

Entre Machiavel et Mère Teresa : la vie sociale des fourmis



Laurent Keller

Dept. Ecology and Evolution

Unil

UNIL | Université de Lausanne

Les fourmis: une longue histoire

“Va vers la fourmi, paresseux. Considère ses voies, et deviens sage. Elle n’a ni chef, ni inspecteur, ni maître, Elle prépare en été sa nourriture. Elle amasse pendant la moisson de quoi manger”

Roi salomon 1000 av. J.-C. Proverbe ancien testament

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Inspirera des siècles plus tard à Jean de La Fontaine sa fable *La cigale et la fourmi*

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Les fourmis: une longue histoire

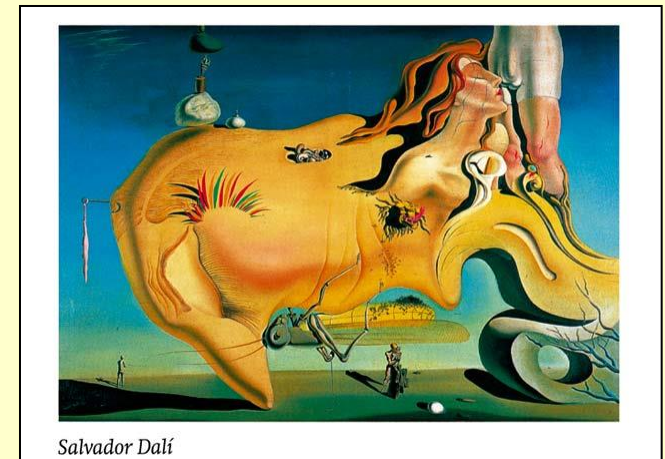
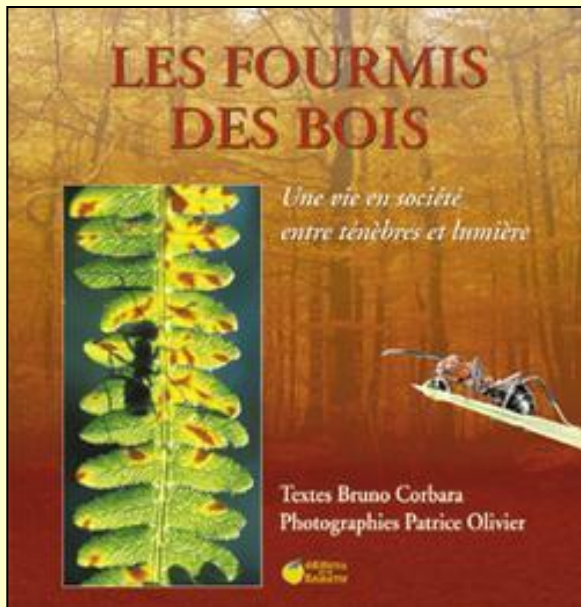
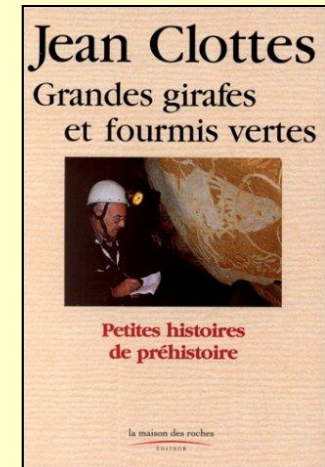
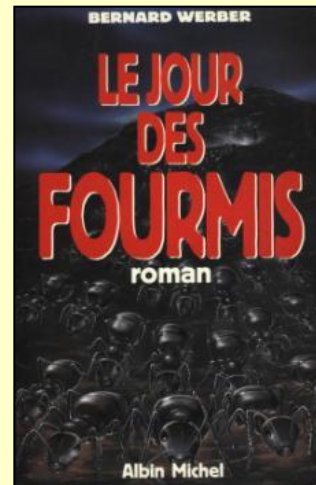
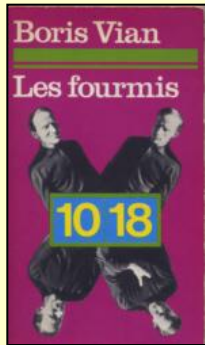
- Dans le coran
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- Dogons d'Afrique centrale: fourmis épouses du dieu Amma et mères des premiers hommes
- Rituels par ex. chez les Wayana-Apalai du Brésil.
Fourmis de feu

Les fourmis dans le cinéma



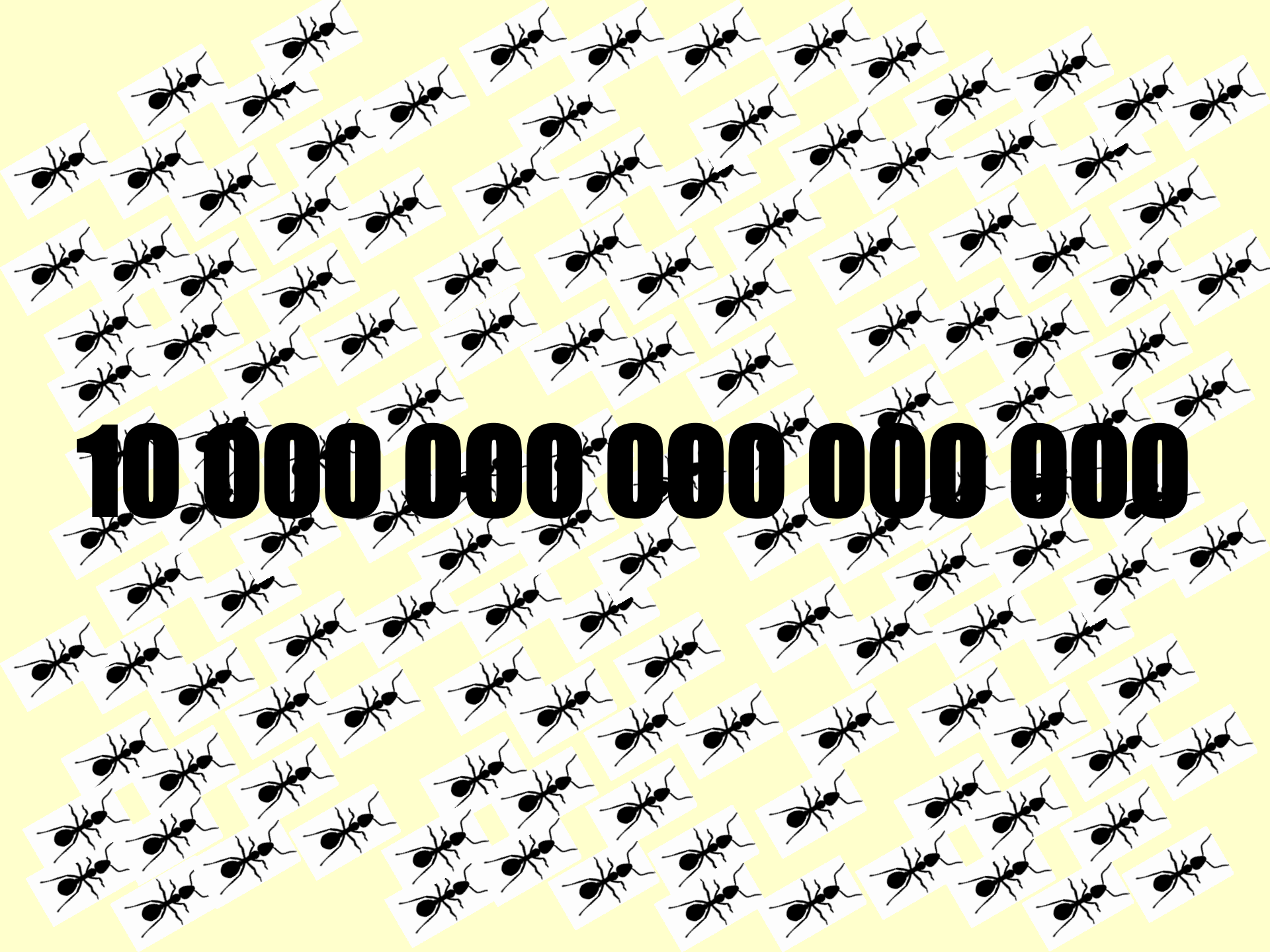
**Un Chien Andalou
Bunuel**

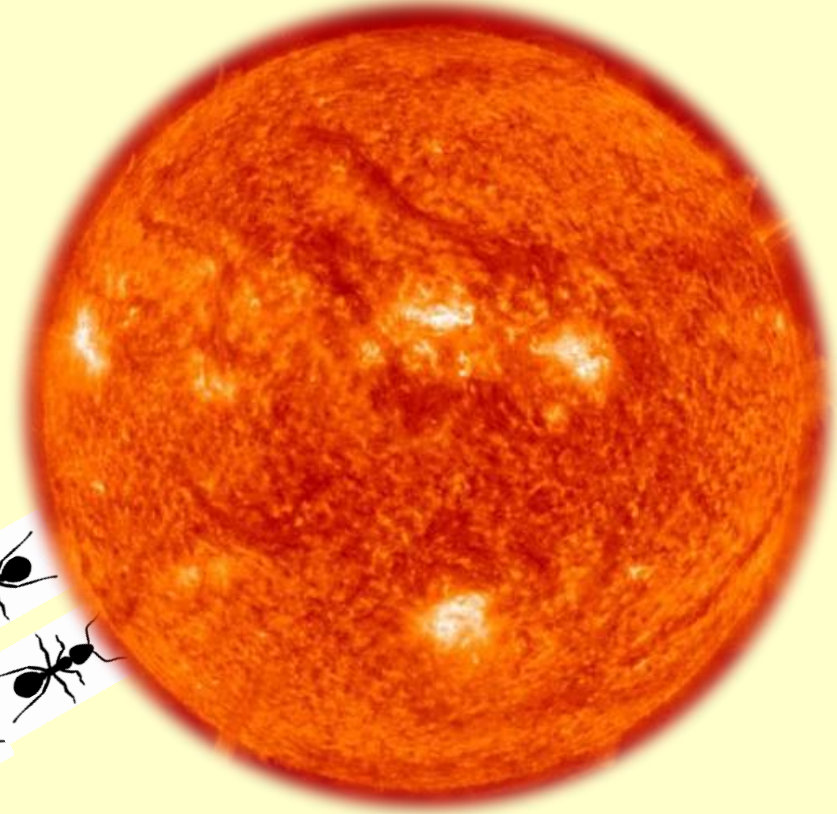
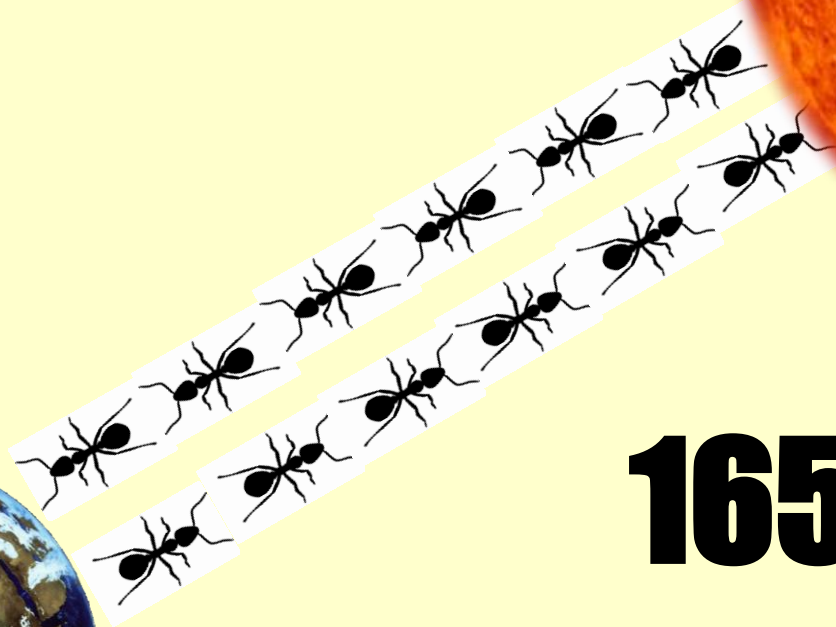
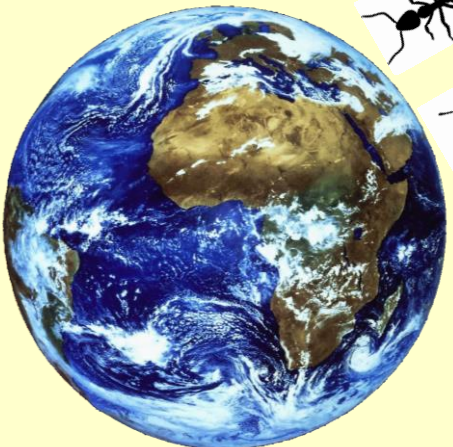
Les fourmis dans les livres, etc



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165 x



Why are social insects so successful?

- Because of their complex social organisation



Environmental modification



Weaver ant



Weaver ant



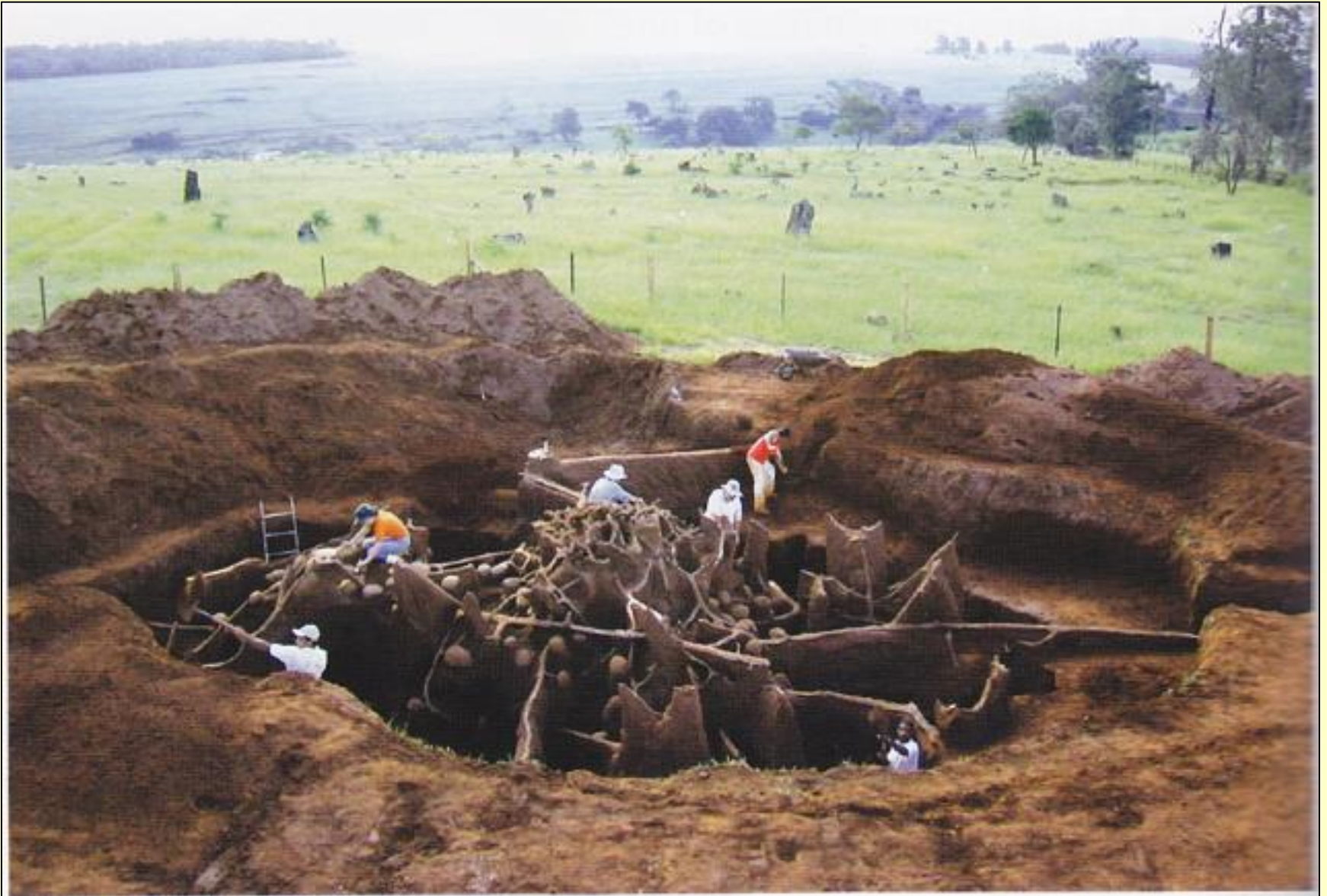
Weaver ant



Weaver ant



Fungus growing ant nest



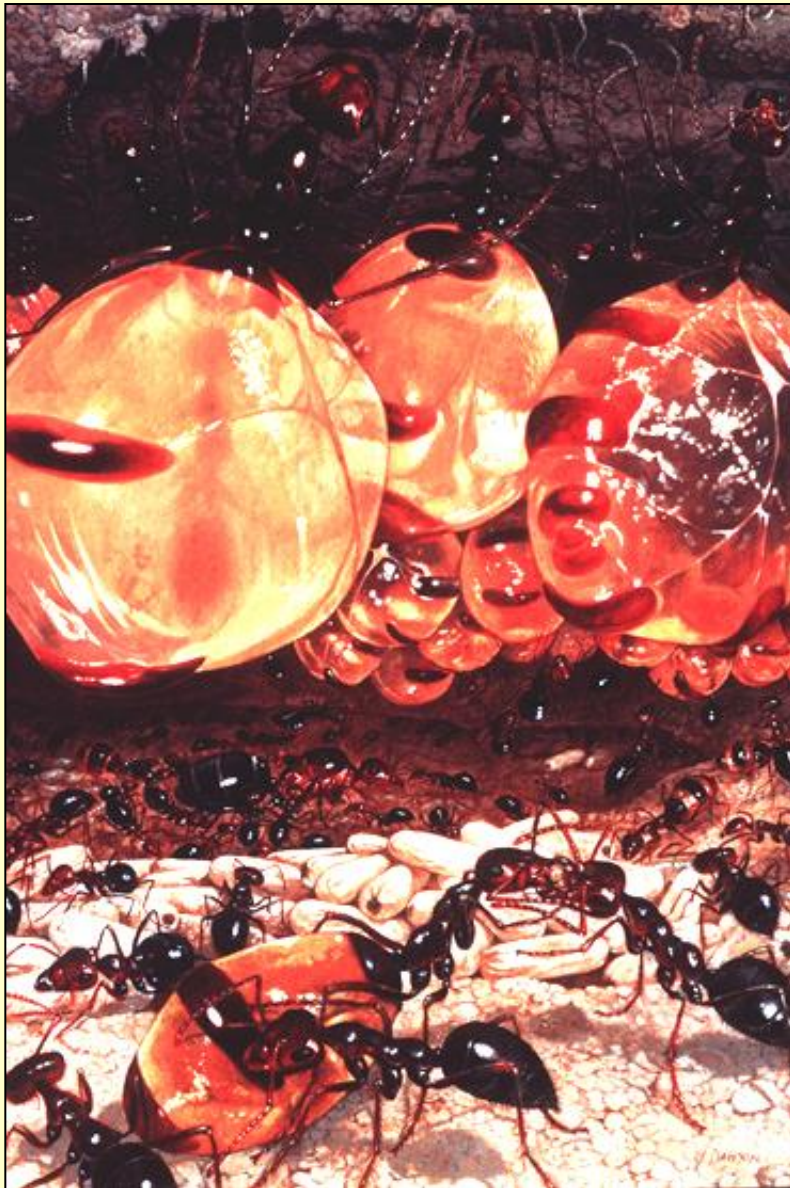
Fungus growing ant



Cattle breeding



Division of labor honey pot ant

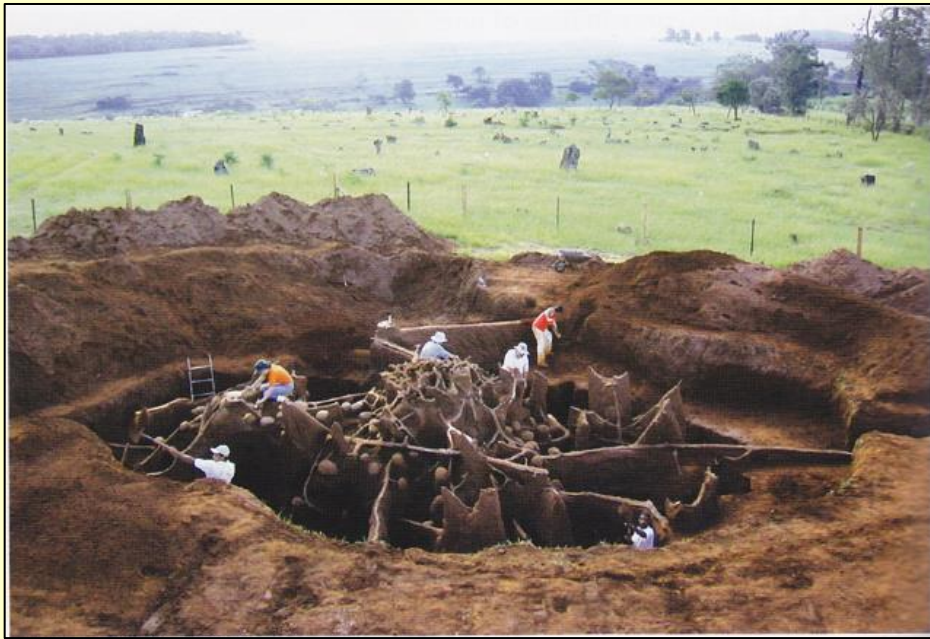


What about humans?

What about humans?



Environment modification



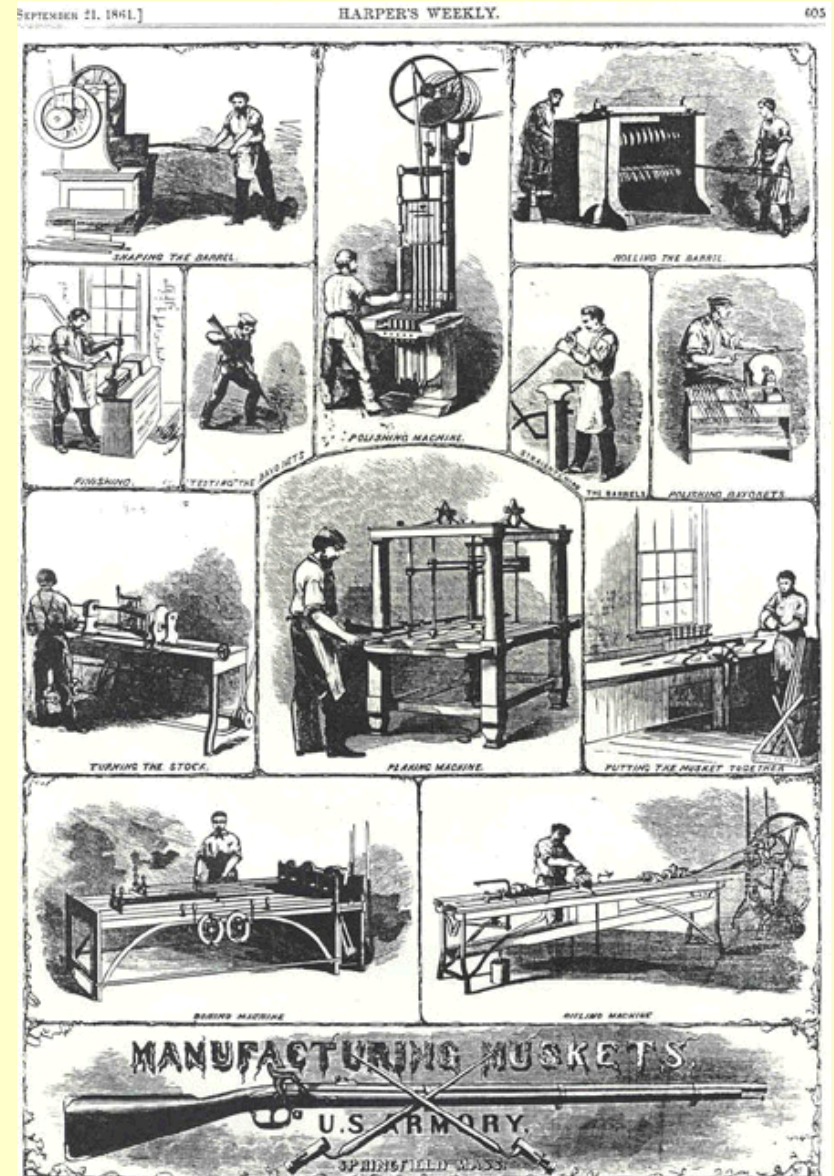
Agriculture



Cattle breeding

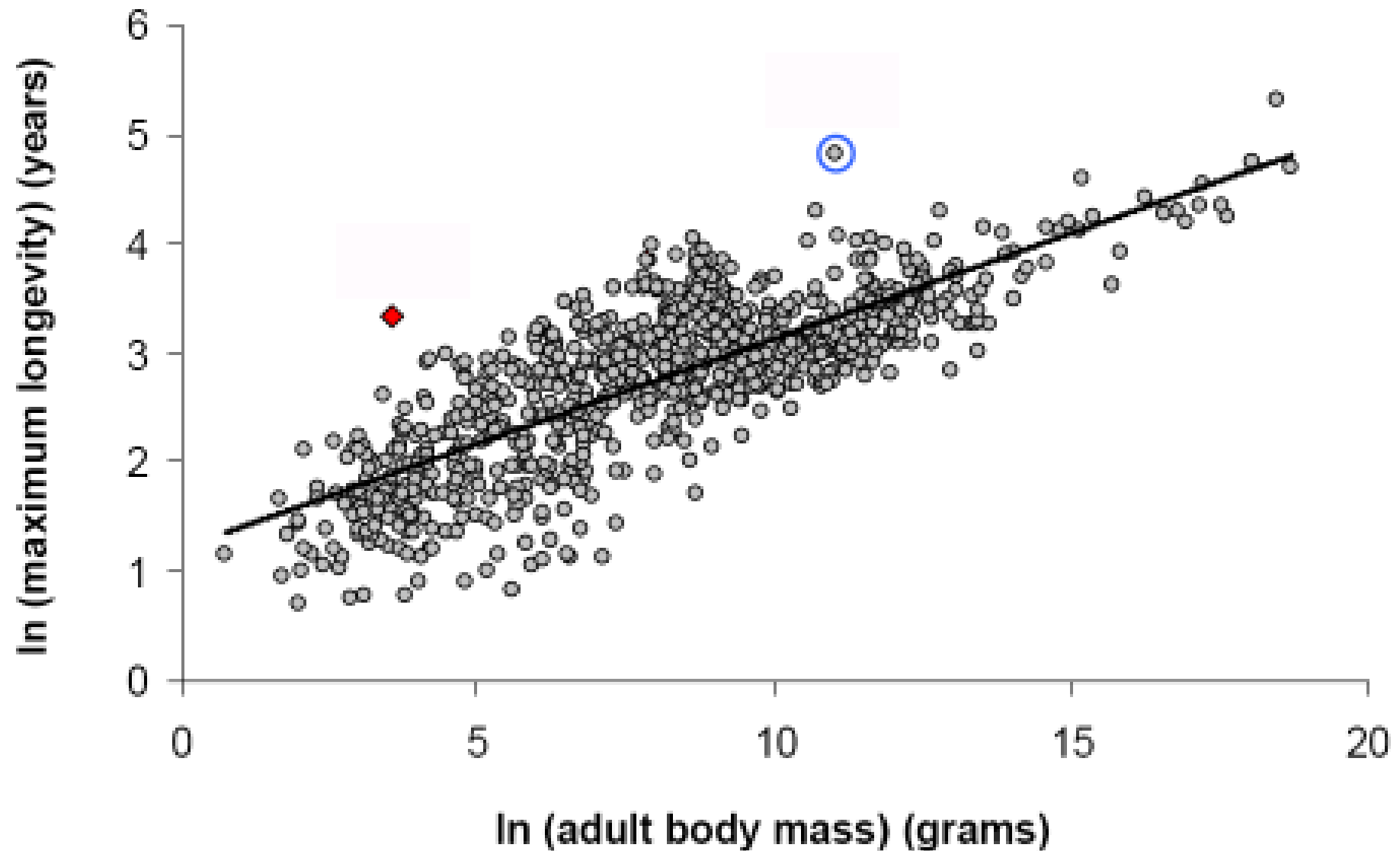


Division of labor

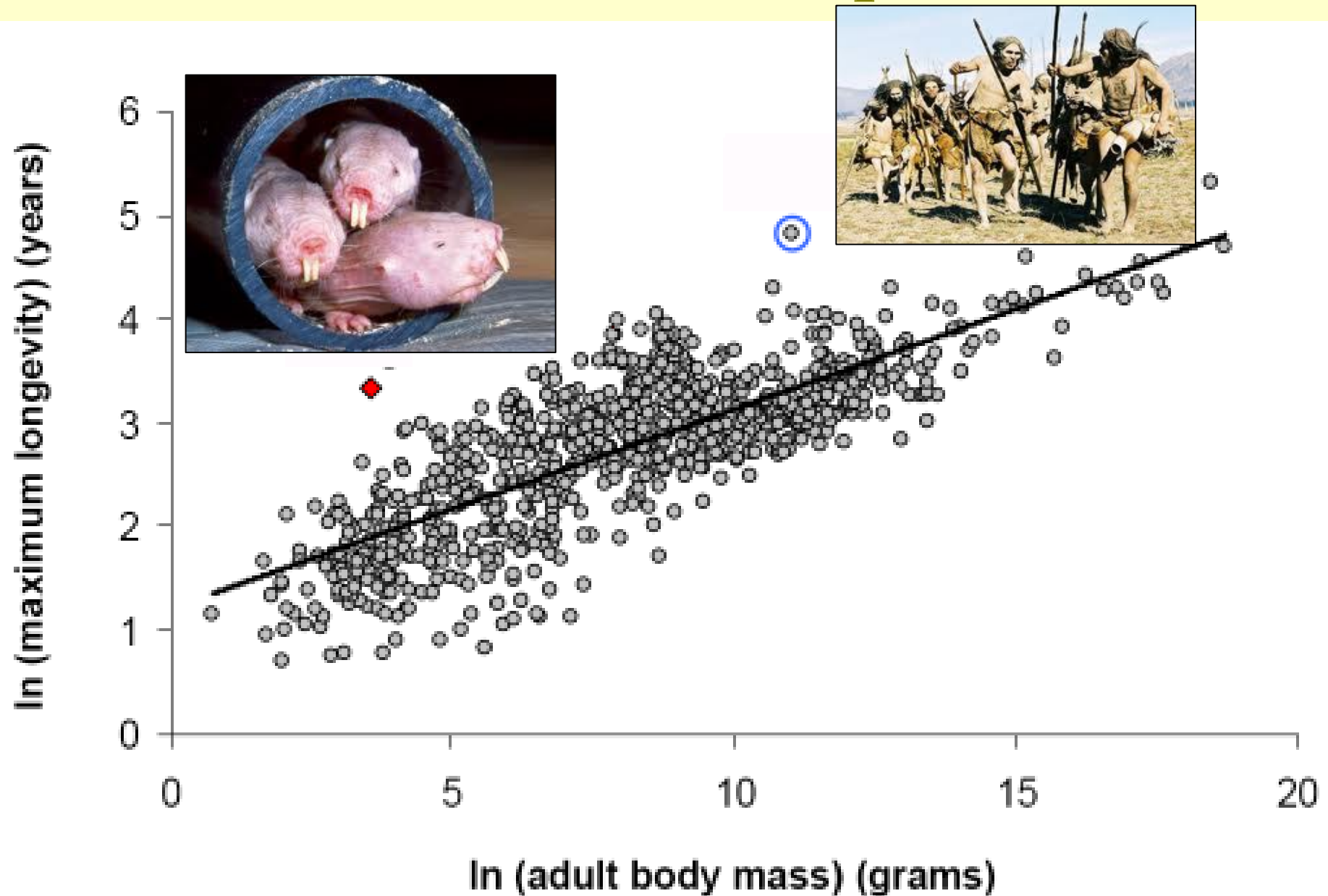


Other similarities?

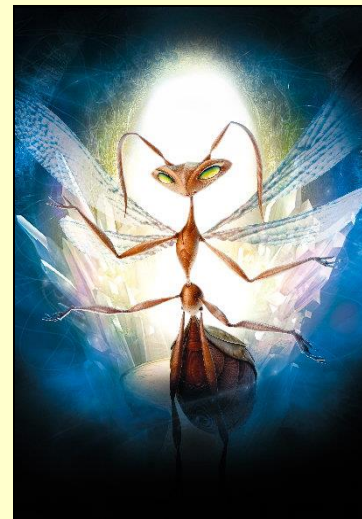
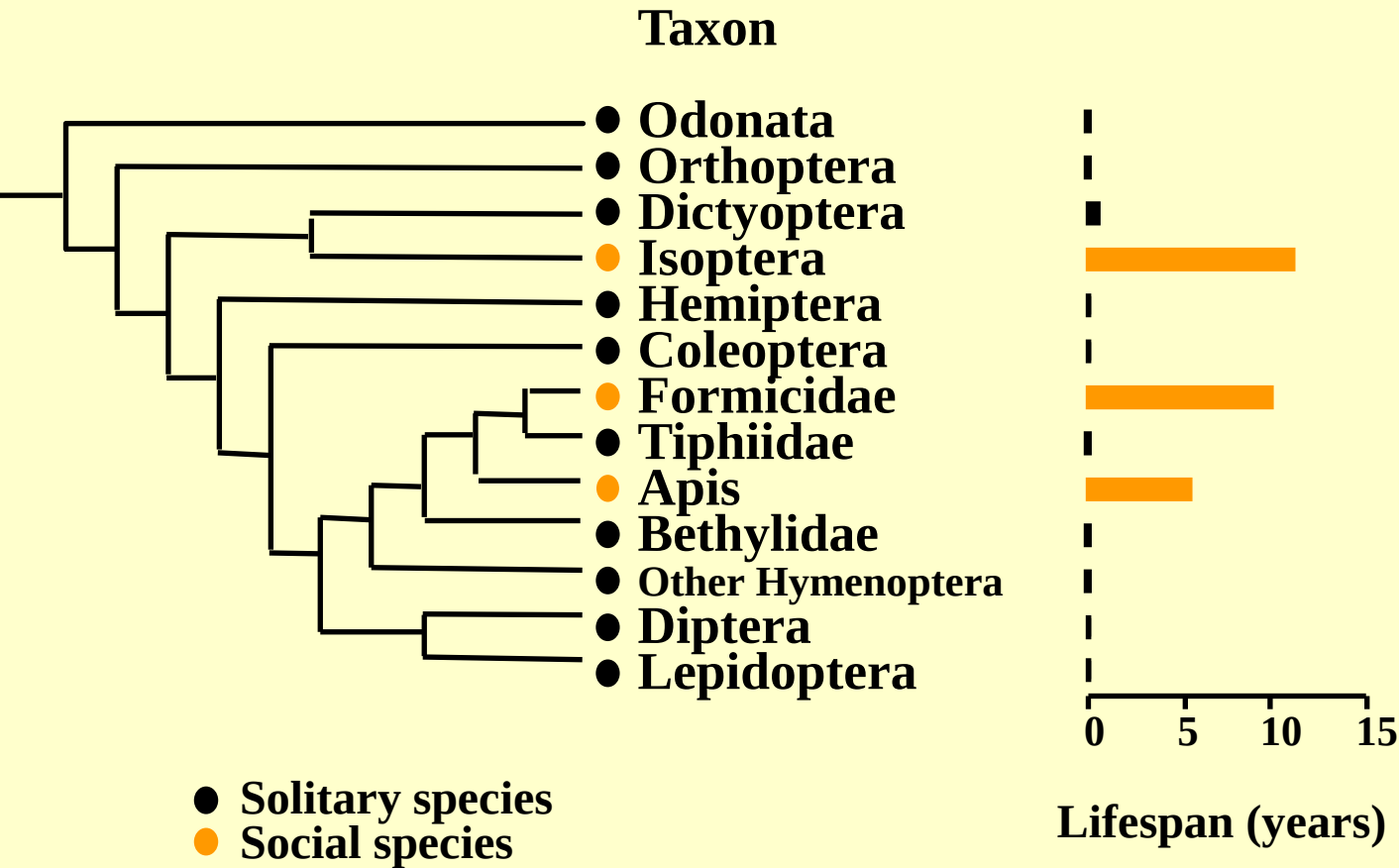
Extended lifespan



Extended lifespan



Social insect queens extremely long-lived



**LONG LIVE
THE QUEEN**

- 100-fold increase in lifespan with emergence of sociality
- Equivalent of a primate living 4'000 years
- 10/20-fold longer than workers

Keller and Genoud *Nature* 1997

Differences?

What are the differences between the two?

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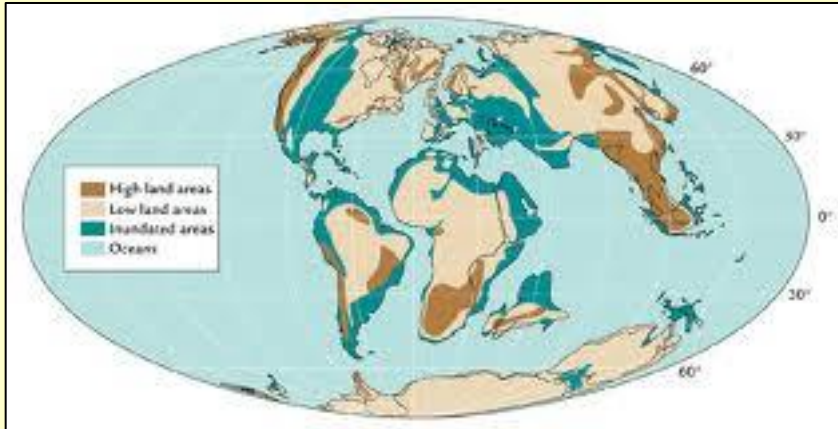
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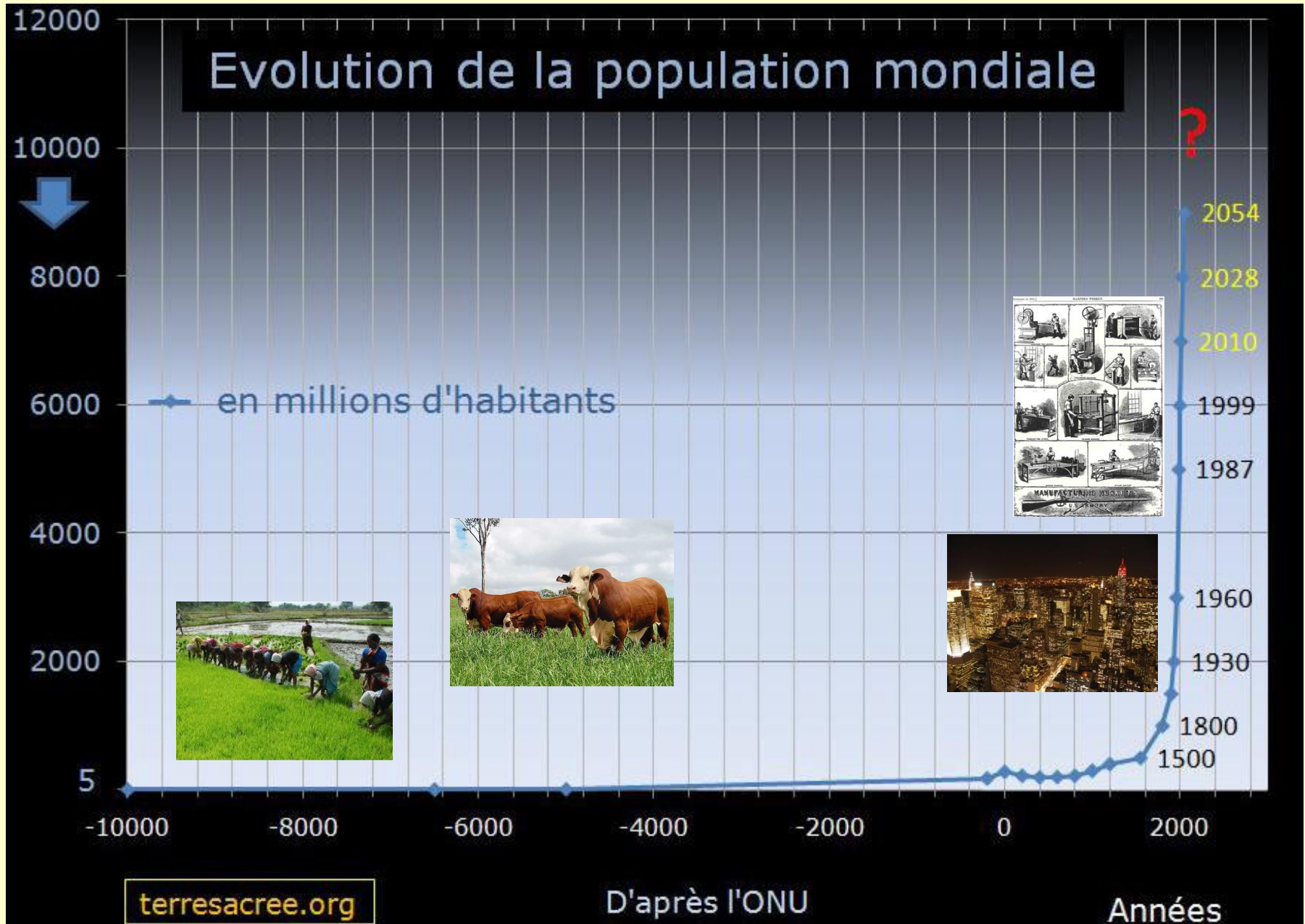
Timescale!!!!!!



- Ants appeared more than 100 millions years ago
- Complexity increased rapidly
- Large colonies since more than 80 million years



Timescale!!!!!!

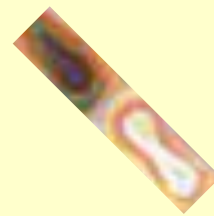


Etude d'une société

- Difficile car il y a beaucoup d'individus qui sont difficiles à tous étudier
- Le comportement collectif est plus que la somme des comportements individuels









Chuck Close



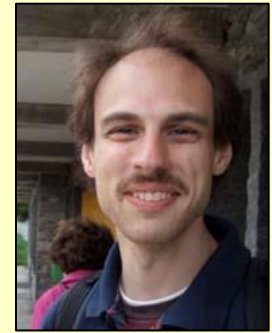
Chuck Close



Social interactions and networks



Danielle Mersch



Alessandro Crespi



Bar code



Tag 37



Tag 4



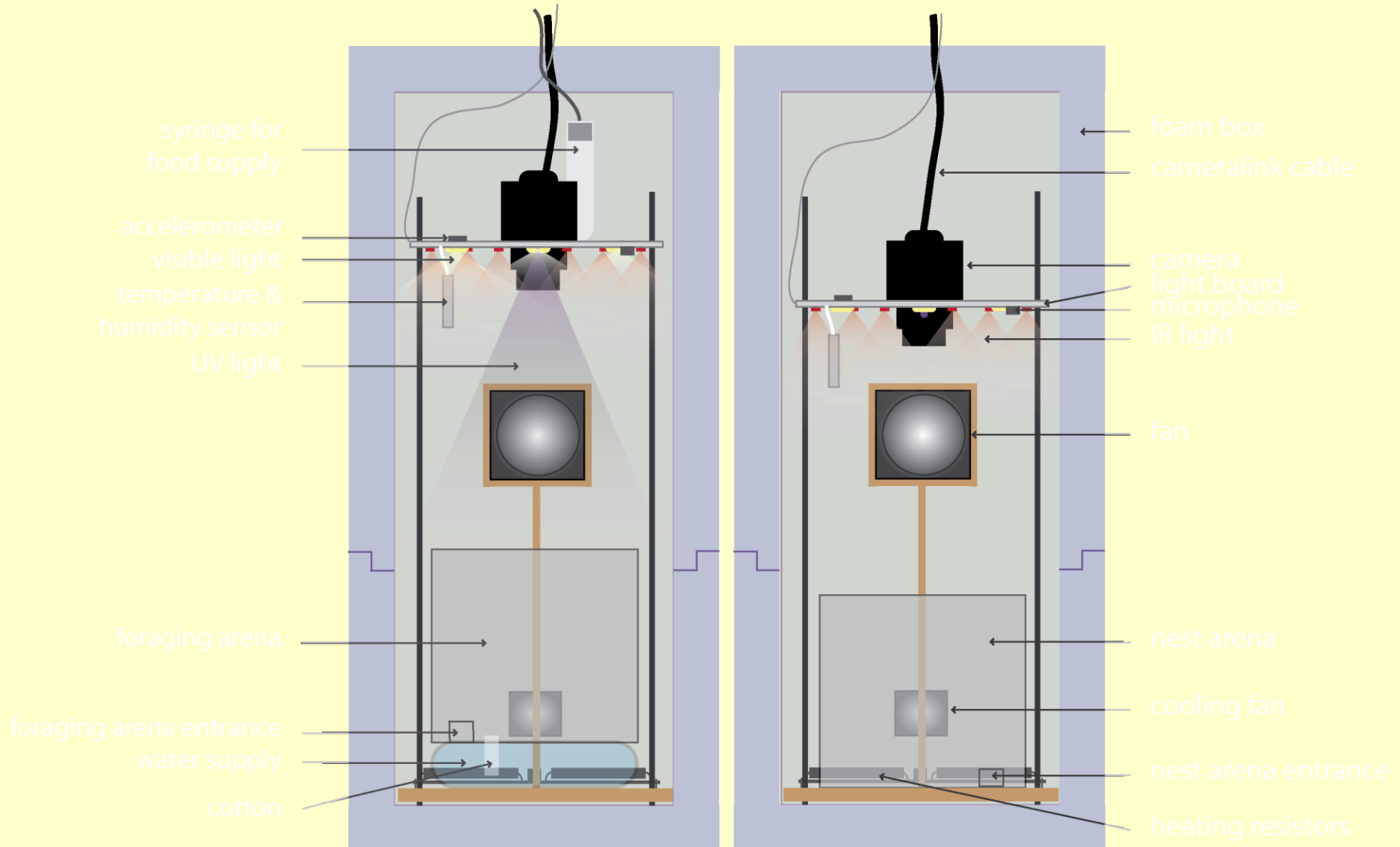
Tag 57



Tag 478



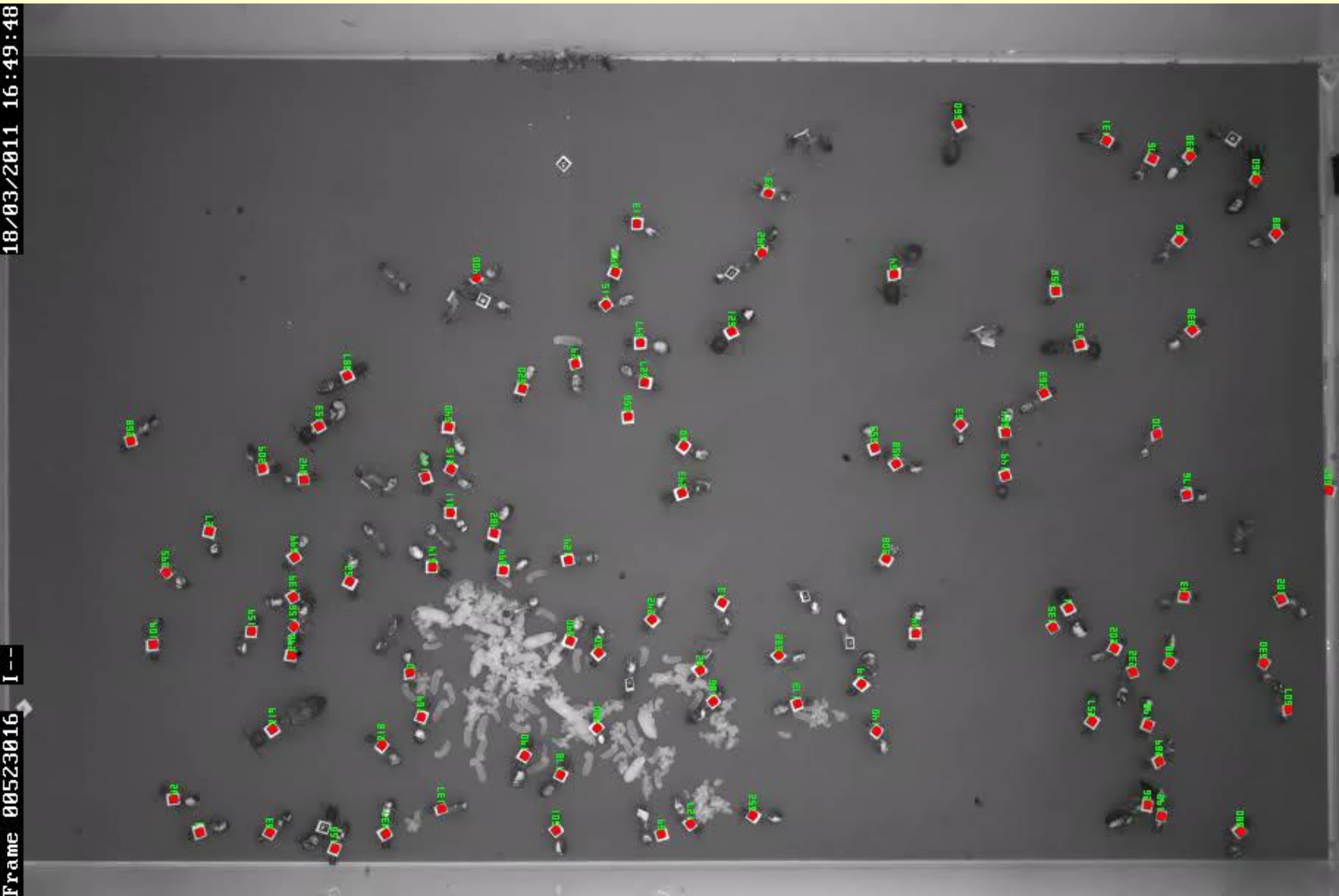
Ants can be followed individually



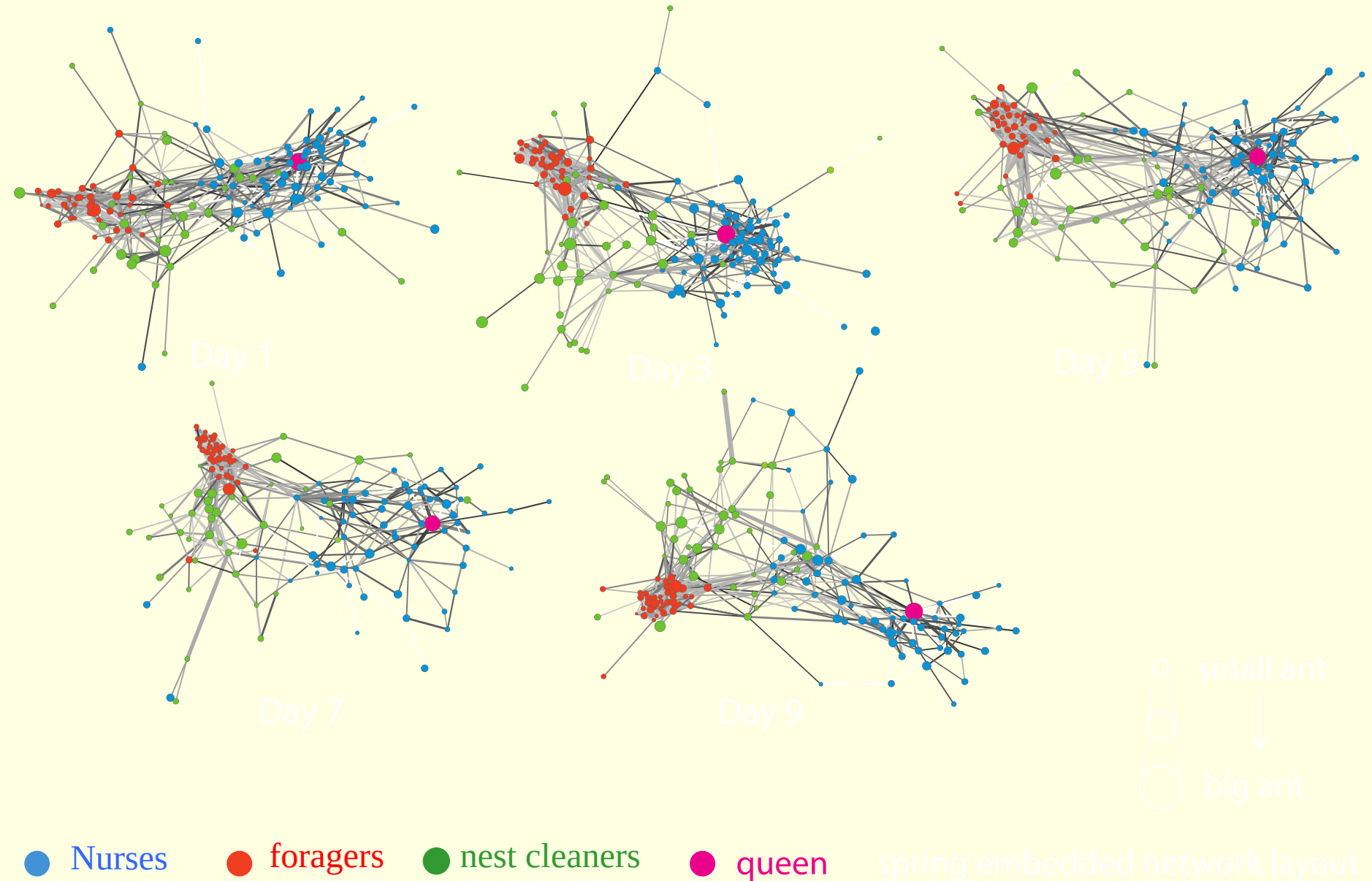
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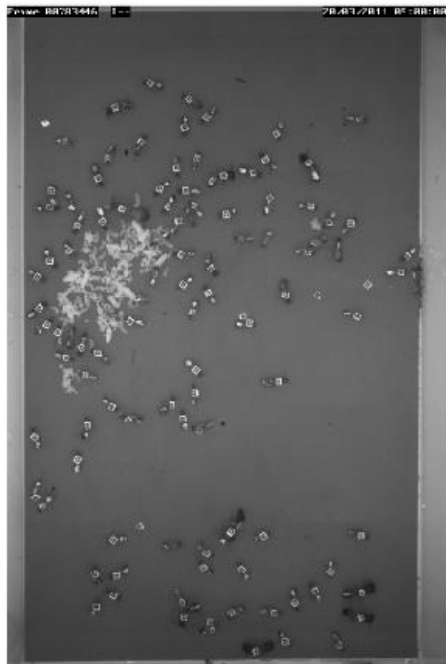
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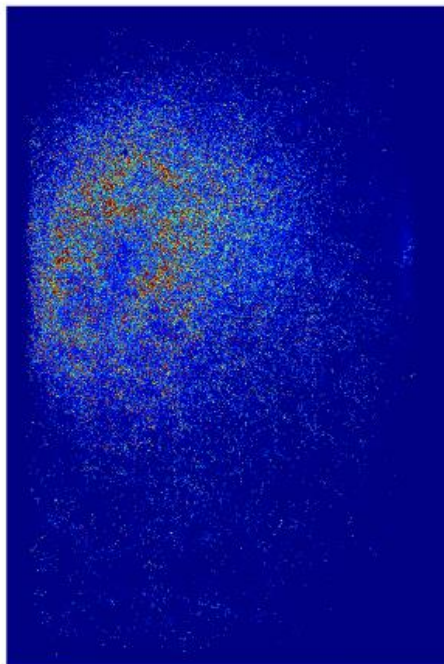
Network interactions



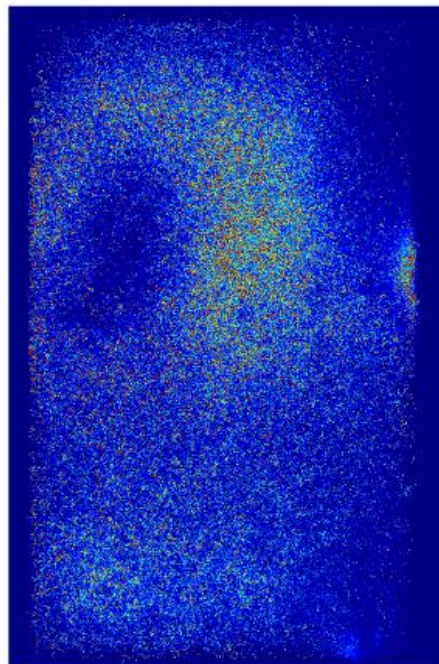
Picture of the nest arena



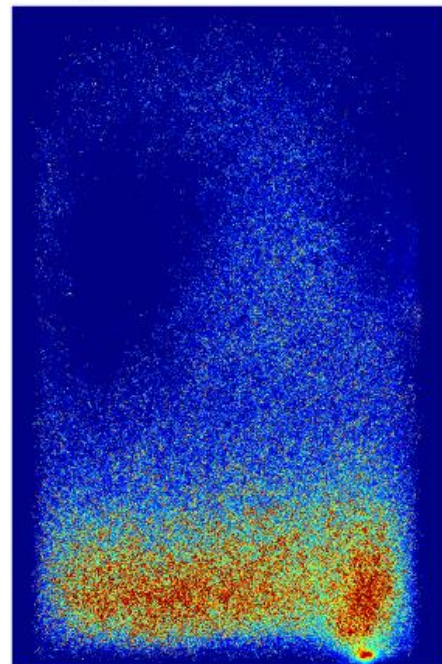
Nurses



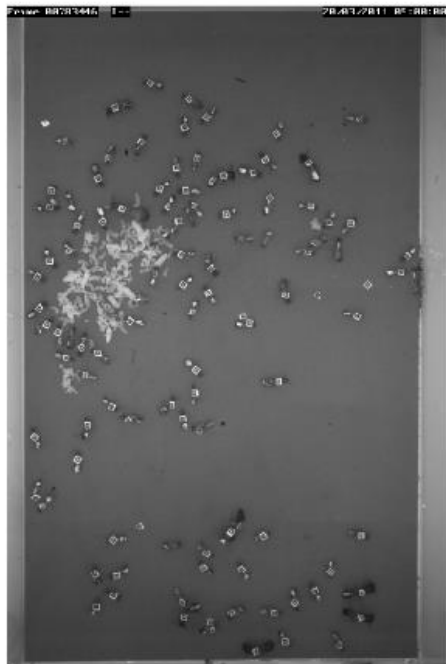
Nest patrollers



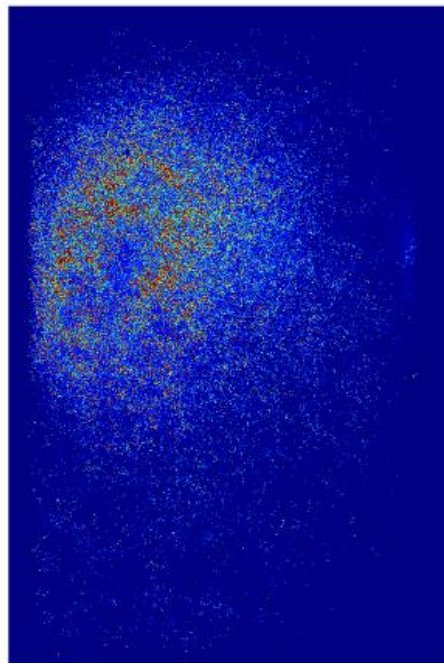
Foragers



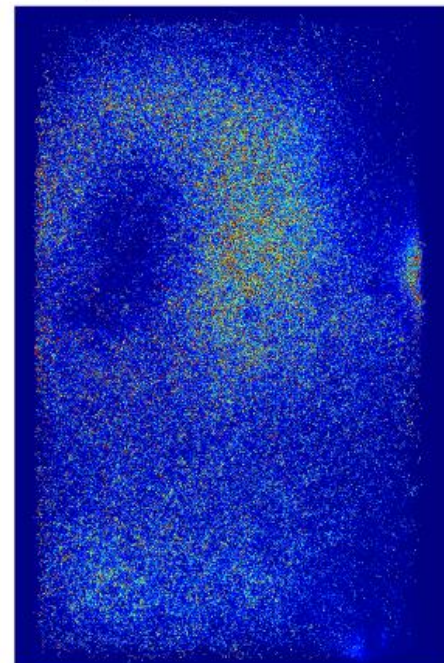
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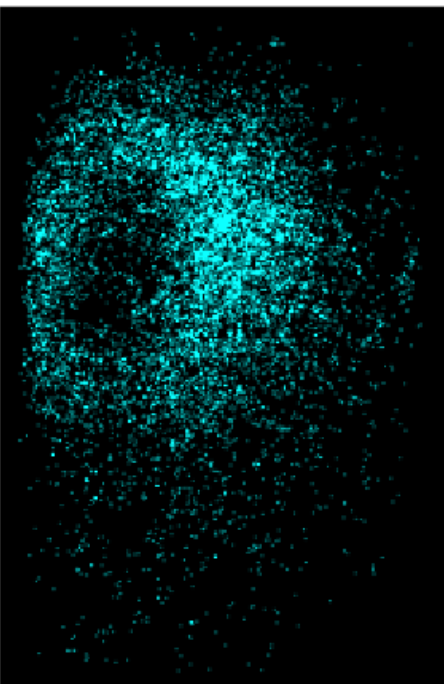
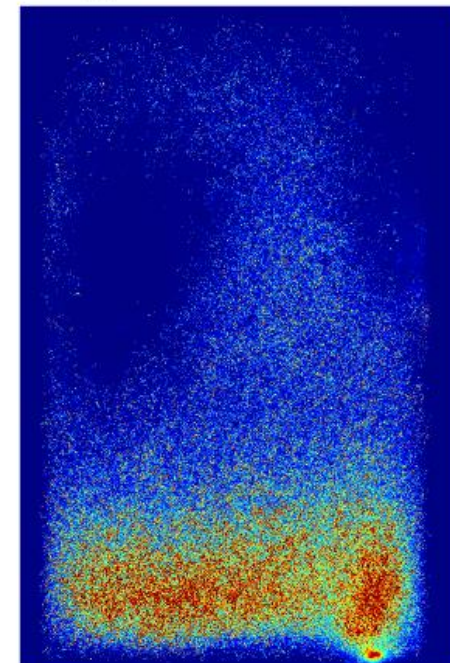
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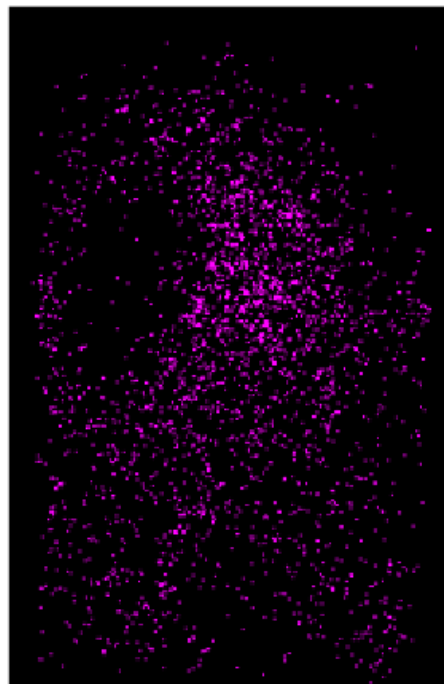
Nest patrollers



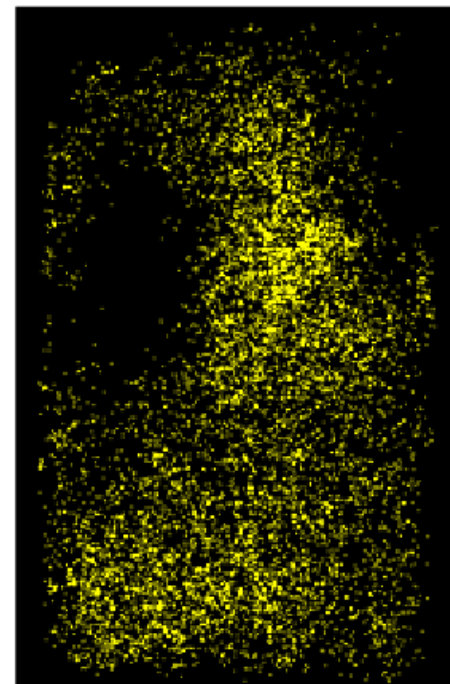
Foragers



Nurses - Nest patrollers



Nurses - Foragers



Nest patrollers-Foragers

Résolution des conflits dans les sociétés



Conflits potentiels

- Reproduction
- Sex ratio
- Népotisme

Guêpe (pas de castes morphologiques)



Hiérarchies avec dominance -> conflit important!

Fourmis (castes morphologiques)



Ouvrières ont perdus la possibilité de se reproduire -> plus de conflit

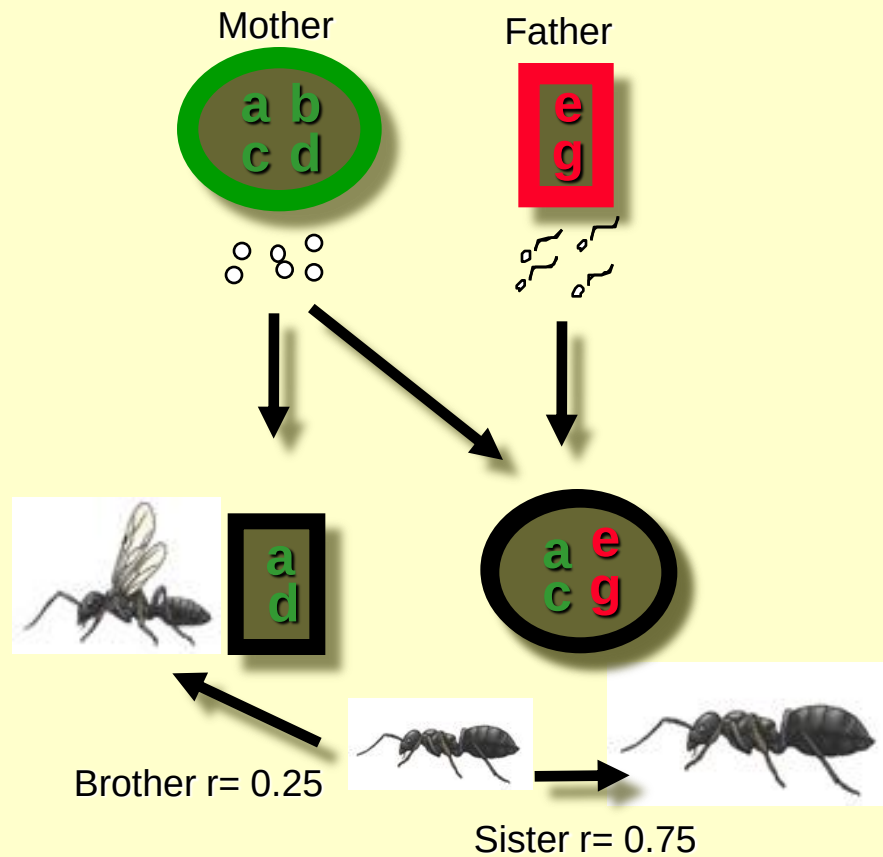
Conflits potentiels

- Reproduction (conflit  au cours de l'évolution)
- Sex ratio
- Népotisme

Sex ratio



Sex ratio



Sex ratio chez *Formica exsecta*



Conflits potentiels

- Reproduction (conflit  au cours de l'évolution)
- Sex ratio (conflit exprimé)
- Népotisme

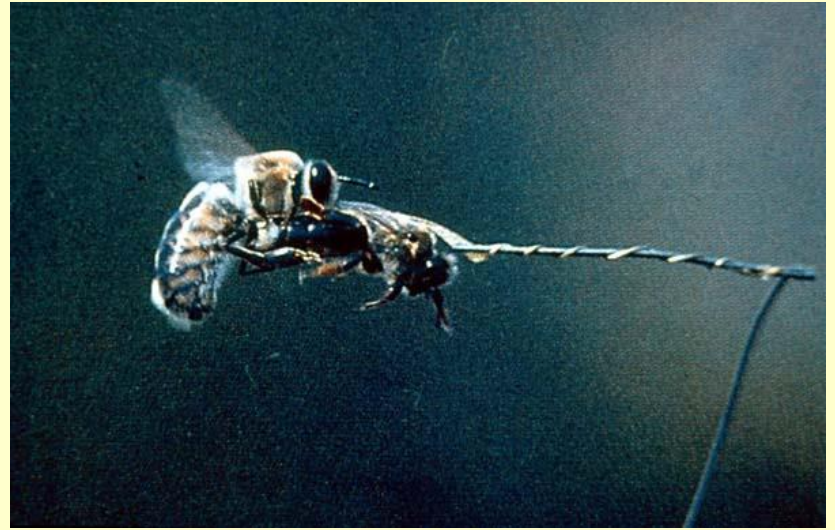
Népotisme



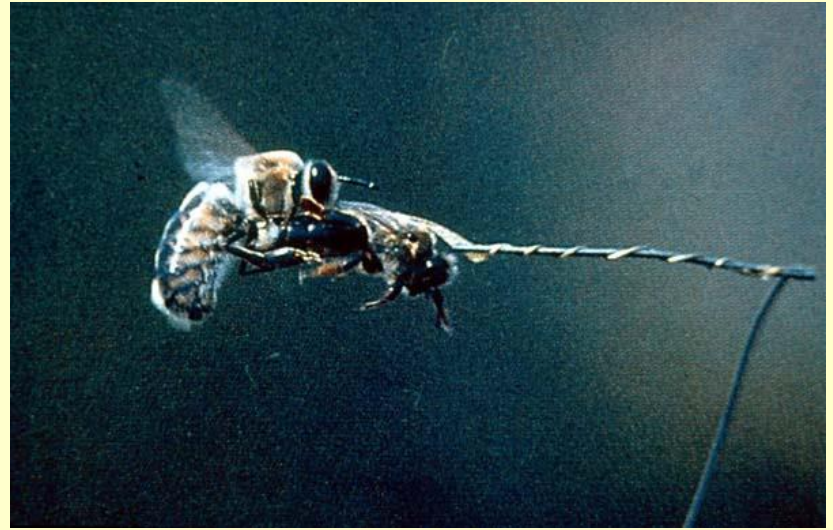
Népotisme



Népotisme



Népotisme



Reines s'accouplent
avec 10-15 males

Népotisme



Pas d'évidence chez les abeilles

Népotisme



Pas d'évidence chez les fourmis

Népotisme

- Népotisme coûteux



- Individus échangent odeur
- Empêche expression du conflit

Conflits potentiels

- Reproduction (conflit  au cours de l'évolution)
- Sex ratio (conflit exprimé)
- Népotisme (conflit non-exprimé)



The end...