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# Louse Infestation

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**KEY POINTS**

- Lice (*Pediculosis humanus*) have been infesting humans since antiquity.
- Infestations are most common in children (head lice), people living in crowded and unsanitary conditions (body lice) and as a result of sexual contact (pubic lice).
- Lice do not fly or jump; transmission is by human-to-human contact.
- Lice live on human blood and so cannot live for more than about 48 hours away from the human host.
- Itching is the most common symptom, but many infestations are symptomless.
- Although most infestations are merely bothersome, lice can act as a vector for diseases such as epidemic typhus, trench fever and louse-borne relapsing fever. Secondary infections with staphylococci or streptococci can enter through skin sores that result from scratching.
- Treatments can be pharmacological (topical or oral) or non-pharmacological.

## Louse Infestation (Pediculosis)

Lice are ectoparasites and belong to the group called sucking lice (*Anoplura*). Three species of louse are parasitic to humans:

- *Pediculus capitis* (head louse)
- *Pediculus humanus* (body louse)
- *Pthirus pubis* (crab or pubic louse).

## Biology and Description

The three species have similar life cycles comprising the egg, nymph and the adult. The fertilized female louse lays eggs which hatch in 7–9 days. The hatchlings moult their exoskeleton three times in a 7–10-day period to develop into mature adults, which survive approximately 30 days. Each female may lay 50–300 eggs in her lifetime.

Since lice have evolved with humans, their anatomy is highly specialized; each of the six legs terminates in a claw which allows the lice to move rapidly and to transfer to new hosts. Head lice are generally smaller than body lice (2–3 mm and 3–4 mm in length, respectively) and pubic lice are crab-like in shape 1.3–2 mm long and slower than the other types. All human lice are haematophagous, depending solely on human blood as a source of water and nutrition. They take a blood meal from the skin 2–5 times a day.

## Transmission

For all three types, transmission is through close contact with an infested person. The role played by fomites in the transmission of head lice is unclear. Body lice are spread by contact with infested clothing. Pubic lice are usually transmitted during sexual contact, but non-sexual transmission can occur and there is some evidence that fomites play a role.

## Diagnosis

The diagnosis of pediculosis is dependent on visual identification of at least one live adult louse, with detection of viable eggs on the hair shafts (for head lice) and/or clothing (for body and pubic lice). In the case of head lice, the optimal method for diagnosis is wet combing of the hair using a lubricating agent such as hair conditioner or oil (sensitivity >90%, even in children with a low infestation intensity).[1] Empty egg cases attached to hair shafts are not diagnostic of an active infection and it is important not to confuse live lice or nits with dandruff, hair casts or other debris.

### *PEDICULUS HUMANIS* VAR *CAPITIS* (HEAD LICE)

Head lice are a dirty-white to grayish-black in colour (Figure 59.1A). They live on the scalp and attach their eggs (nits) close to the base of the hair (Figure 59.1B). They can survive for 6–24 hours away from the human host, dying of dehydration at a rate dependent on the relative ambient humidity. Eggs rarely hatch at a temperature lower than that near the scalp.

#### *Epidemiology*

Head lice infestations occur throughout the world and affect populations in every stratum of society. Systematic collection of prevalence data is not undertaken and so it is difficult to estimate the size of the problem in most countries. Prevalence rates between 0.7% and 76% have been reported in a range of settings.[2] Children aged 3–11 years are most frequently affected, with girls twice as likely to be infested, probably as a result of social behaviours (e.g. closer physical contact, sharing of hair accessories). Sociodemographic status and seasonality do not appear to affect prevalence.

#### *Clinical Features*

Pruritus is the most common symptom of infestation. Affected areas include the scalp, the back of the neck and post-auricular areas. While infestations can be asymptomatic, some people develop an allergic reaction to the saliva injected during feeding. Pruritus is more common in persistent infestations, although itch is not specific for head lice. Excoriation can accompany the pruritus and may lead to bacterial skin super-infection.

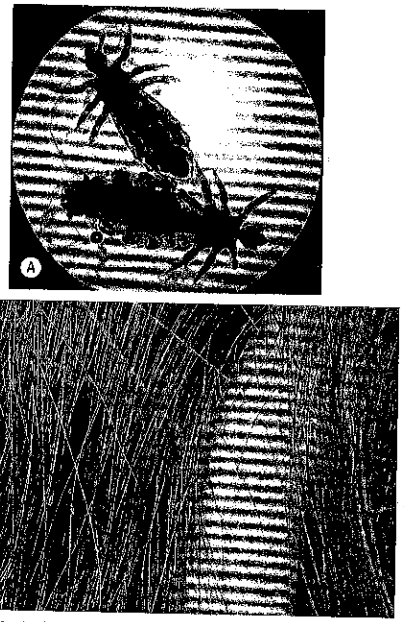


**Figure 59.1** (A) Head lice. (B) Head lice eggs in hair. *(A, from Zaoutis L. Comprehensive Hospital Medicine, with permission from Elsevier. Copyright © 2007. B, from Frazier M. Essentials of Human Diseases and Conditions, with permission from Elsevier. Copyright © 2009.)*

Occasionally, cervical lymphadenopathy and conjunctivitis may occur. Rarely, glomerulonephritis may occur as a consequence of group A streptococcal super-infection of the skin.[3] Infestation can also have psychological effects and result in social stigmatisation. Persistent infestation can lead to poor performance at school secondary to sleep disturbance and difficulties in concentration.

## *PEDICULUS HUMANIS* (BODY OR CLOTHES LICE)

The body louse almost certainly evolved from head lice with the advent of clothing and is the only parasite to evolve to fill this niche.

The adult is grayish-white, reddish or cream in colour with thinner antennae and better developed abdominal muscles than the head louse (Figure 59.2A). Females lay their nits in the seams or hems of clothes (especially underwear) that are adjacent to the surface of the skin (Figure 59.2B). They feed only when the host is resting or sleeping. Unfed body lice rarely survive longer than 10 days, while those which have fed may survive in moist clothing for 30–40 days away from a host.

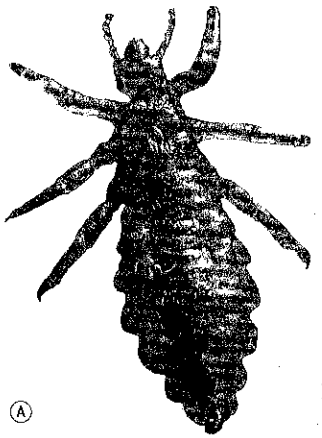
### *Epidemiology*

Body lice infestations are found worldwide, but are generally limited to persons who: live in crowded conditions; own just one set of clothes; and do not have access to hot water for regular bathing and laundering of clothes. The prevalence of body lice has declined in recent years because most people do not wear the same clothing for prolonged periods. Prevalence is greater at higher altitudes where the cold climate necessitates heavier dressing, but poverty prevents frequent changing or washing of clothes in hot water, which will kill the eggs and lice.

### *Clinical Features*

Bites appear as minute red dots, developing into papular lesions with wheal-like inflammation. Symptoms of repeated inoculation with saliva include headache, malaise, anorexia, joint pains, fever, irritability and a Rubella-like rash. Pruritus can indicate the development of an allergy; inhalation of faeces or parts of cast skins from body lice can trigger hay fever symptoms. Secondary infections related to scratching are common. Long-lasting infestation may result in vagabond's disease (pediculosis melanoderma).

Body lice are known vectors of epidemic or louse-borne typhus (*Rickettsia prowazeki*), trench fever (*Bartonella quintana*) and louse-borne relapsing fever (*Borrelia recurrentis*).



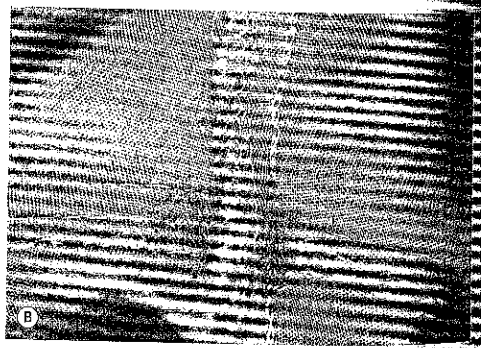


**Figure 59.2** (A) Body louse. (B) Body louse eggs in seams of clothing. *(A, from Habif T. Clinical Dermatology, with permission from Elsevier. Copyright © 2010. B, from Bolognia J. Dermatology. 2nd edn., with permission from Elsevier. Copyright © 2008.)*



**Figure 59.3** (A) Crab louse. (B) Crab lice eggs at the base of lower abdominal hairs. *(A, from Resh V. Encyclopedia of Insects. 2nd edn., with permission from Elsevier. Copyright © 2009. B from Ko CJ, Elston DM. Pediculosis. J Am Acad Dermatol 2004;50:1–12.)*

These conditions are fatal in up to 40% of patients and are most common in areas where climate, poverty, social customs, war or social upheaval prevent regular changes and laundering of clothing in hot water. Since 1995, louse-borne diseases have had a resurgence, and trench fever has been diagnosed in many developed and developing countries.[4]

## *PHTHIRUS PUBIS* (CRAB OR PUBIC LICE)

The pubic louse is grey in colour and the nit is oval, opalescent, 0.2–0.8 mm in size and glued firmly to the hair (Figure 59.3). Pubic lice most commonly infest pubic and perianal hair, but can be found in the hair of the beard, moustache, eyelashes, armpits, chest and abdomen. The preference for these sites is due to hair spacing. The 2 mm between pubic hairs matches the space between the louse's hind legs. Pubic lice are associated with, but do not cause other sexually transmitted infections.

### *Epidemiology*

Pubic lice are primarily found on younger sexually active adults and sex workers. Infestation rates of around 2% are usually seen. Infestation in children can be indicative of sexual abuse. Infestation is uncommon in older age.

### *Clinical Features*

Puncture sites are red with swelling in the immediate area. Intense itching is common, but is delayed until approximately 4 weeks after the initial infestation. A characteristic grey-blue pigmentation (maculae ceruleae) appears at the feeding site. This is thought to result from altered human blood pigments or a reaction to substances excreted in louse saliva. Affected patients report rust spots (louse excrement) on clothing. Pubic lice do not transmit disease, but excoriation and secondary infection can occur in those with symptoms.

## Treatment for all Types of Lice

Lice are commonly treated with over-the-counter products containing agents such as pyrethrins, permethrin, malathion, essential oils (e.g. eucalyptus oil) and products that physically suffocate the ectoparasite. The emergence of drug-resistant lice and concerns about the neurotoxic effects of malathion have created the need for new therapies. Results from trials of mechanical removal, suffocation-based pediculicide treatments, shampoos containing complex plant-based compounds, topical application of dimethicones, and home remedies (vinegar, isopropyl alcohol, olive oil, mayonnaise, melted butter and petroleum jelly) are inconsistent. Head shaving is effective but is distressing for children. Because no approved pediculicide is completely ovicidal, topical treatment failure is most commonly due to the lack of repeat treatment to ensure emerging nymphs are killed. Treatment failure can also be the result of inadequate application of the treatment product, resistance in the lice or re-infestation.[5–7] Oral and topical ivermectin have demonstrated both efficacy against head lice and acceptability in several studies,[8–11] but only the topical route of administration is currently licensed for use against lice by the United States Food and Drug Authority (FDA).

## Control and Prevention

Regular surveillance, early detection and treatment may reduce the burden of lice infestation.[12] Washing of clothes, bed linen and towels used by an infested individual using a hot water laundry cycle and a high heat drying cycle is recommended for body and pubic lice infestations, but not for head lice infestation. Shaving pubic hair can be helpful and all sexual contacts should be examined and treated empirically. Household contacts should be treated only if infested. The use of fumigant sprays is not recommended because of toxicity if the agent is inhaled or absorbed percutaneously. Commonly used treatments are listed in Table 59.1. Cure rates vary between 50% and 100%.[13] Resistance to pediculicides is a growing problem.[1,14] Major types of resistance include knock-down resistance, glutathione-S-transferase-based resistance and monooxygenase-based resistance.[15]

## Exclusion

Because a child with an active head lice infestation is likely to have been infested for a month or more by the time it is discovered, the child poses little additional transmission risk to classmates and so should remain in school. Parents should be discreetly notified and treatment initiated that afternoon or evening. The child may return to school the day after effective treatment has been initiated.

**TABLE 59.1 Treatment for All Types of Lice**

| Category | Examples |
|---|---|
| **Pediculicides** | |
| Prescription | Malathion lotion 0.5%, Benzyl alcohol lotion (5%); ivermectin (topical or tablet forms) |
| Over-the-counter | Pyrethrins combined with piperonyl butoxide, Permethrin lotion 1% |
| 'Natural' products | Essentials oils and other plant extracts |
| Occlusive agents | Petroleum jelly, hair conditioner, silicone oil (dimethicones) |
| Manual removal | If only a few live lice and nits are present, it may be possible to remove these with fingernails or a nit comb |
| **Particular Interventions** | |
| Head lice | Check family members |
| Body lice | More frequent changing of clothes |
| Pubic lice | Contact tracing and testing for other sexually transmissible infections |
| | Applying ophthalmic-grade petrolatum ointment (available by prescription) to the eyelid margins 2–4 times a day for 10 days is effective for infestations of the eyelashes. |

No pediculicide is 100% effective in killing the eggs; resistance varies geographically.
Treatment with the organochlorine insecticide lindane is no longer recommended due to potential neurotoxic effects and low efficacy.

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# Other Ecto and Sand

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KEY

- Out of 650 known leech species, few some living inland and the majority in fr
- Leeches are hermaphrodites and the haematophagous.
- Myiasis is the fourth most common tr skin disease, and cutaneous myiasis is quently encountered clinical form.
- A higher incidence of myiasis is found especially in tropical and sub-tropical are America.
- Flies producing furuncular myiasis incl *hominis*, *Cordylobia anthropophaga*, *V* and *Cuterebra* spp.
- In humans, *Gasterophilus*, *Cuterebra*, *Hypoderma* species can also produce c
- Sand fleas, also known as jigger, chigge are haematophagous insect parasites domestic animals.
- Sand flea infestation is considered a tr Cases of tungiasis are also reported in rles and workers returning from ende

## Leeches

Leeches belong to the class Hirudinea from ida. There are about 650 known species of l land, others in salt and fresh water. Althou ers, most of the leeches are haematopha ive in the vegetation of tropical rainforest near springs, streams and wells frequented other vertebrates. Species from this group at *Haemadipsa zelanica*, *Haemadipsa sylvestr picta*.

Freshwater leeches, which infest humar *ilotica*, *Limnatis maculosa*, *Phytobdella co ferox*, *Myxobdella africana*, *Hirudinea gre viridis*, *Emys orbicularis*, *Diestecostoma mex Igria ghilianii*. Leeches, which are used fo clinical symptoms in humans, are called m include *Hirudo medicinalis*, *Hirudo verban Hirudo troctina*, *Hirudo michaelseni*, *Hir Placobdella ornate* and *Macrobdella décora*.