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**Biomimicry of social foraging bacteria for distributed optimization: Models, principles, and emergent behaviors.** (English) [Zbl 1031.92038](#)

*J. Optimization Theory Appl.* 115, No. 3, 603-628 (2002).

Summary: We explain the social foraging behavior of *E. coli* and *M. xanthus* bacteria and develop simulation models based on the principles of foraging theory that view foraging as optimization. This provides us with novel models of their foraging behavior and with new methods for distributed nongradient optimization. Moreover, we show that the models of both species of bacteria exhibit the property identified by Grunbaum that postulates that their foraging is social in order to be able to climb noisy gradients in nutrients. This provides a connection between evolutionary forces in social foraging and distributed nongradient optimization algorithm designs for global optimization over noisy surfaces.

**MSC:**

[92D50](#) Animal behavior  
[90C90](#) Applications of mathematical programming  
[92D15](#) Problems related to evolution

Cited in **13** Documents

**Keywords:**

[distributed optimization](#); [biomimicry](#); [bacteria](#)

**Software:**

[avida](#)

**Full Text:** [DOI](#)

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