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Evolvability in the context of antibiotic resistance

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Propositions

Accompanying the dissertation

Evolvability in the context of antibiotic resistance

by

Timo J. B. van Eldijk

1. While *nothing in antibiotic resistance makes sense except in the light of evolution* (paraphrasing Theodosius Dobzhansky), the evolutionary process underlying resistance is commonly ignored.
2. Temperature impacts the mutation rate towards antibiotic resistance in *Escherichia coli*. (Chapter 3)
3. Condition-dependent mutation rates are widespread in bacteria. (Chapters 3 & 4)
4. “*Random mutations are not random in evolved systems*” - Paulien Hogeweg in *Evolutionary Systems Biology* (Chapter 5)
5. Evolvability can evolve; not merely as a byproduct but as a direct result of natural selection. (Chapters 4 & 5)
6. High-level antibiotic resistance requires multiple mutations (Chapter 6)
7. The role of plasmids in the emergence of antibiotic resistance remains one of the major unanswered questions in the antibiotic resistance field. (Chapter 6)
8. To understand and predict evolutionary processes, we need a coherent theory of evolvability and its evolution. (Chapter 8)
9. We need to study evolvability by constructing many specific mechanistic models from which we may eventually distil general principles. (Chapters 2 & 8)
10. Public outreach is an important duty of a scientist; if the public is kind enough to fund our research, the least we can do is explain what we use their money for.
11. If we want to understand evolution, we should overcome our self-obsession and stop studying vertebrates: their very existence is merely an irrelevant outlier.
12. Science without vision is like a foot fungus resistant to antifungals: everyone agrees it stinks, yet somehow it persists.
13. “*Life is quite absurd.*” - Monty Python in *The Life of Brian*