







"When you stop to think about what you're doingpicking bugs out of your kid's hair - you realize what a disgusting experience this is," one mom says. The family's normal limits on TV and junk food got tossed as she developed tunnel vision in trying to eradicate the pests.



But then I recalled how Helen had responded an hour earlier, when I asked her if she had ever gotten lice as a consequence of her work, and she admitted that, yes, she had. Twice. And if this visit led to a third infestation, at least she would have pulled down her usual 120 bucks an hour for her troubles. But me? All I'd get would be an ironic ending for my story.

Michelle, the friendly, chatty mom of the house, met us at the door and led us through a well-lit foyer and into the open dining room/family room area, where her daughters, ages 7 and almost 5, sat on the upholstered sectional, watching the Disney Channel. It was a perfectly normal scene, but suddenly I felt an abnormally intense urge to scratch my scalp

These are the games that lice can play with your head

HEHEADLOUSE IS A PARASITE, BUT A PRETTY HARMLESS ONE. No one dies from it, or contracts disease because of it. When it shows up on a child's head, it is not, contrary to popular belief, a sign of poor hygiene or bad parenting, but rather bad luck. It is a nuisance, nothing more. But what a colossal nuisance, es pecially for the many parents who feel they're just barely holding it together with their regular routine. One study found that lice outbreaks could be responsible for 12 million to 24 million school absences each year.

With researchers finding lice increasingly resistant to popular over-the counter treatments, many parents find themselves feeling helpless to rid their homes, and their kids' heads, of the pests - and willing to pay any price to do that. At least two small pharmaceutical companies are hoping to meet that market demand with new products now in development. One of these companies, Topaz Pharmaceuticals, recently secured an impressive \$20  $\,$ million from Fidelity Investments' Biosciences venture capital division in Cambridge and a New York firm to conduct clinical trials for its new head lice treatment. The other product, from a company called ParaPRO, is already in phase-three clinical trials. But even if everything goes well, it will be about a year and a half before that product is available to consumers. So it's no surprise that when the dreaded letter comes home from the

school principal reporting a case of head lice, or a cluster of cases, it doesn't take long for panic to set in among parents. Right away, the gossip machine is cranked up, with parents determined to suss out the names attached to the principal's nameless report, pumping their kids for details on who from their class had been absent or sent down to the nurse because of scratching.

As Helen sat on the vinyl-and-chrome stool she'd wheeled in, Michelle's

younger daughter, still wearing her pink leotard from ballet class, climbed up into a chair by the dining room table and offered up her head of long hair for inspection. I took a seat next to them, but before my backside touched the chair, I paused midair. While all the dining room chairs had wooden backs, the seat cushions were upholstered. Was Helen thinking of them when she whispered her no-upholstery warning to me? It was a pretty preposterous fear, the idea that one of these tiny parasites – which die after more than a day away from human hair attached to a human head – could be lying in wait in a seat cushion and then have the wherewithal to climb up my back and onto my scalp as soon as I sat down. Besides, all the other furniture had even more upholstery. I took a seat. Helen put on her magnifier glasses and, using a fine-toothed comb and

small wooden implements, began her methodical examination of every section of the girl's hair. While that was going on, Michelle shared her lice story with me. Like all the parents I spoke with whose children had lice, Michelle asked that her last name not be used so as not to stigmatize her daughters. Besides that stipulation, she could not have been more forthcoming.

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One night back in December, Michelle called her friend, whose daughter had recently been playing with Michelle's girls. "I can't talk to you now," the friend said abruptly. "We have lice." Immediately, Michelle's head began to itch. Over the next few days, her itching intensified. But every time her husband checked her hair, he found nothing. Then one week later, on a Sunday during December school vacation, as Michelle sat on the couch, her husband found a live adult louse in her hair. She immediately checked her daughters' hair and found bugs there as well.

For her and her husband, the next two days were a cross-eyed-induc-

ing blur of nine-hour sessions tediously picking nits and bugs out of their daughters' hair, then washing every sheet, comforter, and winter coat in the house, bagging all the stuffed animals, and applying over-the-counter lice-treating shampoos, which the girls hated and Michelle found to be ineffective. Michelle estimates that over the first couple of days, she found about 25 live bugs on each daughter's head and many, many more lice eggs, or nits. "When you stop to think about what you're doing – picking bugs out of your kid's hair – you realize what a disgusting experience this is," she says. All the normal family limits on TV and junk food got tossed as Michelle devel-

oped tunnel vision in trying to eradicate the pests from her home.

After that, things improved. The nightly head checks became more manageable, and no new nits appeared. But with a female louse laying six to eight eggs a day, it can be easy to miss one of the exceedingly tiny nits and risk a repeat infestation up to two weeks later. That's exactly what happened with Michelle's younger daughter. Two weeks after that fateful Sunday, during a nightly head check that Michelle figured would be the last, she found a live bug. Michelle walked into her bathroom, sat down, and cried.

Deciding she couldn't stomach another nine-hour nit-picking session, she called Helen for professional help. A tall, stately woman who has a reassuring voice and wears her hair in a bun, Helen spent  $4\frac{1}{2}$  hours in the family's dining room, working on the heads of Michelle and her daughters. (Michelle's husband was never infested.) Since the most common way to spread lice is through head-to-head contact, Michelle took no chances in trying to keep her older daughter from becoming re-infested. She insisted her younger daughter keep her hair under a ski cap even while inside the house, and insisted that both girls keep their hair in braids in bed and at school. She also insisted that both girls sit only in their assigned sections of the couch, insisted they stay

out of each other's rooms, and insisted on a no-snuggling-in-bed policy.
"I called myself the Lice Nazi," Michelle says. Convinced the anti-lice shampoos from the drugstore were useless, she tried an alternative: coating her daughters' scalps nightly with olive oil, to try to suffocate the bugs. There is little data on the effectiveness of these home-remedy suffocating agents – some people prefer to use mayonnaise – but many parents swear by them.

Though Michelle told her daughters' teachers about their battle with lice, she was fearful that if other parents found out, they would look differently

+ONLINE

work on kids' heads

at her and her younger daughter, blaming the girl for being "the breakout monkey" who brought pestilence into the school. Even if school officials could be counted on to protect her daughter's identity, Michelle knew it wouldn't take long for the word to get out. "Parents talk. They want to know which kid it is." Michelle gave her younger daughter a five-point bonus on the family's good-behavior reward chart if she kept her mouth shut to friends about the re-infestation.

On the late January day when I showed up at their house, Helen had come to perform a follow-up check, to make sure the lice were gone for good. For Michelle, nothing less than

rthday party at a local gym. Even her in-laws were coming into town. Reflecting on the previous month, Michelle couldn't get over how these poppy-seed-size nits could so thoroughly disrupt her family's life. She also couldn't comprehend how, despite all the advances in medicine, the treatment for lice remained so primitive. Still, with her long lice nightmare about to be over, Michelle felt more able to laugh about it now, rather than cry.

Three-quarters of the way through the examination, Michelle's daughter had yet to look away from the TV, where The Suite Life of Zack & Cody bled into Hannah Montana. And Helen had yet to find anything to be concerned about. Then, out of nowhere, Helen announced, "We have a live one!"

Michelle appeared stunned. "Are you kidding me?"
The louse had scurried away from Helen's comb, but she was determined to find it. "This is when I love the chase!" she said, her professional excitement showing through.

Michelle's eyes grew moist, and I half expected to see her head for the bathroom for another cry. When she stayed put, I asked her what she was feeling. She stared back at me sullenly. "Complete and total pa

THERE'S THIS GREAT ARABIC EXPRESSION THAT MY FATHER TAUGHT ME: "I'm so busy I don't have time to scratch my head." I love it because it's vivid and funny and a bit poetic (though more so in Arabic). But here's what it isn't: true. The fact is, most people will make time to scratch their heads, although usually without realizing they're doing it. Don't believe me? Slip into the back row at a concert or the back pewat church and, instead of looking at the stage or the pulpit, let your eyes scan the backs of those heads. Do this for an hour, and you'll see those scalps being tended to as faithfully as newborns in a nursery.

One of the reasons it's so easy for people to find themselves scratching when they hear about a lice outbreak is that they were probably going to scratch anyway. The only difference is, now they're hyper-aware of their actions.

Archeological evidence suggests that lice have been around forever. Head lice, which live on human hair and feed on human blood, appear to have evolved with man. Head lice are believed to be the main reason the likenesses of all those ancient Egyptians we see in the hieroglyphics are either bald or wearing wigs; the easiest way to get rid of head lice, then and now, is to shave all your hair off.

Despite the relatively mild problems posed by head lice, many people in this country continue to view them in the same "lousy" light as body lice, their much nastier cousins that are, in fact, associated with poor hygiene and are, in fact, a transmitter of dangerous disease. (Body lice are different from puble lice, also known as crabs.) In parts of the Third World, where body lice are still common, head lice are viewed as nothing but a minor annoyance. But the property of the property ofin the United States, where we thankfully don't have to worry much about body lice, we tend to get worked up about the head-scratching variety.

How prevalent is head lice? The statistic you most often see comes from the American Academy of Pediatrics, which estimates 6 million to 12 million cases of head lice in the United States each year. Several researchers who specialize in head lice say that figure is almost certainly inflated, though they disagree on how much. (For reasons researchers can only speculate about, the incidence of head lice drops off significantly after the elementary school years.)

In a narrow lab in the Harvard School of Public Health, entomologist Richard Pollack peers into a microscope to review a specimen a parent submitted to him. The parent was so sure her 9-year-old had head lice that she had treated her with a prescription shampoo that contains a powerful pesticide

"Look at this," Pollack tells me, turning the microscope over to me. Thanks to the magic of magnification, even an untrained eye like mine can tell it's not a nit, but merely a knot in a strand of the girl's hair.

In the 1990s, Pollack and his research assistants traveled to schools across the country, examining the heads of about 10,000 students. They found a dramatically lower incidence of active lice infestations than most school nurses and parents had reported. And in recent years, Pollack has maintained a database of about 1,500 submissions he's received of samples

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purporting to be head lice. Of all the submissions claiming to be a louse or louse egg, he found that fewer than half actually were. Often, specimens labeled as lice turned out to be dandruff, bits of hair gel or shampoo, or debris. Even if actual nits were found, many were unhatched from a long-ago infestation and no longer a risk.

"We have parents withholding snuggling, going crazy, spending tons of

money on treatment and services, departing from the directions on pesti-cide treatments to perform repeat treatments – all for a few bugs?" Pollack's advice: Relax. "If you find an egg, look for a live, crawling louse. If there's no

live, crawling louse for two weeks, it's safe to go back into the water."

Then again, Pollack isn't exactly a mainstream voice in this regard. This, after all, is a guy who loves bugs and who was actually disappointed that his daughter never did him the favor of coming home from school or camp with a case of head lice. "Imagine how thrilled I'd have been," he says, "to have a ready supply of lice so close at hand." He tried to grow his own colony of lice, wearing a contraption he Velcroed to his wrist that contained lice and some human hair (a common researcher approach). For periods of a month at a time, he would wear the contraption 24/7. When he would climb into bed wearing it, his wife would just roll her eyes. But had he → PAGE 32



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accidentally gotten her and their daughter infested, and been forced to do all the laundry and nit-picking, his attitude toward lice might have become less carefree.

One of Pollack's colleagues in the field was more successful in growing his own colony of head lice. At his lab at the University of Massachusetts at Amherst, toxicology professor John Clark created an artificial membrane and arrayed tepeelike tufts of human hair on top of it. In those tufts, he let lice loose. Underneath the membrane, he put an ample supply of human blood. It took him and his team several years to get this arrangement right, but eventually it worked perfectly. The lice mate and lay their eggs in the tufts of hair. When they're hungry, they head down to the membrane, present and dirth unserned blood.

pierce it, and drink up some blood.
By making it relatively easy to run controlled experiments, the UMass colony has allowed for big leaps in our understanding of lice. And that, in turn, has replaced some squishly assumptions about lice behavior with hard data.

For instance, do head lice have to be passed by head-to-head contact? While some researchers had argued there was little risk of lice being passed by combs or bedding, Clark's team, using "hair bridges," was able to show that lice could, in fact, hang out in fabrics and combs for eight or more hours and make their way onto the head of a new human host. "The idea that it has to be head-to-head contact," he says, "is simply not true," though that remains by far the most common method of transmission. For years, many parents and pediatricians have complained that the over-the-counter lice-killing shampoos like Nix and RID were becoming less effective, and the assumption was that head lice had developed resistance to them.

Clark's team has been able to maintain different strains of lice to study resistance. He says resistance varies by region of the country, but he estimates that, on average, the resistance level for treatments like Nix and RID is between 60 and 70 percent, making the need for new treatments all the more pressing. (In some other parts of the world, he says, the resistance is even higher.) And, here again, his colony is improving the process for developing new treatments, since it can approximate an actual human scalp, to determine the effect of particular compounds on the development of lice, from eggs to adults.

The Food and Drug Administration hasn't approved a new treatment for head lice since Nix came onto the market more than 20 years ago. Progress has been slow because of the high research and development costs and heightened fears over the harmfulness of pesticides. In addition to

the over-the-counter treatments, there are two insecticide treatments for combating head lice that are currently available by prescription: Ovide (malathion) and Lindane. There have been enough concerns about neurotoxicity raised with Lindane to prompt several countries and the state of California to ban the chemical. Clark says he would never put Lindane on his own child. And while Ovide is generally viewed as safer, many parents complain about its smell and messy application process and feel squeamish about leaving any kind of pesticide in their child's hair for eight to 12 hours at a time.

Yet the head lice market is big enough -Clark estimates there are 3 million to 6 million cases a year in the United States, about half of the pediatric academy's estimate -that pharmaceutical companies like Topaz in Pennsylvania and ParaPRO in Indiana now view it as worth significant investment. Clark is working as an adviser to both companies. Robert Weisskoff is a former associate

professor of radiology at Harvard Medical School who now makes his living as a partner in Fidelity Biosciences, searching for the most promising medical treatments to invest in. He says he and his Fidelity partners passed when they were first approached by Topaz, figuring the roughly \$75 million-a-year market for prescrip tion lice drugs wasn't big enough to warrant their investment. But when they dug deeper, factoring in the over-the-counter products as well as services such as professional nit-picking, they estimated the mar-ket to be \$250 million a year. Because of the growing resistance problems and high dis-satisfaction among parents and pediatricians with the current array of treatments, the Fidelity team forecasts a major shift in coming years to a new generation of prescription treatments like the one being developed by Topaz. So that explains their willingness to plunk down \$10 million to help Topaz get the product approved.

Weisskoff says initially it was hard to get older and younger people at Fidelity to muster much enthusiasm for a head lice product, since it didn't touch their lives. "But the people between, say, 35 and 45 who are parents recognized the potential immediately," he says. As the 45-year-old father of three, Weisskoff fit squarely into that latter group. It helped that he had had his own household upended a few years back when his two daughters were infected with lice.

"Do you have kids?" he asked me.
"Yep, three daughters," I said. "Thank-

"Yep, three daughters," I said. "Thank fully, they've never had lice."

fully, they've never had lice." He laughed. "They will."

The new products being developed separately by Topaz and ParaPRO both rely on active ingredients used in existing pesticides but which would be new to the head lice treatment market. The Topaz product

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is a topical ointment that is a reformulation of a low-toxicity drug whose active ingredient, ivermectin, is used to treat heartworm and roundworm in animals. The ParaPRO product is a shampoo (applied to a dry head) that relies on an Eli Lilly compound called Spinosad, which is used for the treatment of caterpillars on crops. Spinosad, which is environmentally friendly enough to be an allowed pesticide in organic farming, causes paralysis in the target insect. ParaPRO's chief executive, Bill Culpepper, says, "A lot of parents are desperate for something that will work."

THE MITCHELL ELEMENTARY SCHOOL in Needham is a well-regarded school in a well-regarded system with a reputation for involved parents who care deeply about their children's education. But lately the topic of lice has dominated the talk among parents standing outside their idling minivans and SUVs in the car line snaking in front of the old brick school during daily pickup. In a school with 460 students, some 26 families – representing about 50 pupils – have been hit with head lice this year.

Mike Schwinden, the school principal, says he and his staff have tried to combat the problem. He's sent notes with advice home to the families, held an evening forum on the topic, and even had 96 hooks installed LIVE LICE John Clark (left), a toxicology professor at UMass-Amherst, pioneered an "in vitro rearing system" to raise a lice colony. The lice mate and lay eggs on tufts of hair (below left), then penetrate a mem-brane to get to a supply of human blood.

in the hallway outside the cafeteria, so students returning from recess didn't have to sit on their coats in the caf and run the risk of passing lice from one coat to another. But for someone who's been a principal for 20 years, in his native Montana before moving to Needham, Schwinden has come to believe there's only so much you can do to stop lice, "Schools tend to see cycles," he says. Three years ago, there were only about four families affected at Mitchell. He hopes to get back to that manageable level next year. But this year, the problem started early and just kept going. "When you get a certain number of cases in a grade level, it increases the probability that it's going to hang around for a while," he says.

He knows how much panic lice outbreaks can cause among parents. He's heard from some upset that Needham doesn't have a 'no nits" policy like some other school districts, where students are not allowed back in school unless they have been treated and all the lice eggs removed. But that's a district-wide decision that Schwinden doesn't control. Besides, he explains, his school back in Montana had a no-nits policy, and that didn't insulate it from occasional lice outbreaks. In fact, one year a foster child who was staying with Schwinden's family became infested with head lice. Everyone in the family had to suffer through the home remedy of covering their head in mayonnaise and wearing a shower cap all night, for five nights in a row.

Fortunately, no one else in the family came down with lice. Yet, all these years later, Schwinden says, "my son still won't eat mayonnaise." His message to freakedout parents: "You get through it." It's a message that Michelle, the Natick

nom, finally feels she can grasp. During that follow-up visit, when Helen the Nit-Picker found another live louse in her 5-year-old daughter's hair, Michelle had fallen into despair. But, after several hours of inspection, Helen had found no other evidence of a new infestation. She guessed maybe it was a lonely male louse and nothing to worry about. So Helen gave the go-ahead for Michelle to hold the birthday party. And the 29 5-year-olds all had fun and left without any excessive itching. Michelle continued to do nightly checks on her daughter's head in the days after the party and was re-lieved to find nothing to worry about.

As for my family, I'm happy to say we are still blissfully lice-free, despite my forays into infested territories. But I'll tell you this much, I haven't been able to relax while sitting on upholstered furniture ever since. ■

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