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PERSONAL HEALTH

## Babies Know: A Little Dirt Is Good for You

By [JANE E. BRODY](#)

Ask mothers why babies are constantly picking things up from the floor or ground and putting them in their mouths, and chances are they'll say that it's instinctive — that that's how babies explore the world. But why the mouth, when sight, hearing, touch and even scent are far better at identifying things?

When my young sons were exploring the streets of Brooklyn, I couldn't help but wonder how good crushed rock or dried dog droppings could taste when delicious mashed potatoes were routinely rejected.

Since all instinctive behaviors have an evolutionary advantage or they would not have been retained for millions of years, chances are that this one too has helped us survive as a species. And, indeed, accumulating evidence strongly suggests that eating dirt is good for you.

In studies of what is called the hygiene hypothesis, researchers are concluding that organisms like the millions of bacteria, viruses and especially worms that enter the body along with "dirt" spur the development of a healthy immune system. Several continuing studies suggest that worms may help to redirect an immune system that has gone awry and resulted in [autoimmune disorders](#), [allergies](#) and [asthma](#).

These studies, along with epidemiological observations, seem to explain why immune system disorders like [multiple sclerosis](#), [Type 1 diabetes](#), [inflammatory bowel disease](#), asthma and allergies have risen significantly in the United States and other developed countries.

### Training the Immune System

"What a child is doing when he puts things in his mouth is allowing his [immune response](#) to explore his environment," Mary Ruebush, a microbiology and immunology instructor, wrote in her new book, "Why Dirt Is Good" (Kaplan). "Not only does this allow for 'practice' of immune responses, which will be necessary for protection, but it also plays a critical role in teaching the immature immune response what is best ignored."

One leading researcher, Dr. Joel V. Weinstock, the director of gastroenterology and hepatology at [Tufts Medical Center](#) in Boston, said in an interview that the immune system at birth "is like an unprogrammed computer. It needs instruction."

He said that public health measures like cleaning up contaminated water and food have saved the lives of countless children, but they "also eliminated exposure to many organisms that are probably good for us."

"Children raised in an ultraclean environment," he added, "are not being exposed to organisms that help them develop appropriate immune regulatory circuits."

Studies he has conducted with Dr. David Elliott, a gastroenterologist and immunologist at the [University of](#)

[Iowa](#), indicate that intestinal worms, which have been all but eliminated in developed countries, are “likely to be the biggest player” in regulating the immune system to respond appropriately, Dr. Elliott said in an interview. He added that bacterial and viral infections seem to influence the immune system in the same way, but not as forcefully.

Most worms are harmless, especially in well-nourished people, Dr. Weinstock said.

“There are very few diseases that people get from worms,” he said. “Humans have adapted to the presence of most of them.”

### **Worms for Health**

In studies in mice, Dr. Weinstock and Dr. Elliott have used worms to both prevent and reverse autoimmune disease. Dr. Elliott said that in Argentina, researchers found that patients with multiple sclerosis who were infected with the human whipworm had milder cases and fewer flare-ups of their disease over a period of four and a half years. At the [University of Wisconsin](#), Madison, Dr. John Fleming, a neurologist, is testing whether the pig whipworm can temper the effects of multiple sclerosis.

In Gambia, the eradication of worms in some villages led to children’s having increased skin reactions to allergens, Dr. Elliott said. And pig whipworms, which reside only briefly in the human intestinal tract, have had “good effects” in treating the inflammatory bowel diseases, Crohn’s disease and [ulcerative colitis](#), he said.

How may worms affect the immune system? Dr. Elliott explained that immune regulation is now known to be more complex than scientists thought when the hygiene hypothesis was first introduced by a British epidemiologist, David P. Strachan, in 1989. Dr. Strachan noted an association between large family size and reduced rates of asthma and allergies. Immunologists now recognize a four-point response system of helper T cells: Th 1, Th 2, Th 17 and regulatory T cells. Th 1 inhibits Th 2 and Th 17; Th 2 inhibits Th 1 and Th 17; and regulatory T cells inhibit all three, Dr. Elliott said.

“A lot of inflammatory diseases — multiple sclerosis, Crohn’s disease, ulcerative colitis and asthma — are due to the activity of Th 17,” he explained. “If you infect mice with worms, Th 17 drops dramatically, and the activity of regulatory T cells is augmented.”

In answer to the question, “Are we too clean?” Dr. Elliott said: “Dirtiness comes with a price. But cleanliness comes with a price, too. We’re not proposing a return to the germ-filled environment of the 1850s. But if we properly understand how organisms in the environment protect us, maybe we can give a vaccine or mimic their effects with some innocuous stimulus.”

### **Wash in Moderation**

Dr. Ruebush, the “Why Dirt Is Good” author, does not suggest a return to filth, either. But she correctly points out that bacteria are everywhere: on us, in us and all around us. Most of these micro-organisms cause no problem, and many, like the ones that normally live in the digestive tract and produce life-sustaining nutrients, are essential to good health.

“The typical human probably harbors some 90 trillion microbes,” she wrote. “The very fact that you have so many microbes of so many different kinds is what keeps you healthy most of the time.”

Dr. Ruebush deplores the current fetish for the hundreds of antibacterial products that convey a false sense of security and may actually foster the development of [antibiotic](#)-resistant, disease-causing bacteria. Plain soap and water are all that are needed to become clean, she noted.

“I certainly recommend washing your hands after using the bathroom, before eating, after changing a diaper, before and after handling food,” and whenever they’re visibly soiled, she wrote. When no running water is available and cleaning hands is essential, she suggests an alcohol-based hand sanitizer.

Dr. Weinstock goes even further. “Children should be allowed to go barefoot in the dirt, play in the dirt, and not have to wash their hands when they come in to eat,” he said. He and Dr. Elliott pointed out that children who grow up on farms and are frequently exposed to worms and other organisms from farm animals are much less likely to develop allergies and autoimmune diseases.

Also helpful, he said, is to “let kids have two dogs and a cat,” which will expose them to intestinal worms that can promote a healthy immune system.

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