

Advantages of selection arena counteract disadvantages of recombination

Manuela Lopez-Villavicencio¹, Fons Debets², Marijke Slakhorst², Tatiana Giraud³ & Sijmen Schoustra²

¹Muséum National d'Histoire Naturelle, Paris, France; ²Wageningen Universiteit, the Netherlands; ³Université Paris-Sud, France

Numerous life-cycles include asexual and sexual reproduction with both self-fertilization and outcrossing

(1) When to self-fertilize and when to outcross?

(2) Why fusion of two identical haploids (no recombination) and go through a costly sexual cycle with a cheap asexual cycle at hand?

We addressed these questions using the filamentous fungus *Aspergillus nidulans*.

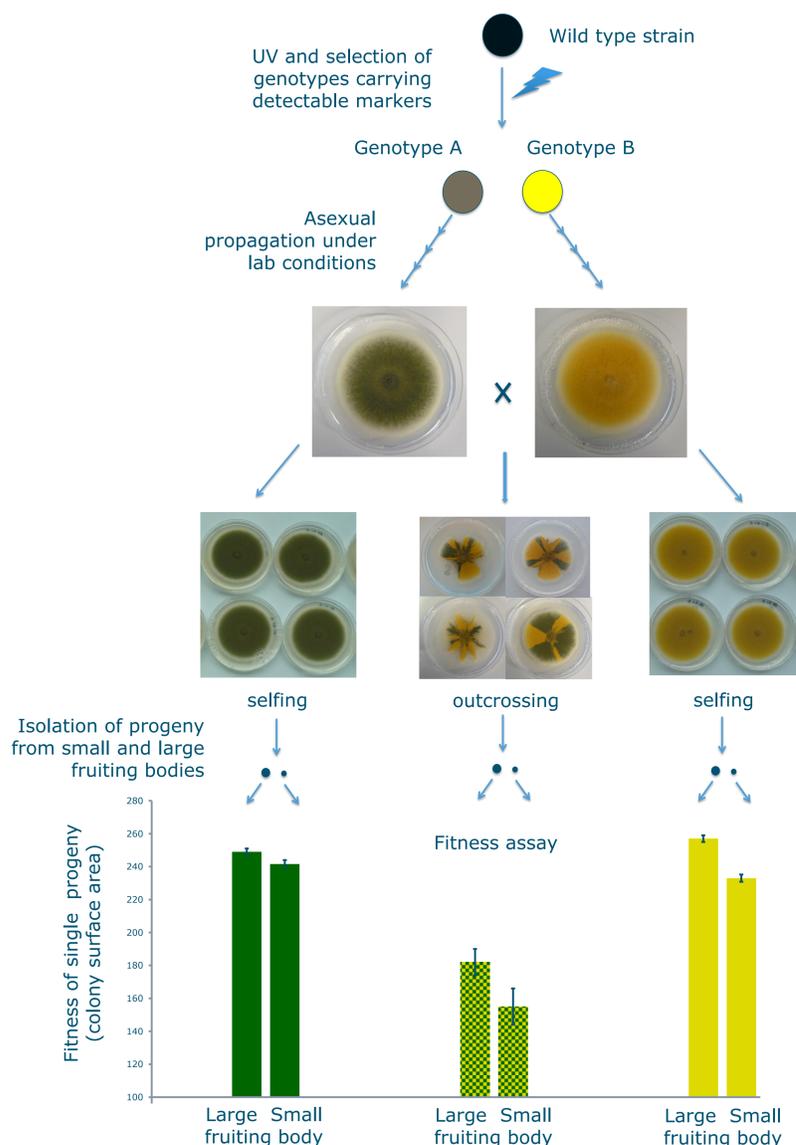
Recombination breaks up favorable gene combinations

(1) Our results show that two fungal strains of *Aspergillus nidulans* with different evolutionary history yield low fitness recombinant progeny.

These two strains limit their rate of outcrossing over self-fertilization. When given the option, only around 12% of all sexually derived fruiting bodies are outcrossed, the vast majority is from self-fertilization (haploid selfing).

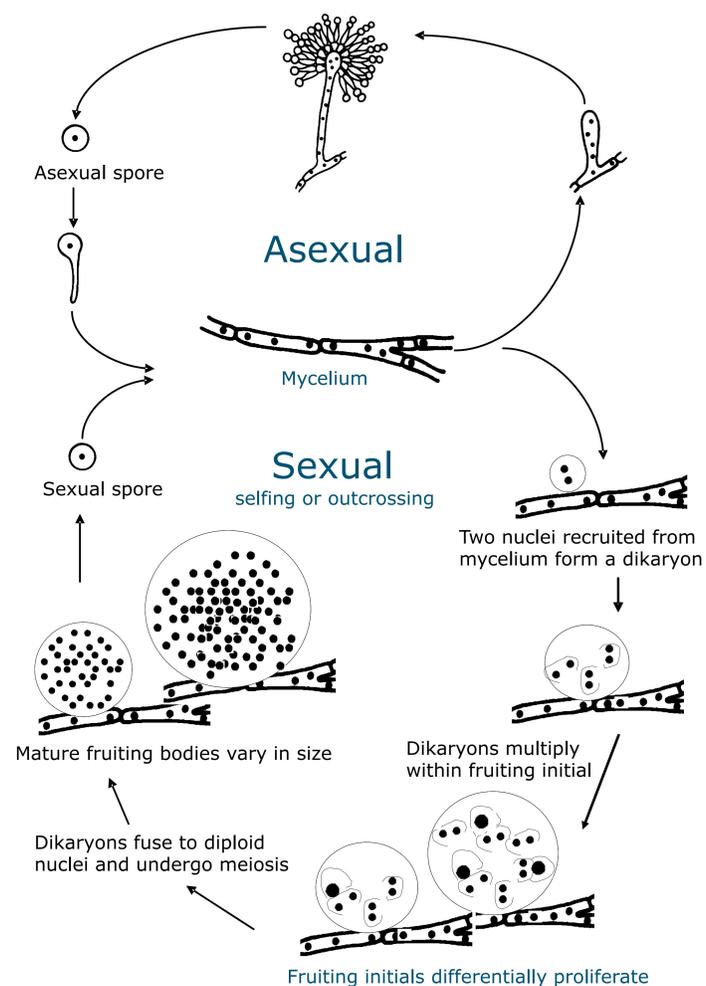
We currently investigate if the rate of outcrossing is a function of fitness of the parental strains.

Experiment



A. nidulans strains A and B that have a different evolutionary history. For their sexual cycle, we allowed them to self-fertilize or outcross. We measured fitness of progeny from self-fertilized as well as outcrossed (single) large and small fruiting bodies. A similar experiment with other strains gave similar results.

Aspergillus nidulans life-cycle



This filamentous fungus can reproduce asexually and sexually. During the sexual cycle, two (identical or different) haploid nuclei from mycelium form a dikaryon. This dikaryon divides within fruiting initials. These fruiting initials proliferate differentially depending on the amount of maternal investment, eventually giving rise to mature fruiting bodies of different size. Under the selection arena hypothesis the maternal tissue invests more in fruiting initials that contain dikaryons of higher genetic quality.

Production of access fruiting initials allows for a selection arena

(2) Numerous fruiting initials are formed during the initial stages of the sexual cycle. Some mature and those that do proliferate to different sizes.

We isolated single progeny from large and small fruiting bodies and assayed their fitness under standardized conditions: the maternal fungal tissue preferentially invests in fruiting initials that contain progeny of high genetic quality (selection arena).

Apparently there is genetic variation to recombine in self-fertilizations (haploid selfing). We are currently estimating the number of mutations present in vegetative mycelium.

We hypothesize that the selection arena is not as functional in the asexual cycle since this cycle is less costly, not allowing for selection on fit progeny.

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Contact:
Sijmen Schoustra
Laboratory of Genetics, Wageningen University
The Netherlands
Sijmen.Schoustra@wur.nl
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