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THE SCIENCE BEHIND MUD'S MAGIC

*For thousands of
years, mud has been
wallowed in and
slathered on for both
medicine and beauty.
Does it really work?*

Linda Ingroia

On a recent vacation to the Sicilian island of Pantelleria, I went straight for the mud. Alongside tourists and locals at the Lago di Venere thermal springs and mud baths, I slathered myself with the sulfuric-smelling ooze, then baked in the sun until the mud cracked. Surely this had to be cleansing; it was such a pristine, uncommercial place. I couldn't detect specific physical improvements, but I did feel rejuvenated.

I wanted to get to the bottom of all the fuss about mud—mud masks for beauty, mud baths for health, mud runs for fun, and garden soil for healing. We're a nation in which clean is good and people carry antibacterial gel everywhere, yet soil and mud continue to fascinate us.

I tried to reconnect to some of that Sicilian indulgent healing with a mud treatment at an urban spa in New York. I was body-painted with a cold mud-and-matcha mixture, wrapped neck to toes in aluminum sheets, and left for 20 minutes on a heated massage table. With no limbs free, there was nothing to do but relax. Postshower, I had an immediate feeling of lightness, a distinct absence of my usual lower back pain developed after decades of commitment to high-intensity fitness. The euphoric, pain-free lightness didn't last more than 48 hours, but it made me curious: Does mud have that kind of power?

NOT JUST SKIN DEEP

Science tells us that healthy mud, or wet soil, is rich with minerals and other nutrients, alive with worms, fungi, and bacteria, and all of their byproducts. It has been used for cleansing and healing rituals for millennia. And Egyptian queen Cleopatra allegedly used wraps made from Dead Sea mud as a beauty treatment.

Board-certified dermatologist Dr. Dhaval Bhanusali, a mask treatment developer, says that the benefits of mud body treatments are usually immediate and obvious: The skin changes, blood flow changes, and muscles relax. "They're a great exfoliator," Bhanusali says. A key is in the minerals. Kaolinite, bentonite, magnesium, potassium, and other minerals in mud and clay masks imperceptibly abrade the skin and dislodge impurities, he says, and

the minerals in mud also help retain heat, which helps relax muscles, stimulate blood flow, and improve lymphatic system cleansing.

Calistoga, at the top of California's Napa Valley, is a well-known American spot for mud baths and thermal springs. The area's proximity to long-dormant volcanic craters means mud made from prime volcanic ash. At Indian Springs, the oldest local spa, the ash is collected every week, sifted to refine it to a silky texture, then blended with boiling water from nearby geysers. The thermal waters and mud in the area are believed to have been used for restorative purposes and as a curative for insect stings and sunburn by the Wappo tribe as far back as 4,000 years ago.

At Indian Springs, your treatment might go like this: Usually nude, you will settle from the neck down into a tub of mud for about 10 minutes. (You can wear clothes, but they will never be the same.) You're buoyant. The mud is warm (104 degrees) and heavy, like a weighted blanket—an invitation to relax. Afterward, you shower off, then enjoy a warm mineral water soak for up to 15 more minutes. That is followed by a relaxing five minutes in a steam room. Finally, there is a cooldown and a nap.

Is it a miracle cure, or just about the relaxing alone time? No one makes any promises, but assistant spa director Susan McCarthy says long-term clients swear by it for a variety of ills, from eczema to aching backs.

There are some promising discoveries to explain their dedication. A 2018

Dead Sea study reports that mud pack treatments helped people with fibromyalgia pain. A study published in *Arthritis Research and Therapy* says that the condition "may be relieved by the hydrostatic pressure and the effects of temperature on the nerve endings" as well as by muscle relaxation. It goes on to explain that the "glow" after a mud treatment isn't only on the outside; the "thermal mud baths increase plasma levels of beta-endorphin." That endorphin is a powerful pain suppressor and it influences our mood, possibly explaining a mud bath's calming effect.

In 2002, the *Journal of Clinical Rheumatology* reported the results of a small study done specifically with mud treatments for knee arthritis. A group treated with natural mineral-rich mud compresses had a significant reduction in knee pain. The control group, given mineral-depleted mud compresses, had no significant change.

As the rheumatology study suggests, not just any wet dirt will do. Skin is a massive, porous organ, and mineral- and microbe-rich soil matters.

SOIL SUPPLEMENTS?

There are records of soil having been studied and pursued as external physical remedies in ancient India, Rome, China, and even for internal consumption to cure ailments in European traditional medicines. Descriptions of medical applications can be found in Sanskrit.

In the 1800s, when Western scientists became interested in the components of soil, they found that within fertile soil, there is constant action and interaction of live organisms and dead organisms. When live and dead organisms interact, a third type of organic matter develops: humic substances. This interaction supports the development of fossil fuels as well as the growth of food, nature-based remedies, and ultimately medicines.

The work of David Newman, retired chief of the Natural Products Branch of the National Cancer Institute, connects fertile soil and these curative humic

substances. Nature has long provided the “chemical scaffolds” of medicines and other healing agents, he and colleague Gordon M. Cragg write. These structures evolved over millennia as plant microorganisms adapted to threats in the natural world. Newman and Cragg cite a report from the American Academy of Microbiology that indicates “less than 1 percent of bacterial and 5 percent of fungal species are currently known, and the potential of novel microbial sources, particularly those found in extreme environments, seems unbounded.”

To that end, health researchers are looking closely at humic substances as remedies.

A 2017 *World Journal of Gastroenterology* study showed that in healthy volunteers who were given oral supplements of humic acids, colonic microbiota increased from 20 percent to 30 percent without changes in the bacterial diversity of the person’s microbiome. The researchers proposed that this could help people with digestive disorders and replace probiotics.

Another humic substance, fulvic acid, has been used in Ayurvedic medicine for 3,000 years. There’s still scant modern research on it, but according to a 2018 study review article in the *Journal of Diabetes Research*, fulvic acid shows promise for preventing chronic inflammatory diseases, such as diabetes. Though the results are controversial, some research has shown that it may “modulate the immune system, influence the oxidative state of cells, and improve gastrointestinal function; all of which are hallmarks of diabetes,” the report states.

MICROBE MAGIC

Not surprisingly, we’re hard-wired to get dirty. Humans become aware of their surroundings as babies and hone that awareness as they begin crawling on the ground. Babies’ senses are stimulated by dirt and microbes. Getting dirty as children helps us develop our internal composition of microbes

that help our bodies adapt to the world.

“There’s a reason children put their hands in their mouths,” says Dr. Jack Gilbert, microbiome specialist, co-author of *Dirt Is Good*, and co-director of the crowdsourced American Gut Project. “Their oral interaction with the microbial world helps to train their immune system to be more robust.”

And it’s important to continue developing that system. He says that it’s important to stimulate the immune system as frequently as possible. Even as adults, when we’re in and around dirt, we inhale and ingest soil particles, which, it turns out, is good for us.

A 2017 *International Journal of Environmental Research and Public Health* review on the benefits of nature sums it up. In addition to the direct sensory benefits of the outdoors, such as feeling fresh air and sun and smelling and touching plants and the ground, there are nonsensory benefits. Being exposed to fertile soil has positive effects on our microbiome, and that affects brain function and behavior.

We take in soil microorganisms through our sensory organs and onto our skin directly. Some of these microorganisms may be missing and needed in our gut for our bodies to function properly.

The 2017 report succinctly connects the dots. “Humans co-evolved with microbes for over 500 million years, and this has led to a symbiotic relationship, where bidirectional neuronal, hormonal, and immunological signals are exchanged between the gastrointestinal tract and the brain. ... (Soil) bacteria are commonly found in the gut, and while they cannot replicate there, were present in our ancestors due to exposure through mud and water. Repeated exposure to these organisms was found to lead to a tolerance response to stress, and indeed continued exposure to environmental organisms is necessary to maintain the diversity of gut microbiota.”

The science seems to be saying ... let your kids jump in the mud puddles.



The Monihei carnival takes place in Cangyuan, in southwest China’s Yunnan Province, each April. It is derived from the Wa ethnic group’s tradition of smearing mud to bestow health and happiness.

And adults should consider walking barefoot in the grass and gardening without gloves.

Dr. Maya Shetreat, integrative neurologist and author of *The Dirt Cure*, says, “We have developed this idea that being sterile or hygienic is good and healthy, and being dirty is bad. The irony is that the instinct to be in the dirt, to be in nature, is actually healthy for us in many ways.”

Anne Biklé, biologist and co-author of *The Hidden Half of Nature: The Microbial Roots of Life and Health*, says that throughout evolution humans were



constantly exposed to the microbiota of the soil. “We walked on it, handled it, had physical proximity to nature. In our modern lives, structures of home and cars, clothing and shoes, have created physical barriers to the microbial world.” While some barriers are obviously beneficial, she adds, “It’s a double-edged sword. ... The more we put up barriers, the more we reduce our human microbiomes.”

When adults do decide to muck around, the garden is often a healthy place to do it. Biklé, a serious gardener herself who converted her lifeless

backyard into a thriving garden (see page 23) says, “Because of the interaction with [healthy] soil microbes and what’s happening to their microbiomes—gardeners tend to be happier, healthier.”

Which brings up mud just for the fun of it. In recent years, many people are jumping back into muddy child’s play at full throttle.

Since its creation in 2010, about 3.5 million people have participated in Tough Mudder events. And at the Louisiana Mudfest in Colfax, along the Red River, people race open vehicles

through acres of mud ponds every spring. The Boryeong Mud Festival attracts large global participation. Every July near Seoul, South Korea, anyone game can partake in mud wrestling and tug-of-war, mud baths and masks, and family-friendly mud rides.

Maya Shetreat says that for some, mudslinging is a way to reconnect to your own wildness. “It’s intuitive to us—to get dirty.” 🖐

Linda Ingroia is a food and health editor and writer. She was formerly executive editor at Houghton Mifflin Harcourt. Follow her on Twitter: @lindat1.