



# Bacteria Farming

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DOPE2024

“Everyone carries a history of contamination;  
purity is not an option.” – Anna Tsing

# Introduction

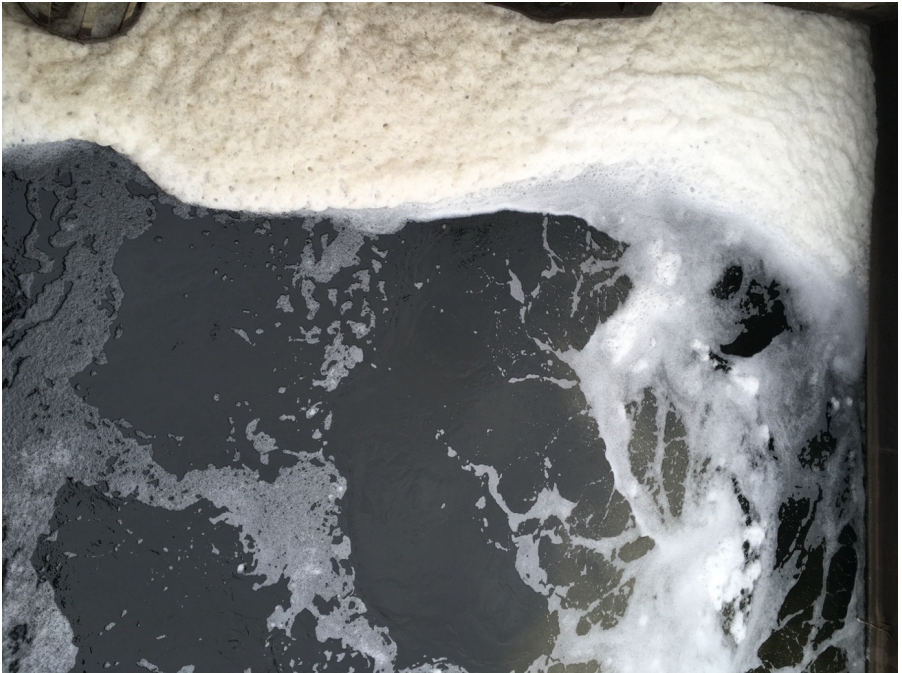
Wastewater treatment specialists in the American Midwest wryly describe their work as “bacteria farming.” In this zine, I show how microbes are central to the treatment and composting of wastewater solids (or “biosolids”), which are increasingly used as a resource for agricultural production, urban gardening, landscaping services, and ecological restoration projects. In exploring these microbial ecologies, this work also highlights the increasing complexity of urban sewage, which presents distinctive challenges for modern sanitation systems and their management.

This zine is composed of written fragments from ethnographic research in the cities of Chicago and Columbus (Ohio) as well as photographs from site visits, internet memes, photoshop collages, and digitized pen-and-ink drawings. This range of materials – at differing stages of development – are part of a larger project that uses the flush toilet as an entry point for understanding urban ecology in a time of ecological uncertainty and disruption.

# You Can't Take a Day Off

A long rectangular pool of dark brown water roils and froths, like a hot tub, teeming with microbial life. In it, flagellates, rotifers, ciliates, amoeba, and other wee beasties are feasting. And whether we know it or not, we are the ones feeding them.

These are the aeration tanks at Jackson Pike Wastewater Treatment plant on the southside of the city of Columbus. After someone flushes a toilet in the city, their bodily waste meanders through sewer pipes before joining a much broader waste stream, including stormwater run-off and everything else that winds up in the sewer with it. Eventually this slurry reaches one of two wastewater treatment plants where it is screened—to remove lost bowling balls, dead raccoons, baby wipes, and beer cans—and then it is directed to a grit tank where coarse particles settle out. Following such preliminary treatment, it moves on to clarifying tanks or “primary treatment,” where the bulk of the remaining suspended solids settle to the bottom while fats, oils, and grease are skimmed off the top. From there, it undergoes the biological process of “secondary treatment”—the bubbling aeration tanks



A secondary aeration tank at Jackson Pike Wastewater Treatment Plant in Columbus, Ohio.

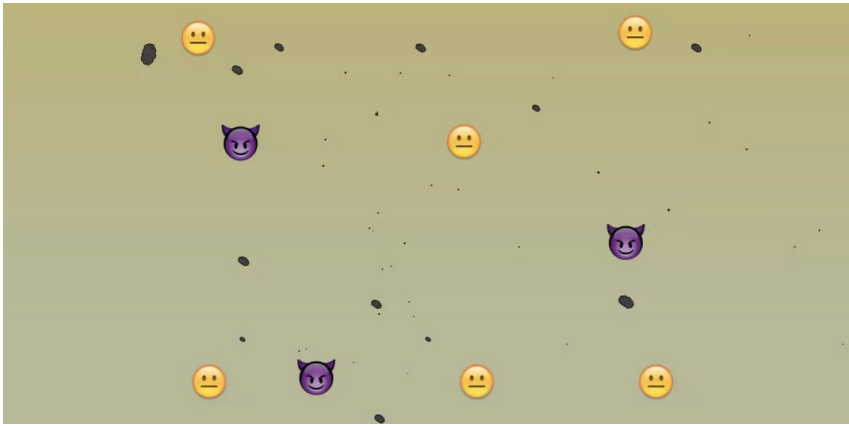
where the communities of microbes described above work to metabolize and transform wastewater.

“The first day on the job, I was told I was hired on a bacteria farm” my guide Rachel tells me. Other wastewater treatment workers later tell me the same—that they are, essentially, *bacteria farmers*. And they insist, the microbes are the ones who are doing most of the work on site. In wastewater treatment, “you can’t take a day off,” Rachel reminds. But lucky for us, the bugs don’t stop eating. They go at it 24/7.

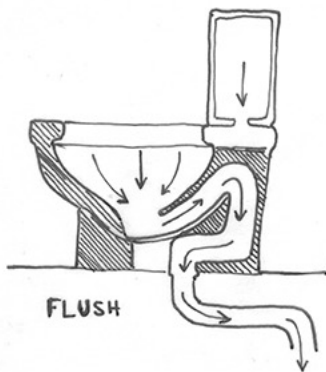
# A Living System

The modern sanitation systems in operation in North America are infrastructural human creations inherited from industrializing Europe. They are also living systems. Not unlike the human body, they eat and excrete. Microbes, and bacteria specifically, metabolize many of the diverse inputs that are directed into the system and the solids that remain after this processing—known in the industry as “biosolids”—are largely composed of mats of microbial bodies. Rachel informed me that biosolids are not really shit at all but rather the remains of the “great-great-grandchildren” of microbes that ate your shit.





But just as our human bodies, and more specifically our gut bacteria, sometimes struggle to adapt to industrialized diets and the diverse chemical inputs that characterize our contemporary lives, the same is true for the microbes present in the wastewater treatment system. The increasingly complex composition of industrial wastes channeled into the sewer can compromise or complicate both the functioning of the system and its outputs. For example, anti-bacterial compounds that are present in people's consumptive lives—from soaps and hand sanitizers to mouthwashes and toothpaste—are now introduced into the waste stream and can threaten some communities of microbes responsible for wastewater treatment. Additionally, some unregulated chemical compounds resist microbial metabolization and thus persist in the by-products of wastewater treatment, which generate concerns about the safety of biosolids and its potential impacts on human and environmental health. So-called “contaminants of emerging concern” (i.e., unregulated pollutants), which are oftentimes only barely perceptible in sanitation waste, raise especially profound questions about the limits of urban sustainability under current industrial systems.

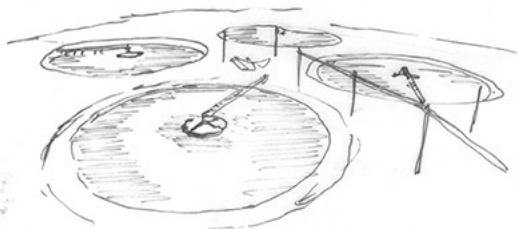


FLUSH

raw sewage  
effluent



OVERFLOW



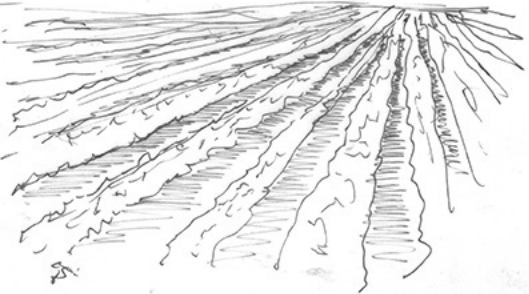
TREAT

Sludge



TRASH

bio-solids  
home manure  
Compost  
fertilizer  
nightsoil



FERTILIZE

By Sam Haugh





Com-Til Biosolids Compost



# The Intestines of the City

“It’s not shit anymore” Rachel tells me. We are driving through the facility where the city of Columbus makes its biosolids compost product known as Com-Til. Ribbons of steam curl off the dark brown mounds as we try to warm our bodies in the cab of the truck. It’s a February morning in Ohio and the sky is an endless gray. Rachel, who is wearing a turmeric-colored Carhart winter cap, explains to me: “The bacteria doing this job, they’re exothermic.” I recall Donna Haraway’s quip: “Composting is so hot!”

On that first meeting, I asked Rachel if the taboos surrounding human bodily waste made Com-Til a difficult product to market. “15 years ago, it was a harder sell. People have a foothold now,” she told me. Part of this she attributed to interest in kombucha and probiotics. “There’s a cultural swell,” she said, “that’s focusing more attention on the importance of healthy microbial populations both in our bodies and in the soils.”

“With the intestine of the city,” she told me, “we can create a story.” The story that Rachel wanted people to understand is how microbiota circulate from bathrooms into the wastewater system to rendered sludge, then to Com-Til and then back to the soil, hopefully to make food.

“Composting waste and using it for agriculture,” Rachel continued, “everyone is contributing to the cycle. “YOU are helping close the carbon cycle, YOU are helping close the phosphorus cycle, YOU are helping close the potassium cycle.” In this way, people can begin to see their role in this broader ecology, she insisted.

In 2017, the city of Columbus claims to have achieved 100% beneficial use of its biosolids. Today, it directs a portion of the material to the compost program, but it also injects liquid biosolids into industrial farm fields. In addition, the city works with a project in eastern Ohio that produces popular trees on degraded strip mine lands, and the remaining sludge goes to bio-digestors for energy production.

But Rachel added that there were limits – both legal and cultural – to the acceptance and application of biosolids. “What kind of hurts my heart is that you can’t sell this as an organic amendment.” She shared that she had bought lots of organic food in the past, but she also saw how the vision of organic farming could become restrictive, especially in its obsession with – in her words – “its own purity.”

“Is it [Com-til] pure? No. Is it pretty damn good? Yes,” she insisted. “What’s pure anyways? It’s like a how-many-angels-on-the-head-of-a-pin question.” “If you take it from the perspective of ‘what’s our best option?’, it’s a pretty damn good option, Rachel concluded.



Virtual Tour of the Stickney Wastewater Treatment Plant in Chicago, IL.

# "It's a Big Farm"

## (An Interview)

Plant Manager: ...that's what this whole plant is about. It's a big farm. We just farm microbes, aerobic and anaerobic, and they do all the work. You just keep them happy. Give them air or an anaerobic digestion process, we don't give them anything but food and they'd give us gas, a lot of gas. They convert it.

Interviewer: Yeah.

Manager: In doing so, they take away the volatility of the material and make it more benign. Can you imagine what the woods would look like if we didn't have a decaying process?

Interviewer: I mean, I don't think there would be woods.

Manager: Well, it'd just be 10 feet thick of logs, right?

Interviewer: Exactly.

Manager: If none of the trees decay since the beginning of time, how big would the log would be?

Interviewer: I have no idea. I don't know.

Manager: 200 to 300 feet? Maybe more than that?

Interviewer: ...It's interesting because there's this moment in which there's a lot of concern about gut bacteria and how that relates to human health, but then there are also simultaneously these conversations about what we are doing with the bacteria in our soils that are necessary for maintaining healthy agricultural lands. Those stories are linked through the work that you guys do...

Manager: Everything we do here to treat wastewater is all present in nature. We don't bring the waste in and add chemicals to it. We use biological processes only or we have nature concentrated here. All we've done is concentrated nature to focus it on the waste coming in....If we ran it all the way through the plant without treatment, if we just bypassed it, went to the river, the same process would occur in that river. The same bacteria would break it down. We're at as concentrating those bacteria before they get to the river, so they don't create so much stress on that river.

Interviewer: Yeah. I'm starting to think of the wastewater treatment plant is like a very wild ecology in a way that I didn't before.

Manager:

Yeah. I mean it's all biology. If you take a sample of our aeration basins, which they do the lion's share of our treatment process and look under a microscope, it looks like a wild kingdom. I mean you have protozoa, you have rotifers, you have ciliates, you have everything just swimming around eating each other and breaking down the waste. The first thing they do is attack pathogenic organisms. They're predatory towards them. It's interesting. There's a lot more biology and chemistry here than I ever would have thought.



GoPro camera image from one of the aeration tanks at the Stickney Wastewater Treatment Plant in Chicago: "We've got a super healthy microbiome here"

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