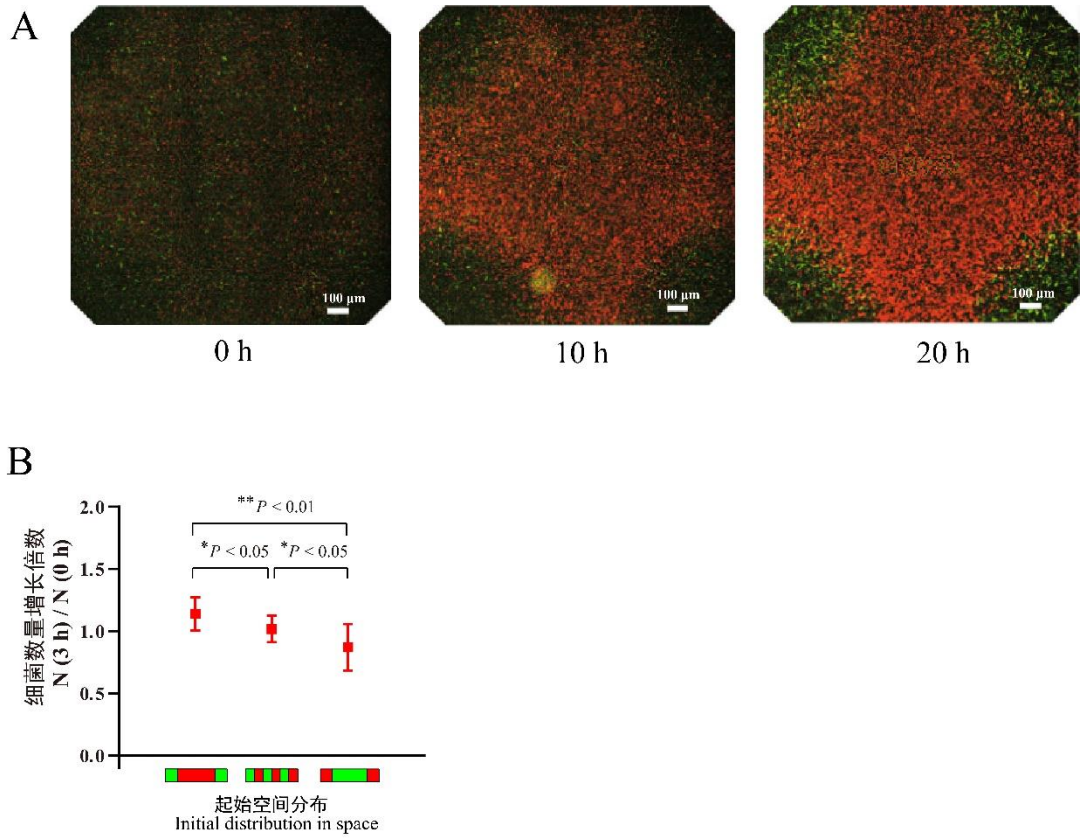

附录 1 特定空间模式提高微生物整体生长速率。**Li 等(2019)**通过微流控装置研究营养供应的菌株(红色)和提供抗生素保护的菌株(绿色)相互合作的空间模式和生态学作用。**A:** 含抗生素的营养物质从装置的 **4** 个角涌入，两个种群通过互惠合作，从最初 **0 h** 的均匀分布模式演变为 **20 h** 时红色菌株生长在中间，绿色菌株分布在 **4** 个角落(记为自然模式) **(Li et al, 2019)**。**B:** 特定的空间模式提高整体的增长倍数**(Li et al, 2019)**。横坐标从左至右依次为自然模式(红色菌株在中间，绿色菌株在四周)，均匀分布模式(红色菌株与绿色菌株充分混匀)和反自然模式(绿色菌株在中间，红色菌株在四周)。比较抗生素环境中相同起始密度的不同空间模式的细菌数量增长情况，以 **3 h** 时刻菌体数量**(N (3 h))**除以初始菌体数量**(N (0 h))**。自然模式的增长倍数显著高于均匀分布模式与反自然模式。

Appendix 1 Specific spatial pattern increased overall growth rate of microorganisms. Li et al (2019) used a microfluidic device to study the spatial pattern and ecological effects of the cooperation between nutrient supply strains (red) and antibiotic protection strains (green). A, The two populations cooperate mutually when the nutrients with antibiotics poured in from the four corners of the device, which evolved a specific spatial pattern with the red strains grew in the middle, and the green strains in the four corners (marked as natural pattern) from the initial uniform distribution pattern (Li et al, 2019). B, The specific spatial pattern increased the overall folds of growth. The horizontal axis from left to right were the natural pattern (red strains in the middle and green strains around), uniform distribution pattern (red strains mixed well with green strains) and anti-natural pattern (green strains in the middle and red strains around). Bacterial growth in different spatial patterns with the same initial density in the antibiotic environment was compared by dividing the number of bacteria after 3 h (N (3 h)) by the initial number of bacteria (N (0 h)). The growth of bacteria in the natural pattern was significantly higher than that in the uniform distribution pattern and the anti-natural pattern.

参考文献

Li L, Wu T, Wang Y, Ran M, Kang Y, Ouyang Q, Luo C (2019) Spatial coordination in a mutually beneficial bacterial community enhances its antibiotic resistance. Communications Biology, 2, 301.