A living inkblot for bees



ORIGIN · 2023–2024

Inkblot for Bees: drypoint artworks conceived to stimulate memory through the visual perception of pesticide-affected bees.

HTBAA · 2026

Exploring how the existing artistic proposition might become a biomanufactured, spatially patterned system.

LONG-TERM TARGET

Contained bioengineered flower: inkblot-inspired form, bee-visible UV patterning and investigated nectar chemistry.

FIRST MATERIAL PROXY Patterned bacterial cellulose · Komagataeibacter rhaeticus · contained, bee-free tests

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From molecular colour to spatial pattern

01

MOLECULAR DESIGN

gfasPurple chromoprotein
TyrSg tyrosinase

Computational construct research; cell-free expression and cellulose integration remain untested.

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02

SPATIAL CONTROL

Automated placement
Hydrogel pathways

Proposed: spatially positioned cell-free reactions; investigate projected-light control with a light-responsive system.

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03

PATTERN EMERGENCE

Reaction–diffusion
Symmetry and self-organisation

Turing patterns / quorum sensing discussed with Jay Handfield (TA); not yet tested.

RESEARCH QUESTION

Can biochemical interactions generate an inkblot-like pattern, rather than simply reproduce a printed image?

STATUS · Computational investigation and experimental planning; no spatial cell-free prototype claimed.

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Feasibility and next experiments

PROPOSED FIRST EXPERIMENT

A POSITION

Spatially dispense reporter reactions at defined coordinates.

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B INTERACT

Introduce shared hydrogel / fluidic pathways and controlled diffusion.

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C MEASURE

Compare deposited patterns with reaction-generated distributions.

MEASURABLE READOUTS

- **Expression**
  Reporter signal at each position
- **Spatial resolution**
  Diffusion and edge definition
- **Reproducibility**
  Pattern variation across repeats

SCALE · PLANNING ESTIMATES Tier 0: 20 units / 0.1 m² / 10–14 days per parallel cycle. Tier 1: 60 units / 0.3 m² / ~5 mg compound. Tier 2: 1,000 units / 5 m² material / ~0.47 g per hectare per season.

OPEN QUESTIONS · Can bees resolve the pattern? Can TyrSg function with available copper? Does the pattern survive growth, drying and rehydration?

BOUNDARY · Contained, bee-free tests proposed; UV visibility and cognition require separate validation.

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