

Colloque international

Domestication and hybrid communities Coexistence, coevolution, cooperation

Mr Hyde and Dr Jekyll: warfare, social behaviour, cohabitation and domestication of bacteria

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Life on Earth has very probably originated from the oldest single-cell archaea and bacteria. These microorganisms are able to live in most inhospitable environments (high salt concentrations and pressures, extreme pH,...), due to their extraordinary capacity of adaptation. At first glance, in human societies bacteria are immediately correlated with diseases, due to the number of dangerous pathogens known to everyone. The era of antibiotics made credible that pathogen bacteria could be eradicated, but they evolved resistance mechanisms that annihilate antibiotic efficiency. Multiresistant bacteria are today a major health concern. Although less commonly known, bacteria struggle for life in microbial communities and wage a merciless war for nutrients. They establish cell-to-cell communication systems, regulate their populations and adapt their lifestyles. They cohabit with various organisms, plants, insects, vertebrates including humans, establishing tight beneficial relations, commensalism and symbiosis. Their capacities to synthesize antagonistic molecules were exploited by man very early, starting the domestication of microorganisms in the 1900s with the discovery of penicillin, gramicidin and other antibiotics of microbial origin. Nowadays, many antibiotics currently used come from bacteria, awarded once again by the Nobel prize in medicine 2015. Defence and adaptation strategies of bacteria are largely used today for the design and production of bioinspired products for various applications (probiotics, engineered microorganisms for medical and veterinary purposes and for the environment [bioremediation, energy]). Development of microbial domestication is one of the most exciting and promising scientific challenges for the XXIst century that can bring essential benefits to our societies, especially in medicine and against pollutions. Bacterial engineering is already well controlled by geneticists and microbiologists. However, a strong involvement of bioethicists to establish appropriate ethical rules is a major point.