though there be no active lesions present. The distribution of the eruption, or of what remains of it when the case comes under observation, is highly characteristic.

As it is of paramount importance in the differential diagnosis of the various types of pyoderma, we may be pardoned for briefly recalling the main features of the scabietic eruption. For descriptive purposes we propose to consider:

(1) A case of early scabies.
(2) One in which secondary pyogenic infection has occurred.
(3) One in which the affection manifests itself in a subject with the seborrhoeic diathesis.

(1) To meet with cases of early and uncomplicated scabies in troops fresh from the trenches is exceptional, as pyogenic infection is a rapid and almost constant sequel. In such, burrows and vesicles, if present, can most easily be demonstrated on the hands, especially along their ulnar borders, and between the fingers, on the flexor aspect of the wrists, on the prepuce and glans penis, and on the ankles and dorsum of the foot.

1 For the purpose of this article it is proposed to use the word “pyoderma” to include the various types of lesions denoted by the terms impetigo, furunculosis and ecthyma.
Clinical and other Notes

(2) When secondary infection has occurred, papules and superficial pustules and boils make their appearance, not only in the above situations, but also on the extensor surfaces of the elbows, the anterior axillary folds (where they are sometimes associated with burrows); round the nipples, and very commonly around the umbilicus, and on the lower half of the buttocks. On the lower extremities the eruption is most evident on the posterior and internal aspects of the thighs, the anterior aspect of the knees, the popliteal space, and behind the malleoli. It is also worthy of remark that long after all evidence of active infection has subsided, chronic pruriginous papules tend to persist in certain situations, particularly the wrists, the inner surfaces of the thighs, the buttocks, and on the scrotum and penis. A feature of the scabetic eruption that has helped us in doubtful cases of pruritus and pyoderma—and one the importance of which we particularly desire to emphasize—is the peculiar goose-like appearance of the affected cutis in general. On examination with a lens this appearance is found to be due to the erection of the pilo-sebaceous follicles, and in our experience it is an almost constant, though unexplained phenomenon in scabies.

(3) Where the exudative seborrhoeic diathesis exists, infection with scabies is usually associated with a severe and widespread eruption. The acarus is one of the most potent agents in provoking and lighting up an acute seborrhoeic dermatitis in persons thus predisposed, which is not infrequently mistaken for the dermatitis excited by the injudicious use of sulphur.

(N.B.—On the other hand, seborrhoeic subjects are particularly liable to suffer from sulphur dermatitis.)

The eruption begins as a discrete papule, follicular eczema confined to the erected pilo-sebaceous follicles already described. Later, confluence takes place by the eczematization of the intervening skin, and this discrete follicular appearance is lost, and diffuse patches of eczema, which may later coalesce to form large plaques, make their appearance.

These characteristic lesions may be generalized, but tend to be most severe and persistent on the forearms, the inner surface of the upper arms and axillae, between the scapulae, on the lower abdomen, on the inner surface of the thighs, and in the popliteal spaces. In this type of case seborrhoeic eczema of the face and scalp often co-exists, and is apt to prove a trap to those who have hitherto believed that facial eruptions preclude a diagnosis of scabies.

Pediculosis.

The conditions under which our troops have been fighting are responsible for the occurrence of cases of pediculosis far more severe and extensive than are commonly seen in civil hospital practice. There is no doubt whatever that in this connexion the Pediculus vestimentorum, or corporis is the chief offender. It is rare to find P. pubis, while P. capitis is still more uncommon. We will, therefore, confine our remarks to the P. vestimentorum. The following description of the main external characteristics of the parasite is taken with acknowledgments from that excellent monograph, "The Louse problem at the Western Front," by Lance-Serjt. A. D. Peacock, R.A.M.C., T.F., M.Sc. (Dunelm).

The female is about four millimetres in length, the male about three millimetres. The head bears one pair of antennae, and the black eyes. The three thoracic segments are fused and present but little demarcation. There are three
pairs of strong legs attached to the thorax, each of which terminates in a short powerful spine. There are eight abdominal segments, the two terminal being fused. Posteriorly, the male is pointed and the penis may sometimes be seen extruded, whereas, in the female, the posterior end is bilobed, and bears a pair of ventral copulatory organs. It is well known that the female deposits her eggs in clothing of all sorts and in blankets, and most of the prophylactic measures against “lousiness” have been directed to the sterilization of the soldiers’ kits.

It does not appear, however, to have been generally realized that the *P. vestimentorum*, like the *P. pubis*, also almost invariably attaches its eggs to the pubic and perineal hairs, and less commonly to those of the axilla, and other covered hairy regions. In no available text-books or monographs to which we have had access is this fact referred to, although its importance is at once obvious and far reaching.

Some months ago, one of us (H.S.), in examining seven consecutive cases of ecthyma and furunculosis of the lower extremities, happened to notice in each of
The pediculous boil in an early stage. Note (1) The central small dark crust capping the elevated, dusky, cone-shaped and puckered focus of infection; (2) external to it a fine collarette of white scales; and (3) a surrounding halo of hyperemia.

Pediculous boil on the anterior surface of the thigh. A crateriform ulcer is in progress of being formed. The characteristic circular crusted lesion would ultimately result.
them the presence of "nits" on the pubic hairs, and from this time forward we have made a point of carefully examining the pubic and axillary hairs in every patient that has come before us.

The results of our observations may be summarized as follows:

1. In almost every case presenting any or all of the lesions we have learnt to associate with pediculosis, "nits" were found either in the pubic, axillary or perineal hair.

2. In cases of pediculosis in which new lesions developed while the patients were actually under treatment in hospital, careful search of the above-mentioned hairy regions almost invariably revealed the presence of "nits" which had escaped the attention of the orderly in charge of the case. Removal of these, the application of paraffin or 1/40 carbolic lotion, and a complete change of kit were always successful in preventing the further appearance of fresh pustules. It may here be said that until we realized the importance of the pubic and axillary hair as breeding places for lice, our cases of pediculosis were constantly developing new furuncles (i.e., infected bites); now that we insist on the pubic and axillary hair being cropped and all nits removed with paraffin, this no longer occurs. The cases are consequently cured in a very much shorter time.

Two early boils which our experience has taught us to recognize as of pediculous origin. They were situated on the fore and upper arm of a patient with marked evidence of "lousiness" on the rest of his body.
Although *P. pubis* is occasionally met with, and when present is usually found both on the pubis and in the axillae, in the vast majority of our cases the eggs found in these regions were those of the *P. vestimentorum*. We were first led to this conclusion owing to the frequency with which live specimens of *P. vestimentorum* were found crawling among the egg-laden hairs, particularly on the pubis, although *P. pubis* were absent. We have since succeeded in hatching out young *P. vestimentorum* from hairs removed from the pubis, and kept

*E*

The pediculous lesions are here displayed in several stages. Above the right iliac crest (and somewhat out of focus), is a late stage of the superficial circular ulcer (4) in text. On the right buttock and in close proximity to the centre of the natal cleft is an abortive example of the type described under (5) in text. The remainder partake of the characters described in detail under the heading of superficial pustules and boils.

*at body temperature for several days.* This experiment conclusively proves that the *P. vestimentorum* habitually lays its eggs on human hair, and this fact should always be carefully considered in undertaking prophylactic measures against louse infection.

We may now consider the different lesions met with in association with pediculosis. Of these there are three main types:—

1. The actual bite of the parasite.
2. Superficial uninfected scratch marks.
(4) Circular encrusted lesions of varying depth.

(5) Very characteristic linear lesions, presumably a sequel to (2) and (4).

(2) SCRATCH MARKS.

These are most commonly situated on the shoulders, chest, buttocks and sacral region, upper parts of thighs, both internal, anterior, and external surfaces, and on the legs. The excoriations correspond in their different situations to the lines along which the patient can most easily scratch himself ("grattage instinctif"—Dubreuilh). Thus on the buttocks they tend to radiate upwards and outwards from the anus. On the outer surfaces of the thighs they run vertically upwards, on the inner surfaces upwards and outwards and similarly on the sacrum.

At this stage it is interesting to compare the scratch marks of scabies with those caused by the pediculus. We have already referred to the erection of the pilo-sebaceous follicles in scabies, and in this disease the scratch marks appear as minute pinpoint blood crusts, at the apices of the erected follicles, whereas, in pediculosis, in which no such follicular erection is seen, the scratch marks are merely linear excoriations of the otherwise normal epidermis.

(3) PUSTULES (SUPERFICIAL): BOILS (DEEP).

Apart from (1) and (2) our observations would lead us to believe that a superficial or deep pustule is the initiatory stage of the other lesions met with in pediculosis. The sequence of events is as follows:

(a) An indurated irritable bright red halo arises around the original bite. In the centre of this a minute yellowish-white vesicle rapidly drying to form a crust, makes its appearance. When pressure is applied to a superficial lesion at this stage a small quantity of pus is exuded from the central vesicle or crust. In the deep variety (or "boil") which is often elevated and surrounded by a wide area of induration, similar treatment results in the forcible projection of a considerable quantity of sanguineous pus, from what is evidently a bottle-shaped cavity. In both types of lesion the superficial opening or mouth is very minute and of definitely circular outline, a fact that supports our view that these pustules are originally formed round punctures made by the parasite. If these pustules are dealt with in this early stage by ordinary antiseptic applications (e.g., tinct. iod.) they usually involute without progressing further, but if not interfered with, the lesions tabulated under (4) are apt to result.

(4) CIRCULAR ENCRUSTED LESIONS OF VARYING DEPTH.

It is not difficult to trace the progressive development of ulcers of varying depth and extent (as may be seen by a reference to the accompanying photographs), from the pustules above described.

(5) LINEAR IMPETIGO.

Superficial linear encrusted lesions result from the exudation of serum along the lines of excoriation due to scratching; they may occur in any pruriginous complaint, and are in no way especially characteristic of pediculosis. On the

1 Major MacCuine and Captain Small have recently drawn attention to the fact that superficial "linear impetigo" may be a manifestation of what they aptly term a "war neurosis." It is frequently associated with anesthesia of the palate, altered cutaneous sensibility, and other stigmata of the psychopathic state.
other hand, the variety which is pathognomonic of louse infection is a gutter-shaped ulcer covered by a brownish crust, and of considerable depth. Its outline varies with the stage of its development, which, in our opinion, proceeds from the longitudinal digital excavation of one of the circular ulcers above described; and in fact in a severe case of pediculosis all the intermediate stages between the

![Photograph of the loins demonstrating a case of "linear impetigo," a very favourite feeding ground of the pediculus: lesions in this region when of a pyodermic character are almost invariably the result of louse infection.](imageurl)

circular and the rectangular gutter-shaped ulcer so called "impetigo linearis" can easily be demonstrated (vide photographs). These circular and linear lesions when healed are invariably replaced by bluish stains and brown pigmentation which persist a long time, or if sufficiently deep, by the formation of actual scar tissue. The chief points in the differential diagnosis of the eruptions due to scabies and pediculosis may now be presented in a tabular form.
Clinical and other Notes

Scabies.

Localization.
Hands, wrists, elbows, anterior axillary folds, umbilicus and abdomen, lower triangular area on the buttocks.
Penis and scrotum.
Front of knees, ankles and feet.

Type of Lesion.
Burrows, vesicles, small superficial crusts, papules, pustules and a specific eruption of the pilo-sebaceous follicles with secondary eczematization, especially in seborrhoeic cases.
Scratch marks are represented by minute blood crusts at the apices of the ecteate follicles.

It is obvious that since infection with both the parasites is quite common, the two clinical pictures may be superimposed.

Pediculosis.

Localization.
Posterior axillary folds, shoulders, sacral region and upper part of the buttocks, groins, thighs, and the skin between knees and ankles.

Type of Lesion.
Superficial and deep pustules, with a surrounding red and indurated halo. Circular encrusted ulcers of varying depth and size, but on the whole very much larger than those met in scabies.
"Linear impetigo."

A pediculous boil from which the crust has been removed and the pus expressed. It demonstrates very clearly the commencement of an ulcer which later assumes an ecchymatous type.
The well-defined "collarette" will be noted in both the above lesions. It would seem to be a common feature in boils due to lice.

Microphotograph of young Pediculus vestimentorum, artificially hatched from ovum on a pubic hair.
Prophylaxis of Pediculosis.

It is beyond the scope of this paper to supplement by other suggestions the measures for the disinfection of blankets and clothing at present in use at all general hospitals and military cleansing depots in France. We would, however, emphasize the extreme importance of simultaneously eradicating the reservoirs and breeding places on the human body itself (as is done in scabies), for which purpose baths, medicated or otherwise, are not sufficient. If these are overlooked, it is obvious that there is every likelihood of a rapid re-infection of the sterilized garments within a short time of their re-issue. We have found the cropping of the pubic hair and the repeated application of paraffin, or 1/40 carbolic lotion to the pubis, perineum, and axilla quite effective—although there is no doubt that if it could be supplied, petrol (which is used for this purpose in the French Army) would be the most powerful agent, as it not only kills the adult parasite instantly, but also penetrates the chitinous envelope of the ovum, and detaches it from the hair.

An improvement of petrol is the solution of naphthalene one per cent, and sulphur one per cent in benzol or petrol, recommended as of proved efficiency by Captain J. A. Gunn, R.A.M.C. (T.), M.D., D.Sc., in the British Medical Journal, May 5, 1917.

This solution is not only prophylactic to garments, momentarily steeped in it, over several months, but is, as we are informed, and have ourselves proved, instantaneously lethal to both parasites and their eggs.

Treatment.—In soldiers the routine treatment of scabies has already been exhaustively dealt with in the current number of The British Journal of Dermatology by Major H. MacCormac, R.A.M.C. (T.), M.D., F.R.C.P.; it is, therefore, unnecessary to discuss it here.

The most important point to be observed in the treatment of pediculosis is the discovery and elimination of the parasite and its eggs.

The methods found efficient by us have already been described. It now remains to mention briefly our methods of treating the secondary lesions.

(1) Treatment of the Primary Pustule.—If of small or moderate size, expression of the contained pus, and painting the surrounding skin with iodine, is almost always sufficient to ensure resolution.

(2) When ulceration and crusting have occurred, there is nothing which in our hands has yielded better results than an ointment of the following composition:—

Acid. salicyl. .......................... 22 gr. x
Sulph. precip........................... ad 3i
Ung. hyd. ox. flav.................. ad 3i

This is kept applied day and night on linen or lint, and in from four days to a week the superficial ulcers will be found in the majority of cases to have healed completely. Deep ulcers of an eczematous type also do well under it, especially if the patient is kept in bed with his legs raised. It is only occasionally that we meet with the deeply eroded indolent variety. These have to be treated on general principles with the patient in bed, and will tax the therapeutic resources and skill of the physician to the utmost.

The views which we hold on the great importance of the pediculus as a cause of disability are strongly supported by the figures we submit below.

The results of our analysis may be tabulated as follows:—
Clinical and other Notes

Total number of cases admitted between April 1 and May 9, 1917, 669.

Pyodermias 631

Other diseases, e.g., psoriasis, herpes, eczema, lice, &c.

Scabies 171
Pediculosis 112
(a) In which lice or evis were present
(b) In which no lice or evis were found, but in which there was presumptive evidence of pediculosis

Scabies 67
Pediculosis 24
(l) In which lice or evis were present
(2) In which there was no lice or evis, but there was existing parasitic infection

These are the combined results of our independent observations; the individual figures were as follows:

<table>
<thead>
<tr>
<th>Total</th>
<th>Scabies</th>
<th>Pediculosis</th>
<th>Scabies and pediculosis</th>
<th>Seborrhoea</th>
<th>Other cases of pyoderma</th>
<th>Other cases</th>
</tr>
</thead>
<tbody>
<tr>
<td>H. C. B.</td>
<td>101</td>
<td>83 (a)</td>
<td>44 (b)</td>
<td>11</td>
<td>11</td>
<td>31</td>
</tr>
<tr>
<td>H. W. B.</td>
<td>70</td>
<td>107 (a)</td>
<td>23 (b)</td>
<td>13</td>
<td>13</td>
<td>61</td>
</tr>
</tbody>
</table>

Thus the various totals correspond fairly closely under each heading.

It will be seen that out of a total number of 631 cases of pyoderma, 452 were associated with parasitic infection, i.e., 71.6 per cent. Of these latter, 171, i.e., 37.6 per cent, were consequent on scabies alone; 257, i.e., 56.9 per cent, were apparently secondary to pediculosis; while in 24, i.e., 5.5 per cent, the two infections were coincident.

The preponderating percentage of the pediculous cases is at once apparent. Of the remaining non-parasitic cases of pyoderma, seborrhoea—which is common, and of a severe type among our troops—accounts for the majority, whilst in only sixty-seven could no definite cause be assigned.

We are therefore justified in assuming that parasites are responsible to a very considerable degree for the disability induced by skin diseases in this War.

Conclusions.

(1) The disability produced by parasitic infection is very considerable. Of 669 cases admitted in just over five weeks, 442 were directly attributable to scabies and pediculosis.

(2) Of these 442, 171 were due to scabies alone, 24 to the combined infections, and 257 to pediculii.

(3) The P. vestimentorum is capable, and in a considerable majority of cases actually does lay its eggs in the hair of the pubis and perineum, and sometimes the axilla.

(4) From this fact there arises the important deduction that measures directed towards sterilization of the clothes cannot be efficient unless the host himself is also disinfected at the same time.

(5) We regard it as extremely probable that the lesions of pediculosis are initiated in susceptible individuals around the actual bite of the louse.

(6) The severity of the lesions produced, especially in the case of scabies, is very considerably aggravated by the seborrhoeic diathesis.
A QUICK METHOD OF DIAGNOSING THE TYPE OF MENINGOCOCCUS IN CASES OF CEREBROSPINAL FEVER.

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AND

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Of the Central Cerebrospinal Fever Laboratory.

In the effective treatment of cerebrospinal fever early recognition of the type of the infecting meningococcus is of the utmost importance in order that the corresponding specific curative serum may be given as soon as possible.

Under the most favourable circumstances, forty-eight hours must elapse before the meningococcus can be grown from the cerebrospinal fluid or nasopharynx of the case and its correct type diagnosed by agglutination and not infrequently seventy-two hours pass before the infecting meningococcus is classed.

An attempt was made in the first place to shorten this period by substituting a precipitin for the agglutination reaction; it failed dismally. Finding that in the case of the four univalent agglutinating sera prepared from the rabbit and sent out from the Central Laboratory for identifying types of the meningococcus, the results given by complement fixation were practically identical with those obtained by agglutination, the writers next proceeded to apply the complement fixation test to serum taken from patients at an early stage of cerebrospinal fever, using the four standard type cocci as antigens in each instance. The results obtained in sixteen successive cases of cerebrospinal fever were as follows:

It will be seen that in each of these sixteen cases except (b) the results were not clean cut; nevertheless the indication obtained by this method was proved right in all of the cases in which the type of the coccus could subsequently be

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1 We have been asked to explain the fact that whereas about ninety per cent of all troops in the trenches are infected with lice, only a relatively small proportion (the exact figures cannot, of course, be given) present the secondary lesions we have described. It can be contended that there is an individual susceptibility in some cases such as has been proved to exist in the case of flea-bites (Boycot), and those of mosquitoes and other insects.

In other cases the phenomenon of anaphylaxis probably plays a part; so that the susceptibility of the individual as evidenced by the appearance of the lesions is at first latent. That some specific toxin is injected by the louse, when feeding is supported by the fact that in marked cases of melanoderma, associated with pediculosis, even the mucous membranes may become pigmented, as in Addison's disease (Thibierge and others). Darier, moreover, points out that it is not rare in such cases to find a marked cachexia with very real asthenia—a fact which we have ourselves observed on more than one occasion.

Another factor in the production of the secondary lesion is, in our opinion, the coexistence of the seborrhoeic diathesis which, as we have already pointed out, plays such an important rôle in the severe eruptions primarily due to the Acarus scabiei.