

Venus harbors one of the most extreme surface environments in our solar system. Its surface is 92 times that of Earth's, 96.5% Carbon Dioxide, and about 740 degrees Kelvin¹. Simply put, Venus's surface is uninhabitable to all known life – extremophiles and all. Though, this is at the surface. It has been theorized that humans may be able to colonize Venus's upper atmosphere (with blimps, basically) where the pressure and temperatures are more comparable to Earth's. Humans have a slight advantage over other (potential) life in our solar system though – we have technology to aid us. Could this concept of life, naturally inhabiting other worlds' atmospheres and forming entire airborne biospheres, exist?

The idea that life can exist in the upper atmospheres is not terribly crazy. For example, microbes have been found to exist in Earth's stratosphere². However, it is not totally clear how these microbes got up there in the first place. One theory states that they have fallen down from space while another proposes they were swept up by weather or hitched a ride on airliners. These microbes, however, did “not appear to be actively growing at high altitude” but rather “simply enduring the upper atmosphere”². So, it appears that life can exist in an airborne environment, but two important questions remain: how would life get there or form there in the first place; and would they be capable of growth and reproduction.

The answers to these questions would vary drastically from atmosphere to atmosphere. Though, the one of the main hurdles present in any of these atmospheric environments would be control and access to resources. Atmospheres are inherently dynamic – wind, storms, vortices, and the rising and falling of different temperature gas. This type of environment would make it extremely difficult to have any kind of control over direction and would make access to resources inconsistent. Microbes could not find their way to sources of food easily. The density of material would also be much lower than say, in a pond. With these major issues, life forming and thriving naturally in a planet's atmosphere would not be impossible, but is not very plausible.

¹ Textbook

² <https://www.astrobio.net/extreme-life/life-on-earths-ceiling/>