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LICE

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The incidence of human louse infestation in Alberta is higher than is generally recognized. There is evidence, moreover, that the predominant species of louse is changing. For these reasons, and also because methods of louse control have completely changed during the last 15 years, this seems an appropriate time to review the situation and to describe briefly the best modern methods of control. In times of national disaster when normal standards of personal hygiene have to be abandoned, populations of lice may build up with fantastic rapidity; and to the direct effects of infestation must be added the risk of transmission of epidemic typhus and sometimes, and in some areas, of trench fever and relapsing fever.

There are two species of lice which infest man ,the "crab" or pubic louse, Phthirus pubis (L). (fig. 1, and Pediculus Humanus L. (fig. 2) of which there are two forms usually regarded as of sub-specific rank,

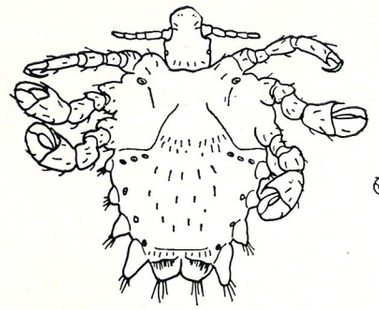

Fig. 1
Phthirus pubic L. Adult ° x 25. A cleared specimen from the dorsal aspect; genital structures are ventral.

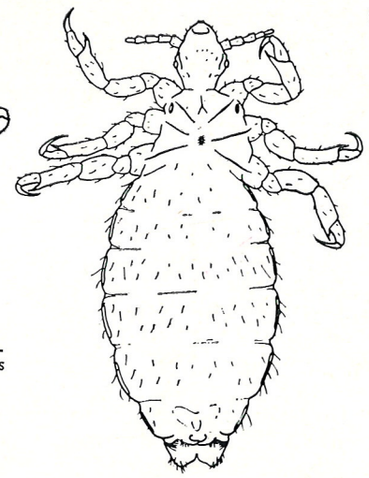

Fig 2.
Pediculum humanus L. Adult ° x 25. A cleared specimen from the dorsal aspect; genital structures are ventral.

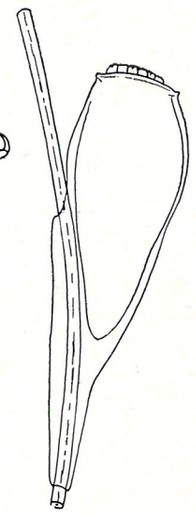

Fig. 3
An egg of Pediculus humanus cemented to a human hair. x 55.

the head louse (P. humanus capitis de G.) and the body louse P. humanus corporis de G.) Pubic lice, with their inactive habits and translucent brownish color, often tinged with blood, may be mistaken for small scabs. As the name "crab" implies, they are as broad as they are long: Pediculus is more slender. The two species can be readily identified with a hand lens, although head and body lice cannot easily be distinguished from each other.

Life Cycles and Habits

An adult female Pediculus lays about 10 eggs per day for a period of about a month. The eggs or "nits" are very characteristic (fig. 3). They are attached to the hairs of the head by P. humanus capitis; and usually to clothing fibres, especially along the seams of wollen underwear, by P. humanus corporis. Eggs hatch in 5 to 12 days, and the nymphs pass through 3 moults to mature in another 10 to 20 days. Nymphs and adults

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feed at least several times a day by sucking blood. The first mating usually occurs within a day or so of the last moult and the first eggs are laid 2 days later. The head louse is largely confined to the scalp and its hair, while the body louse is usually found most abundantly on the inner surface of clothing worn next to the skin, especially on the seams of these. Lice found in hats and caps may be of either sub-species.

Phthirus lays fewer eggs than Pediculus, feeds much more frequently or for longer periods or both, and is much less active. The most important difference, however, is that Phthirus is adapted to life among hair which grows more sparsely than in areas suitable for Pediculus. Such hair is to be found in the pubic and perianal regions, the axillae, chest, chin, eyebrows and lashes, and on the scalp of infants; and it is in these body regions that Phthirus is usually found.

Transmission

The passage of Pediculus from person to person is readily accomplished in a variety of ways. These include interchange of clothing, including bedclothes and perhaps especially headwear; mutual use of a towel, brush or comb; loose hairs of the body, head, or clothing, while borne on the wind carrying eggs or active stages; and personal contact. The activity of lice is greatly reduced by light: for this reason most means of transmission are far more effective at night. Lice leave a host if his temperature becomes abnormal, either through fever or death, and actively seek a new host. This fact is of considerable practical importance in epidemics of louse-borne disease.

While Pediculus may survive for a week or more off the host, or in the egg stage even longer, Phthirus will rarely survive for 24 hours. Phthirus then, being also less active and more restricted habitat, is less readily transmitted. The difference is so marked that it is popularly though quite erroneously held that Phthirus is only transmissible during the close personal contact of sexual intercourse. Two divorces have been granted in recent years on this assumption (Stead, 1927; Borden 1957) despite the fact that the men involved may have been doing nothing worse than kissing a baby. The quite common occurrence of Phthirus on facial hairs and especially on the scalps of infants, the occasional discovery of living specimens on toilet seats and in beds, and the readiness with which it may spread through the crews of merchant ships (Ferguson, 1930), all indicate that although most transmission may take place during sexual intercourse, other methods of spread must always be considered. It is clear, moreover, that the discovery of lice—of either species—on the person is not necessarily a reflection on cleanliness or a matter for shameful concealment. This all too common attitude is one of the biggest obstacles to control.

Incidence in Alberta

A true assessment of the incidence of human lice is never easy to make. The delousing plant operated by the Edmonton City Health Department treated only one case in 1953, none in 1954; and it closed down in 1955 as there seemed to be insufficient demand for it. This probably reflects the greater ease with which effective treatments can now be applied in the home; it does not necessarily indicate a reduced incidence. There are facilities for louse control at the Single Men's Hostel run by the Provincial Department of Public Welfare. Here two or three cases are treated every week; but of these only two or three a year are reported as infestations with Phthirus pubis. These facilities are now used by the City Health Department.

In their quarterly reports for the first part of 1957 only 5 of the 20 Health Units in Alberta record any cases of pediculosis. The incidence varied from 1.7 per cent of school children in the Foothills Health Unit to 2.9 per cent in the Wetoka Health Unit (Wetaskiwin). These figures are based on 1080 school children examined. On the other hand, Mrs. D. McPhail, Director of Public Health Nursing, reports that 28 children at Smith had head lice out of a total 280; and at Paddle Prairie nearly all of a group of 66 Metis children were infested. Dr. M. Matas reports that about 20 people infested with Pediculus were seen at the Charles Camsell Indian Hospital in 1957. These were nearly all infestations with head lice; body lice are seen occasionally on very aged, but he has no records of Phthirus pubis. Dr. Matas believes that the incidence of head lice is rather high in residential schools on the Indian Reserves.

At the Department of Entomology, University of Alberta, 4 or 5 specimens of Phthirus are submitted for examination each year, as against one Pediculus. This was certainly not the case before the last war. Mr. J. H. Brown, entomologist with the Provincial Department of Health, reports that his experience has been similar. Since people are more reluctant to seek advice and aid when infested by Phthirus than by Pediculus, the actual incidence ratio of Phthirus to Pediculus is probably higher still. Dr. P. L. Rentiers reports that 18 persons were treated for lice, of unknown species, at the venereal diseases clinic in 1957. In his private practice he saw two cases, both of them infestations with Phthirus pubis.

Prevention and Treatment

In view of the duration of the life cycle and the fact that efficient laundering of cottons will destroy all stages, body louse populations are unlikely to build up on any person who can get a change of underwear at least once a week, unless he wears woollens. Wash water hot enough to kill lice will unfortunately shrink woollens; and it is woollen articles that are most commonly infested. Since head lice and Phthirus lay their eggs on hairs and are more closely associated with the person, and since the hottest soapiest water which a person can wash in will kill neither lice nor their eggs, populations of either form may build up on the cleanest of people.

The ordinary practices of personal hygiene are the most important preventive measures. The following points are of particular importance: using only one's own brush, comb, and towel; keeping the hair well trimmed; the changing of clothes, especially underwear, at least once weekly; and avoiding the interchange of clothing with others.

With the advent of DDT (dichloro-diphenyl-trichloroethane) it is no longer necessary to incur the hazards of heroic applications of ointments containing mercury or copper, nor to indulge in the sometimes embarrasing advertisement of applications of kerosene or vinegar to the head. Without question the most satisfactory treatment is the use of 10 per cent DDT dust. The nature of the diluent is unimportant. This material is applied at the rate of 1 to 1½ oz. (0.1 to 0.15 oz. of actual DDT) to the inner side of the clothing (including headwear) and to the skin, with particular attention to the most affected parts of the body and to the seams of the clothing. The patient should not bathe for at least 24 hours after treatment because the dust kills slowly. Eggs are not affected. While sufficient DDT usually remains to kill the nymphs when they hatch from these, a second treatment after 10 days is desirable to make certain of this. Application may be made by hand. If many cases have to be treated a simple dust gun or blower may be preferred since this obviates the need for removing clothing; the

outlet of the blower is simply inserted in the clothing openings at neck, waist, wrists, and ankles. Other methods of application are illustrated in United States Department of Agriculture Circular No. 977, 1955.

Although strains of Pediculus resistant to DDT have been reported, there is as yet no evidence of this in Canada. DDT treatment will not, of course, remove dead eggs. Eggs are cemented to the hair with a material for which there is no known solvent. Vinegar, despite popular opinion, will not remove them; close clipping or the use of a fine comb are the only established procedures.

In circumstances in which a second treatment is not practicable or cannot be ensured, or if scabies (infestation with Sarcoptes, itch mites) is suspected as well as pediculosis the following dual purpose single application treatment may be preferred:

Emulsion concentrates:

Benzyl benzoate	68 per cent by weight
DDT (technical)	6 per cent by weight
Benzocaine	12 per cent by weight
Tween 80 (emulsifier)	14 per cent by weight

Dilute one part of this emulsion with five parts of water by volume and apply to the whole surface of the body with a brush or sponge. Care must be taken not to get the material in the eyes. If this treatment is used, alll clothing, towels, bedding, and personal effects should be sterilized by heat. Although exposure to high or low temperatures is impracticable for killing lice on the body, it is very suitable for this purpose.

Since lice are more of a problem in winter than in summer, and in the north of the province than in the south, and since the use of low temperatures requires no special equipment, it should be widely known that an overnight exposure to the open air when the temperatures goes down to 0°F will kill both lice and eggs. Garments must be well spread out and ventilated so that all parts of them are rapidly chilled to the ambient temperature; placing them singly on hangers spaced along a clothes line is simple and nearly ideal. High temperatures require special facilities but are independent of the weather; thirty minutes at 122° F will kill lice and eggs, but again this temperature must be reached for the full time at all parts of the garments. Other time and temperature combinations and methods of achieving these are given in Buxton's (1947) comprehensive little book on lice. Fumigation with methyl bromide or hydrogen cyanide is also a practicable procedure; the latter material, however, requires special precautions and an experienced operator. Details are given in the Defence Research Board Interservice Manual on Pest Control (1956).

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