

Virus wars: The evolutionary battle between humans and COVID-19

The past (horrible, tragic, no-good, very bad) year might have seemed like a straightforward battle between scientists and a virus to find new drugs and vaccines. But this wasn't just a stand-up fight; it was also a bug hunt—a subtle push-pull across a dozen different vectors. Viruses aren't exactly alive, but they still follow the same rulebook as every living thing on Earth: Adapt or die. Understanding those more occult forces—how viruses evolve inside us, their hosts, and how they change the ways they get from one person to the next—will define the next phase of the pandemic.

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A virus exists amid a sea of troubles—changes in context and conditions that apply selective pressures to every new mutant. Every emerging generation manifests new YOLO genetic tricks; the immune system of the host is what makes some of them better fitness landscape climbers. And since the virus is moving from within-host dynamics to host-host dynamics, and more of those hosts have already been infected ... well, things are tough all over.

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“What’s happening over time is, the host environment is changing. An increasing fraction of the population has memory immune responses that are basically impeding the growth of the virus,” says [epidemiologist Sarah Cobey.] “So there’s this growing selective pressure also to escape that immune response.”

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