Life Cycle

The life cycle of the louse is from 23 to 30 days and consists of three stages. The first stage is the ova, or nits. After the nits are laid, they incubate for 7 to 14 days prior to hatching (Pe'er & BenEzra, 1998). A newly laid egg is attached to the hair 2–3 mm from the scalp. It is usually light–almost translucent–in color. The nit has an operculum (a donut-shaped opening), which allows the passage of air and humidity the nit needs to breathe (see figure 2-5). The developing louse breathes through small holes called spiracles (Chesney & Burgess, 1998). As the embryo develops, a rounded spot may be visible in the nit. This is the developing louse. When ready to hatch, the larva takes in air and expels itself from the ovum. For nits to successfully incubate and hatch, the temperature needs to be at least 72°F to 82°F with a minimum humidity of 70% (Pe'er & BenEzra, 1998). The human head is capable of, and often ideal for, providing these conditions.

Figure 2-4: A nit (magnification about 60x)

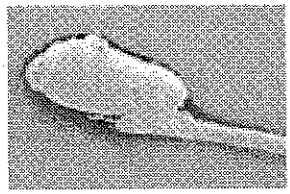

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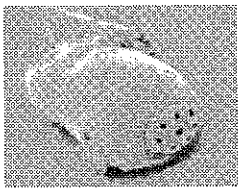
Figure 2-5: Operculum (magnification about 110x)



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The second stage in the life cycle is the nymph. The nymphal louse is smaller than an adult louse. This newly hatched louse must eat a blood meal within the first hour after birth if it is to survive. They are not sexually mature and cannot reproduce (Chunge et al., 1991a). During the next eight to nine days, nymphs grow and develop, going through three molts until they reach maturity (Chesney & Burgess, 1998).

The third and last phase of the life cycle is the adult louse. During this stage, female lice are capable of reproducing after impregnation. A female lays from five and ten ova a day and is capable of laying up to 300 ova during her 30-day lifespan (Dillenberg, 1999). Temperature sensitive, optimum nit production occurs at 84°F (Dillenberg, 1999). Only nits that are fertilized may develop and hatch.

For lice to survive, they generally require a blood meal every three to six hours. Lice, however, are extremely hearty. They have been known to survive in suboptimal environments, such as going without food for 15 to 20 hours and, in the right conditions, off the human host for as long as two days (Molinari, 1992; Chunge et al., 1991b). They can survive simple shampooing or swimming. Their survival is dependent on whether the louse is fully mature, when it ate its last meal, and what the ambiant temperature and humidity are. Adult lice are more resilient than nymphs, but nits are more resilient than either nymphs or adults. Exposure of nits or lice to temperatures of 125°F for at least five minutes is lethal.

Transmission

Lice are usually transmitted directly from head to head, from one person to another. Although less common, they may also be transmitted through a vector–combs, earphones, hair ornaments, bike helmets, or the like. Bed linens, pillows, stuffed animals, and carpeting may also serve as vectors. Transmission by vector is more common in warmer climates, where lice are

more likely to have longer survival times when off a human host. Some selected antibiotics may also interfere with a louse's reproductive capacity (Burgess, 1995; Rosenthal, 1999), however their use in treating head lice is not recommended because of the risk of the development of resistant bacteria and the resulting diminishing of the usefulness of the antibiotic (Pollack, 2000).

Although all people are susceptible, some groups are more vulnerable than others. Children between the ages of 3 and 11 are most often affected, and prevalence decreases with age (Pe'er & BenEzra, 1998; Dillenberg, 1999; Juranek, 1977). Girls are infested approximately twice as often as boys, probably because they share more personal items. Lice also seem to have a predilection for red or brown hair over blonde or black hair. Hair length, on the other hand, appears to be irrelevant (Juranek, 1977).

In the United States, 99% of infestations are seen in Caucasian children as compared to African American children. This distinction has to do with the texture of the hair shafts (Chesney & Burgess, 1998). Lice have difficulty gripping the oval-shaped hair shafts characteristic of African Americans. Oil or grease-based hair preparations commonly used by African Americans may also play a role as they may make it more difficult for the louse to obtain a satisfactory meal or lay its eggs. This information, however, should not lead the school nurse to exclude African American children from screening programs if others with whom they have close contact are infected.

Some children seem resistant to lice. Their immune response may play a role, killing off symbiotic microflora that lice need to survive (Chesney & Burgess, 1998).

Transmission of lice usually occurs in the home where family members enjoy close proximity. Higher rates of infestations are seen in larger families (Chunge et al., 1991a). Bed-sharing increases the risk. This is due to the close proximity of family members, not their socio-economic status or cleanliness. When lice transmission occurs in the schools, it is probably due to activities that place students in close proximity to each other, e.g., group work, games, or through vectors, including shared lockers, brushes, dress-up clothes, or coats and hats that are stacked together. Sleepovers are another risk factor. Unfortunately, some children seem more prone to repeated infestations than others, despite appropriate treatment and vigilant observation by their parents and others.

Despite their unsavory reputation, lice are not known to be vectors for any disease, although symptomatology such as itching may predispose an individual to secondary infection (Chesney & BenEzra, 1998; Pollack, 1999; Modern Scourge, 1998).