Preliminaries for Distributed Natural Computing Inspired by the Slime Mold Physarum Polycephalum

Michael T. Dirnberger

Max Planck Institute for Informatics

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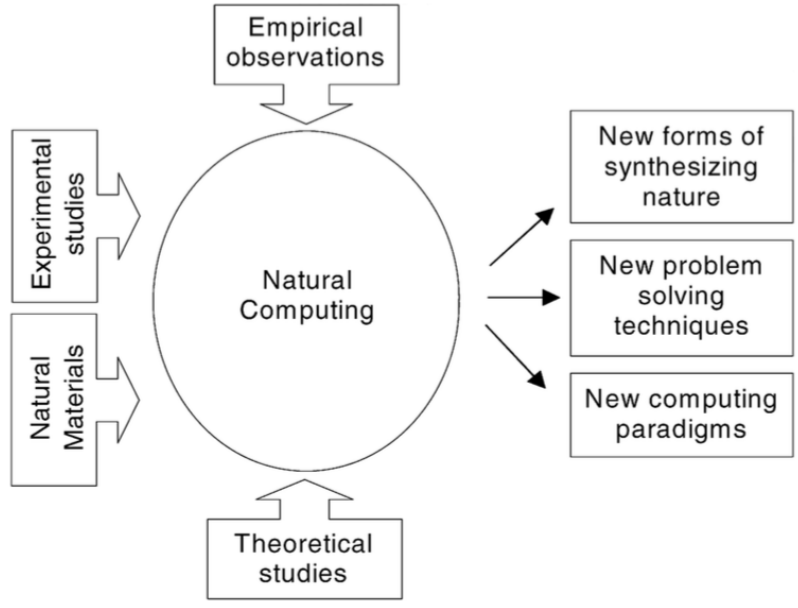
Part I: Natural Computing with P. polycephalum

Natural Computing in a Nutshell

- Design of novel nature inspired algorithms.
- Synthesize natural phenomena by using computers.
- Use natural materials to do computations.



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Natural Computing is a highly interdisciplinary field!

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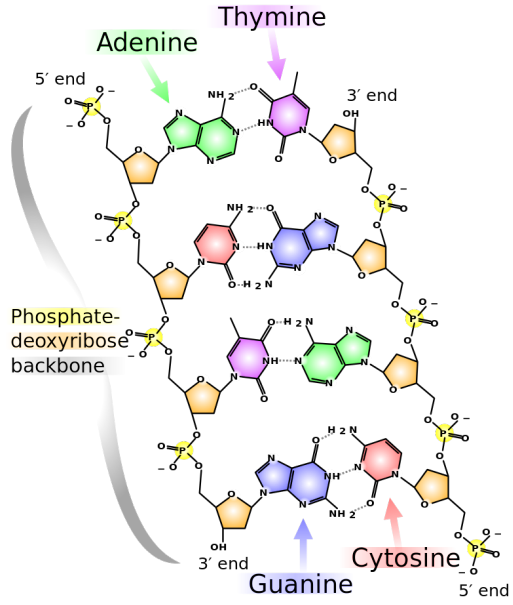

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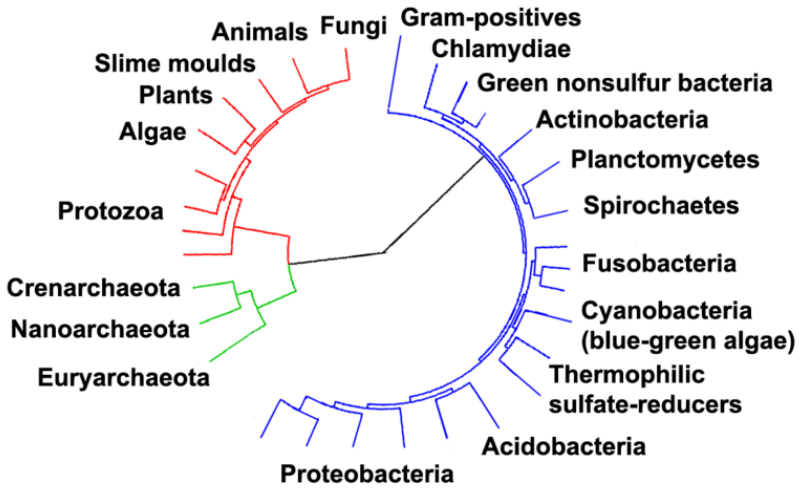
Meet a Magnificent Mold

Physarum Polycephalum:

- Unicellular organism with many nuclei.
- Intricate foraging strategy.
- Networks distribute protoplasm.



Images courtesy of Prof. T. Ueda.

Key Experiments show:

Distributed operation, Minimisation/Maximitation capabilities

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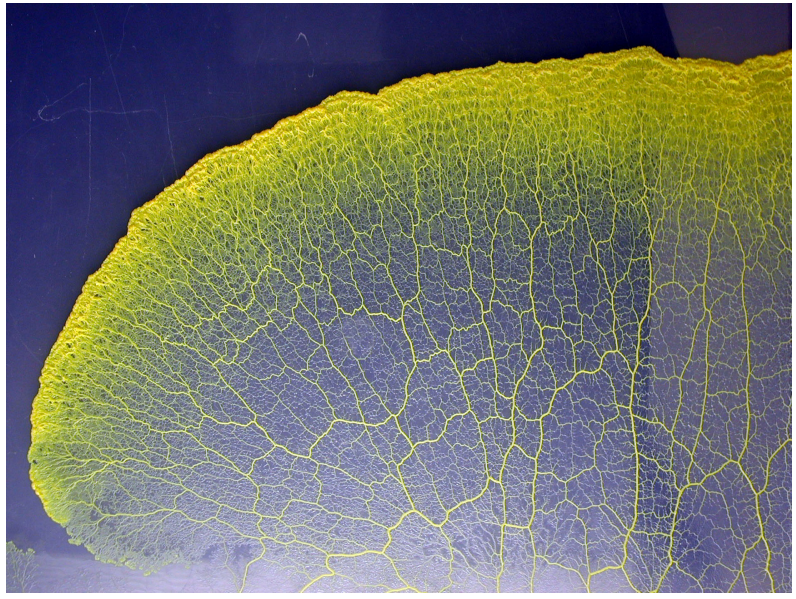

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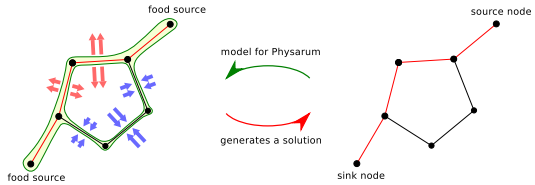
Natural Computing with *P. polycephalum*

Succes stories

- Positive feedback models
- Many particle simulations/cellular automata
- Steering *P. polycephalum* using light



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Caveat:

Distributed nature of *P. polycephalum* has not been investigated in the context of Natural Computing.

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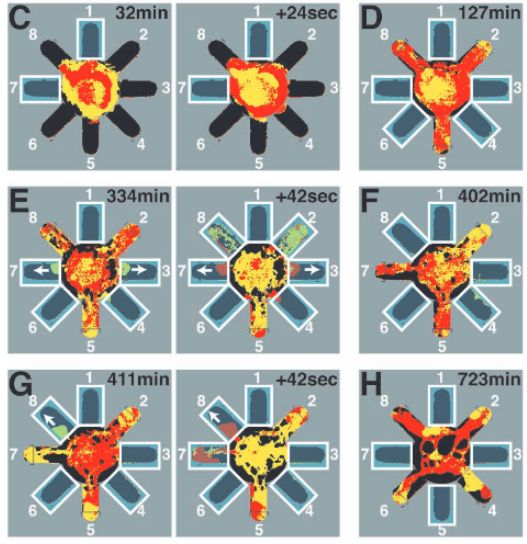

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Towards distributed Natural Computing with *P. polycephalum*

Our aim:

Study the networks formed by *P. polycephalum* in order to drive the development of a distributed model.

Our approach:

- Design and conduct experiments
- Process raw experimental data
- Analyze network properties
- Model the dynamics exhibited by *P. polycephalum*

Part II: Networks formed by P. polycephalum