**The Carnival of Microbes**

Alexis Zimmer

Giants are linked to carnivals, these great moments of subversion by the common people of the social and political order, where communal positions and roles are suspended, where the shoemaker becomes the king, the launderer becomes the queen and vice versa.

In this they find valuable companions in microbes. Microbes render obsolete a certain world order, a certain way that biologists have had of organising and describing it. At the same time, behind the giants lies a multitude of beings. Neighbours, humans, half-goats and witches, animal and plant communities and the host of stories that created these giants, influence them and travel with them, becoming their constantly renewed offspring. In other words, giants create us at the same time as we create them. And here again, they find in microbes valuable companions. Something has changed: we are more numerous and more blurred than we had believed.

Carnival of microbes. Anatomically speaking, we are more microbial than human. In our bodies, the number of bacteria alone exceeds that of human cells. From a genetic viewpoint, the gap is even greater: 99% of non-redundant genes are bacterial. If we take into consideration the multitude of other creatures that make up what biologists call microbiota – the complex ecologies of the viruses, fungi, yeasts and archaea that compose them and us – these proportions become even more dizzying. But these creatures do not simply inhabit our bodies, nor do our bodies simply house them. Literally, they compose us. They help digest what we eat – releasing nutrients, breaking down toxins and chemicals. They produce vitamins and nutrients missing from our diets, train our immune systems to perceive threats and protect us from more hazardous microbes – the dangerousness of which depends precisely on the composition of this multitude and its capacity to accommodate it. They participate in the proper development of our organisms. They even determine, to a large extent, our imagination and the way we behave. The intimacy of these relationships is such that some of these creatures mix their genetic material with ours. Viral genes, we are told, make up 8% of the human genome. Some shape our ability to recall events, our memory capacities, while others enable the production of proteins necessary for the constitution of the placenta. It is they that have allowed us and other species to become mammals.

Carnival of microbes, I said. Once enemies favouring the emergence of pathologies, microbes are now potential health allies. Their presence is no longer the exclusive sign of a health hazard but can, on the contrary, indicate the restoration of a previously pathogenic situation. Their pathogenic power no longer belongs to them alone but is distributed, seen as the product of the deterioration or the constitution of certain relationships within a wider environment and community of microorganisms. Put another way, certain diseases are viewed less as the consequence of the intrusion of a pathogen than as that of an ecological disturbance. The entire way we have imagined the human immune system has been turned on its head.

Since the start of this essay, it has seemed as if it were still easily possible to distinguish between human cells and microbes, between human genes and microbial genes – if you like, between ‘us’ and ‘them’. However, if there is one thing that is now becoming obvious, it is that these borders have become fragile, permeable. (Perhaps this is the primary meaning of ‘border’: a place of passage and traffic rather than an impassable barrier. Go ask the giant Edgard l’motard (the biker) of Steenvoorde.) If our languages and our imaginations are always full of these frontiers, and it’s often difficult not to refer to them, it’s important to note that describing these inseparable assemblages forces us to think of them differently, with their constituent porosity and the metamorphoses they allow.

Carnival of microbes. As some researchers state perfectly correctly: ‘We have never been individuals.’[[1]](#footnote-1) Our organisms are less discrete and individual entities than they are chimeras, multispecies organisms and ecosystems. Depending on what parts of the body we consider, we are forests, meadows or deserts. To designate these heterogeneous assemblages, biologists have coined the term *holobiont* (a combination of the Greek *holos*, ‘whole, all’, and *bios*, ‘life’). This new multi-specific understanding of organisms also presupposes previously neglected forms of extra-parental and extra-genetic inheritance: newborns assume the microorganisms present in the environments in which they develop. In this way, heredity is not reduced to the transmission, from procreators to their offspring, of genetic information supposedly preserved from the singularities and alterations of the broader environments in which organisms evolve. Our bodies incorporate the material and environmental transformations generated by our societies and affecting microbial populations. We inherit, microbiologically, our histories.

But this heritage is catastrophic. Biologists are describing a decline in microbial diversity and the disappearance of microorganisms from the intestines of populations in urban and industrialised societies. For them, this explains the chronic, degenerative dominant of these societies’ epidemiology. Some speak of an ‘epidemic of absence’[[2]](#footnote-2) to characterise these health consequences and the historical rupture of the links with our microbial companions. The reasons for this disappearance are multiple, including the inconsiderate consumption of antibiotics and the widespread extension for more than a century now of hygiene standards and practices. More generally, many aspects of the ways of life of the Global North involve a multitude of changes that have affected their relationships with the microbes listed in the literature. Among them are the transformation and urbanisation of habitat, changes in the methods of supply and the chlorination of drinking water, industrialisation of food production and the presence of ultra-processed foods, and the disruption of relationships maintained with animals, thereby modifying the microbial exchanges that they involve. Connections are drawn with climate change or the sixth extinction of species and the Anthropocene. From this story emerges the idea that the environmental crises characteristic of our time, the consequences of the western lifestyle found in the water, soil, air, fauna and flora, extend into the entrails of the bodies of many human populations.

However, microbiota that are still relatively intact have not yet completely disappeared. Certain populations considered ‘traditional’ or ‘hunter-gatherers’, in that they have remained more or less on the margins of ‘modernisation’ processes, would be their living carriers *still today*. But according to some estimates, by 2050, more than two and a half billion people will have left their ‘traditional’ ways of life for ‘urban’ lifestyles. The continuation and generalisation of this story of a progressive and supposedly inevitable ‘westernisation’ of lifestyles *and* of intestines is cause for worry. And all the more so since, once initiated, this degradation of the microbiota will be transmitted and amplified irremediably from generation to generation. To alleviate this crisis in our internal ecologies, biologists have launched vast campaigns to collect excrement from these ‘traditional’ populations.[[3]](#footnote-3) Their objectives: the development of knowledge and the improvement of public health. But these practices and the stories of disappearance on which they are based pose many problems. By constituting populations located on the margins of industrial histories as possible resources for restoring the ecologies of industrialised populations, they replay the tropes of a colonial history polarised by the evidence of its western accomplishment.[[4]](#footnote-4) In doing so, this makes it difficult to take seriously the knowledge, practices, lifestyles and worlds of those who would be in the process of disappearing, other than by precisely delimiting ‘resources’ deemed interesting. It makes obvious and necessary the collection by scientists, ‘for the long-term health of humanity’,[[5]](#footnote-5) of samples of microbiota, and the cataloguing, in their names, of data, knowledge and practices that could emerge from the process. But then another problem arises: that of the partial nature of their collection and conservation. The microbiota gathered only represent a portion of the intestinal microbiota, and the technologies used cannot guarantee their conservation. And what sense could there be in seeking to conserve dynamic ecologies, sets of situated relationships, that condition what microbes are and do?

What is disappearing due to the deterioration of ecologies and the disappearance of certain microbial strains from the intestines is less the disappearance of isolated microbial species, the emptying of boxes in the nomenclature of their classifications, than the shattering of whole worlds and unique lifestyles. These worlds, this story suggests to us, are full of interspecific relationships, constituting ways of feeding and (self) healing, of giving birth and growing, of inhabiting territories and maintaining relationships with the multitude of creatures who populate and shape them: so many ways of living and dying in worlds much larger than those of humans alone, a fortioriof westerners; so many ways, again, to weave and tell stories. Seeking to preserve these microbiota then requires much more than the collection and preservation of excrement samples. This necessitates the defence of the worlds that these microbiotas presuppose or the reinvention of worlds where they, and the human communities they imply, could regenerate.

This is where carnivals give us a way forward. Rather than ‘a long, flat and necrophiliac line’[[6]](#footnote-6) of the end of time and inevitable disappearances, we should learn from these pagan times of which carnivals are the testimony. These are moments of change, where time revolves ‘like the movement of a pendulum or the spindle of a distaff’.[[7]](#footnote-7) In societies that celebrated ‘these ritual and seasonal times, of which the solstices constituted the two great moments’, ‘the continuous generation of the world needed to be accompanied, that is to say manufactured’.[[8]](#footnote-8) There is no evidence that our worlds are self-perpetuating, even less for believing that we could save parts of them independently of the multiple and heterogeneous relationships that they presuppose. What the giants and the microbes teach us, if we are willing to hear them, is that the generation of worlds requires paying attention to and taking care of the dense, multiple and tangled relationships that make us what we are, along with the worlds we live in, and celebrating them in an ever-renewed concern for their regeneration.

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1. Scott F. Gilbert, Jan Sapp and Alfred I. Tauber, ‘A Symbiotic View of Life: We Have Never Been Individuals’, *The Quarterly Review of Biology* 87, no. 4, December 2012, pp. 325–41. [↑](#footnote-ref-1)
2. See Moises Velasquez-Manoff, *An Epidemic of Absence: A New Way of Understanding Allergies and Autoimmune Diseases*, reprint (New York: Scribner), 2013. [↑](#footnote-ref-2)
3. Global Microbiome Conservancy <https://microbiomeconservancy.org> (accessed 4 March 2022); Maria G. Dominguez Bello, Rob Knight, Jack A. Gilbert and Martin J. Blaser, ‘Preserving Microbial Diversity’, *Science* 362, no. 6410, 5 October 2018, pp. 33–4. [↑](#footnote-ref-3)
4. See Alexis Zimmer, ‘The Disappearing Microbiota: The Coloniality of a Narrative and Anti-Colonial Proposals’, forthcoming*.* [↑](#footnote-ref-4)
5. A Vault for Humanity | The Microbiota Vault <https://www.microbiotavault.org> (accessed 4 March 2022). [↑](#footnote-ref-5)
6. Gilles Deleuze, *Critique et clinique* (Paris: Éditions de Minuit), 1999, p. 61. [↑](#footnote-ref-6)
7. Émilie Hache, *De la génération: Enquête sur sa disparition et son remplacement par la production*,Les Empêcheurs de penser en rond (Paris: La Découverte), 2024, pp. 76–7. [↑](#footnote-ref-7)
8. Hache 2024, pp. 76–7. [↑](#footnote-ref-8)