It’s raining viruses! Hallelujah!
(With apologies to the Weather Girls.)

Trillions upon trillions of viruses are falling to Earth all of the time—about 800 million every square meter every day. This estimate was recently reported by researchers who did fieldwork in the European Sierra Nevada mountains. A New York Times story on the discovery describes how viruses seem to rain down from a viral stream cruising above our weather systems. Where does it come from? Most observers believe the stream is created by viruses rising up from soil and water, but some contend the microbes could originate in the atmosphere or in space.

We do know that viruses are elemental to our existence. They are part of our ecosystems and our bodies. Much of our DNA probably arose from viruses; and since life began, pieces of viral genetic material have integrated themselves into virtually all life-forms. As evolutionary biologist Anne-Ruxandra Carvunis notes, “We are very virus-y.” (I encourage you to read this issue’s cover story to learn how Anne is finding meaning amid DNA’s “dark matter.”)

The Times story mentions the ARC gene, which a team at the University of Utah has determined includes ancient viral DNA. ARC plays a role in our consciousness and memory. Isn’t it astonishing to consider that the recollections and thoughts we have seem to owe their origins to microbes? These bodies and minds we inhabit are part of the virosphere.

We do not know the extent to which ancient ARC contributes to one of the most interesting examples of a shared memory system, i.e., the common molecular ground between the immune system and the nervous system. In our Spring 2016 issue, I wrote about how both are plastic organs. This April, the School of Medicine’s annual symposium with our partner Tsinghua University was devoted to how both systems learn and create memories.

Indeed, they have a lot in common at the molecular and cellular levels. For example, classic inflammatory cytokines build our substrates for learning and memory. They share RAG gene expression, and both immune and nervous systems are able to take cues from neurotransmitters. Although this is wildly speculative, I can imagine that one viral “hit” in evolution—if not ARC, then something similar—could have been sufficiently small and exquisitely integrated to endow our genome with this transcendent commonality.

I can’t resist sharing another piece of biology news here. In a startling paper, David Glanzman at UCLA just reported that his lab was able to transfer memories from one snail to another by injecting RNA. (Think ancient viral RNA!)

If he’s correct, it implies that memory resides in cellular nucleic acid, not just synapses, as most neuroscientists hold. Further, it means the capacity of our bodies to learn and remember actually reaches beyond our immune and nervous systems, stretching—perhaps—to the virosphere!