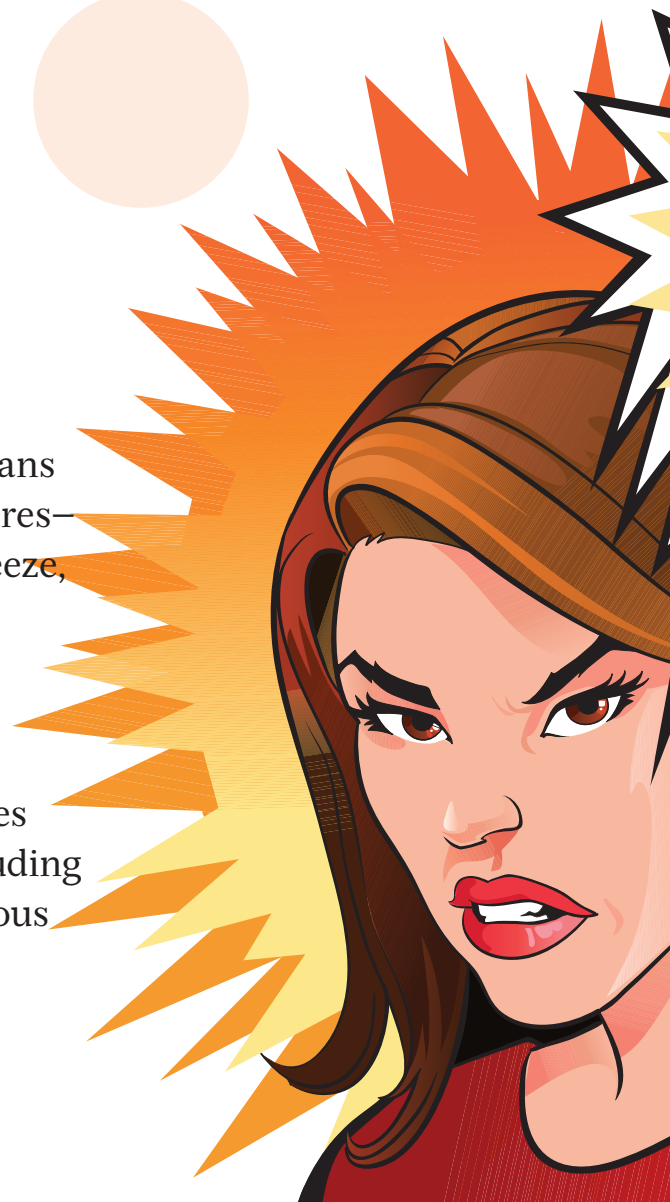


Lice, mites, and worms, **OH MY**

METAZOAN PARASITES OF CHILDREN IN NEW ORLEANS

■ BY CLAUDIA S. COPELAND, PhD

With its subtropical, swampy climate, New Orleans is well-suited to breeding unwanted little creatures—termites eat our houses, dust mites make us sneeze, and cockroaches are simply unwelcome guests when they sneak into our homes. Even more disturbing than these home-invading pests, however, are pests that invade the bodies of our children. A number of creepy metazoan parasites commonly infest children in New Orleans, including insects, arachnids, and worms. In addition, serious complications can arise from worm parasites that rarely infect humans, but still manage to parasitize Louisiana children now and then. →





HEAD LICE! eeeww!

THE MOST COMMONLY ENCOUNTERED

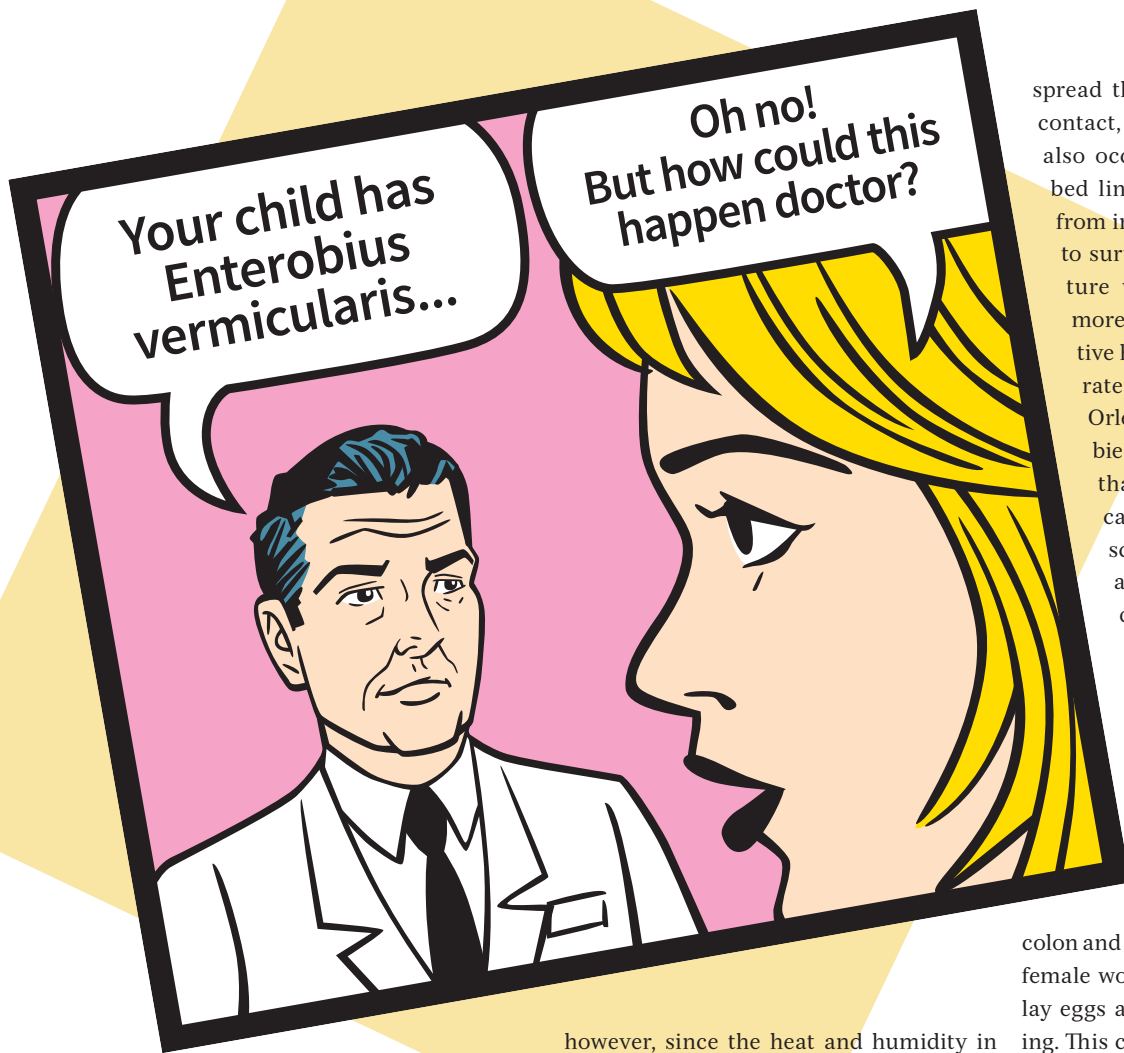
metazoan parasite in New Orleans children, by far, is *Pediculus humanus capitis*, or head lice. Head lice are tiny insects that infest the head and neck, feeding on blood several times a day and attaching their eggs (nits) to the base of the hair shaft. Exclusive ectoparasites of humans, they cannot survive more than two days away from the human scalp area. They also cannot jump or fly, so the only way they can be transmitted is through crawling from head to head, or via items like combs or hats that can serve as vehicles of transportation from one head to another. In spite of these limitations, head lice are extremely common among young children (almost every parent contacted for this article had at some point dealt with lice), especially in our warm and humid environment.

Adrienne Shulman, a former elementary school teacher and currently the director of a well-regarded New Orleans nursery school, has “taught in public and private New Orleans schools before becoming the director of this nursery school, and lice were a recurring problem in all of them. Wherever groups of kids get together, there will be regular outbreaks of lice. Parents are embarrassed, but it has nothing to do with cleanliness or neglectful parenting of any sort.”

Parents, however, are often taken aback and even shocked the first time they hear that their child is infested. Though lice infestation is unrelated to lifestyle factors such as cleanliness, there is a widespread misconception that hygiene or lifestyle is somehow responsible, and even knowledgeable parents often feel embarrassed. One mother from the Uptown area, whose children attended a fastidiously hygienic private preschool, put it this way: “Even though I understand how kids get them and that being dirty is not the cause, it felt like a parenting failure. I quickly learned

that misinformation is rampant. Other parents and the school told me I basically had to fumigate my entire house and bag up stuffed animals and all sorts of crazy things. I went to the CDC’s website and learned about their life cycle and what was actually necessary. I put that awful poison in both of my children’s hair at first and was horrified when [her four-year-old child] ended up with open sores all over his head ... after that I just used tea tree oil shampoo and picked nits. It was quite the learning experience.”

Fortunately, head lice can be effectively treated by combing the hair with a fine-toothed nit comb. Pediculicides (shampoos that kill the adult lice) are considered safe for children older than 2 years of age, but as the mother quoted above stated, they can have side effects on some children even if they are older. Another New Orleans mother, whose three children have all been infested with lice at some point, asserts that, “I believe the only way to clear them is to comb, comb, comb, using conditioner on the hair to catch all the lice in the steel comb. Also, very careful searching for lice yielded nothing in [the youngest son’s] head until I put in white conditioner and combed. They were all over his head, but quite invisible in his light brown hair.” Combs used to clear lice and nits should be cleaned in rubbing alcohol, Lysol®, or with soap and hot (130°F) water after use. In addition, even though head-to-head contact is the main mode of transmission, head lice can survive briefly off the head. Therefore, the Louisiana DHH recommends vacuuming of floors and furniture, and washing of clothing, bedding, and other personal items onto which lice may have crawled, in very hot water, or sealing them in plastic bags for two weeks. (This time period is officially recommended by a number of sources. Lice in general cannot survive longer than two days off of a human scalp;



spread through prolonged skin-to-skin contact, but scabies transmission can also occur via prolonged contact with bed linen, clothing, and other fabrics from infested hosts. The mites are able to survive 2-3 days at room temperature when the relative humidity is more than 30%. The higher the relative humidity, the higher the survival rate, so Southern cities like New Orleans are at increased risk of scabies transmission via routes other than skin-to-skin contact. Child care facilities are common sites of scabies infections, and the Louisiana DHH recommends that children be excluded from school or daycare until treatment has been completed.

Rivaling lice in prevalence (and parental horror) in New Orleans children are *Enterobius vermicularis*, a.k.a. pinworms. These thin, white roundworms (about the length of a staple) live in the colon and rectum of the child. At night, the female worms emerge from the anus and lay eggs around the outside of the opening. This causes intense itching. When the child scratches, the eggs get underneath his or her fingernails. From there, they can be transferred either directly to the child's own mouth, establishing a new cycle of infection when they hatch in the stomach, or to toys and other items, where they can survive for as long as 2 to 3 weeks (ideal conditions for egg viability are low heat and high humidity) and be ingested by other children. To prevent infection, children should be encouraged to wash their hands often. Nails should be kept trimmed, and items from an infected child should be washed. Treatment with anthelmintics will kill the worms, but not the eggs, and so must be repeated after two weeks to kill any newly hatched worms. While

however, since the heat and humidity in New Orleans can at times be high enough to mimic the conditions of the human scalp, there is concern that eggs could hatch away from a scalp during particularly hot and humid weather here. Sealing items tightly in plastic bags for two weeks ensures that no living lice will remain on the items, even under the unique New Orleans conditions that might theoretically make it possible for the eggs to hatch.)

Another common ectoparasitic infestation of children, scabies, is caused not by insects, but by an arachnid, the microscopic mite *Sarcoptes scabiei*. Scabies mites burrow into the upper layer of the skin where they live and lay eggs, causing an intensely itchy rash. Scabies is most commonly



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—A New Orleans Mom

garlic (specifically, a peeled clove of garlic inserted into the anus and left overnight, or a paste of garlic and petroleum jelly applied to the anus) is a traditional remedy, little research has been done to confirm or refute the validity of this treatment. Petroleum jelly serves to cut off oxygen, which is required for maturation of the eggs. Anti-itch cream can also be useful to prevent spreading of the eggs or auto-infestation via scratching.

Fortunately, enterobiasis is a benign disease, with no major effects beyond itching. Indeed, the strongest symptom may be repugnance on the part of parents. As one New Orleans mother put it, “Pinworms were just gross...but I do like science so I found the life cycle interesting. Honestly, I'd rather have them any day over lice. They are much easier to get rid of.”

These three common parasites, all exclusive parasites of humans, cause annoyance for many New Orleans parents, but they do not lead to any serious disease conditions. In contrast, parasites that normally infect animals, known as zoonoses, may infect humans only rarely, but can cause disease conditions that are quite serious when they do. When dog or cat roundworm eggs (*Toxocara canis* or *Toxocara cati*, respectively) infect humans, the larvae do not develop

properly, and instead migrate to various tissues, where they can lead to severe local reactions. Such reactions in organs such as the liver, heart, or central nervous system are known as visceral larva migrans. Though rates of visceral larva migrans are low in Louisiana, a study of soil samples by LSU researchers Smith et al. found high numbers of *Toxocara canis* eggs in Baton Rouge back yard soil samples, highlighting the importance of teaching children hygienic practices, including the avoidance of putting their fingers in their mouths. Another condition, ocular toxocariasis, results when the larvae migrate to the eye, and can lead to blindness. A survey during 2009-2010 found 68 patients newly diagnosed with ocular toxocariasis, the majority of whom were children from the South. One child was from Louisiana.

Toxocariasis occurs most commonly through ingestion of contaminated soil, unfortunately a common practice among children. This worm is found in all regions of the United States; however, development of *Toxocara* larvae does not occur below 50°F (10°C), making soil in warmer climates such as that of Louisiana more hospitable to infectious *Toxocara*.

Like *Toxocara*, hookworm larvae live in soil, especially sandy soils such as beach

sand. They enter the body by piercing the skin, often of a bare foot. Human-infecting hookworms (*Necator americanus* in North America) travel through the bloodstream via a circuitous route, eventually hooking into the wall of the small intestine where they feed off of blood and produce eggs that are released in the feces. While these hookworms were historically a very serious problem in Louisiana, improvements in hygiene have all but eliminated them as a local disease.

Instead, the more common local hookworm disease is, like toxocariasis, a zoonosis, caused mainly by the dog- and cat-infecting hookworm, *Ancylostoma braziliense*. When infected dogs or cats defecate on soil, such as beach sand, that humans walk on with bare feet, the larvae penetrate the skin of the humans but cannot establish an intestinal infection. Instead, they migrate aimlessly within the epidermis, sometimes several centimeters each day. This condition is called cutaneous larva migrans, also known as “creeping eruption”, and is characterized by snake-like, raised red tracks under the skin that mark the path of the migrating worms. The larvae eventually die in the skin, never reaching adulthood, but cause intense itching along their paths of migration.

Sandboxes contaminated with dog or cat feces have long been considered a risk factor for toxocariasis, but the increasing problem of dog feces in public parks in New Orleans begs speculation about the risk to children by this route as well, especially since children here often play barefoot in parks frequented by dogs.

Another roundworm parasite occasionally seen here is *Strongyloides stercoralis*. As with hookworm, strongyloidiasis is acquired when larvae in contaminated soil come into contact with and penetrate the skin. Unlike hookworms, though, newly hatched *Strongyloides* larvae that emerge from the anus can also immediately penetrate the skin to cause a re-infection of the same host, and this causes red, hive-like areas around the anus that can be painful. However, while very dangerous for children with an impaired immune system, like many helminthiases, most infections with this well-adapted worm are mild or symptomless.

Finally, flatworm parasites can also occasionally infect children in Louisiana. This recreational infection, known as Swimmer's Itch, is transmitted by members of the schistosome family, which includes the genus *Schistosoma*, a very serious parasite of humans in developing countries that lack modern hygienic infrastructure. Schistosomatid parasites have a complex life cycle that involves a definitive host (generally a mammal or bird) and an intermediate snail host. The infectious stage consists of swimming worms known as cercariae that are released from the snail host into a body of water. When the definitive host steps into the water, the cercariae pierce the skin and enter the blood stream, where they become adult worms. Birds are the definitive hosts of schistosomatid parasites of the genus *Trichobilharzia*. When the cercariae of these parasites penetrate the skin of humans, they, like zoonotic

hookworms, cannot proceed past the skin to complete their life cycle. Instead, itchy red bumps form at their sites of entry, hence the name Swimmer's Itch. The condition is better known in colder, Northern lakes, since the snail hosts tend to die off if temperatures exceed 30 °C (86 °F), but cases have been reported occasionally in Southern Louisiana (in Cameron Parish, among others).

All in all, eradication programs and improvements in hygiene have all but eliminated metazoan parasites of humans that cause serious health problems, such as the hookworm *Necator americanus*. The remaining arthropod and helminth parasites that commonly infect New Orleans children are for the most part harmless, leading to plenty of annoyance and disgust, but, fortunately, not to serious illness. ■

