Community

All of us have the guts to admit our co-dependents.

YOU HAVE roughly 100 trillion bacteria and other microbes living in or on your body. They outnumber your human cells 10 to one. It's something to ponder next time you find yourself wishing for intimate company.

You and your tiny tenants are part of a profoundly close relationship that dates back long before you, indeed long before humans. For the last few generations, we have extended life expectancy by launching antibiotic and antiseptic attacks on some of these less agreeable little creatures. On the whole, however, we need our bacteria as much as they need us, and we've not been giving them due respect.

Consider mitochondria, for example. They are our bodies' energy refineries, converting sugars, proteins and other food energy sources into a compound the body needs for most everything that involves action. But mitochondria did not begin as human parts, and they still have their own DNA. The ancestors of your mitochondria were independent bacteria, closely related to the nasties that cause typhus. A couple of billion years ago, these bacteria were swallowed into the living cells of early plants and animals, establishing a mutually beneficial relationship that had a tremendous effect on the evolution of life.

It's enough to make your skin crawl. Except that without the mitochondria, there would be no energy for crawling.

A similar story explains chloroplasts, the tiny organisms that were incorporated in plant cells to capture and convert solar energy. They too retain the DNA of their ancient bacterial origins. And they too represent a symbiotic arrangement that was crucial in evolution and remains a key foundation of life.

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Our basic grasp of these microscopic collaborations goes back nearly 50 years to the pioneering work of Lynn Margulis and others, subsequently endorsed by genetic research. By now one might have expected such evidence about the fundamental importance of symbiosis in evolution to have pushed aside the facile idea that progress arises only from competition and conflict.

Since that enlightenment has not yet arrived, perhaps we need to look more closely at our internal entourage of microbial life. In humans and other mammals, great and diverse crowds of bacteria are beavering away down in our guts. Though my microbial community will differ from yours, especially if our diets are quite different, we all depend on them. No bacteria, no digestion, no life.

It's all a co-evolutionary phenomenon. They adapted to us. We adapted to them. We all shifted a bit over time as circumstances changed. In the human gut, the big changes were due to agriculture and cooking, new pathogens, chemical additives and antibiotics. Not all of these have had uniformly cheerful effects, and few of the implications are well understood (though the white-lab-coat crowd is working on it).

What is clear is that diversity and collaboration down among the mitochondria and digestive microbes are crucial to our well-being, just as they are in bigger realms – city neighbourhoods, ecosystems and the planet as a whole.

All life on Earth apparently emerged, expanded and changed in a great network of competing and supporting influences, with positive and negative forces functioning together as a complex global community. According to the Gaia hypothesis of James Lovelock and Lynn Margulis (yes, the same one who understood mitochondria), the planetary system and its innumerable intertwined subsystems has not only been evolving, but also more or less successfully regulating itself to the continued advantage of life.

We humans are well on our way to messing all that up by disrupting atmospheric chemistry, ecological systems and associated services, in part because we've failed to see ourselves as interdependent members of a community. There are no easy fixes for this situation. But as a start, we could try to learn something from our microbial companions.

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