Heterothallism

A condition shown by heterothallic species is called *heterothallism.* **Heterothallic** [species](https://en.wikipedia.org/wiki/Species) have [sexes](https://en.wikipedia.org/wiki/Sex) that reside in different individuals. The term is applied particularly to distinguish heterothallic [fungi](https://en.wikipedia.org/wiki/Fungi), which require two compatible partners to produce sexual spores, from [homothallic](https://en.wikipedia.org/wiki/Homothallic) ones, which are capable of [sexual reproduction](https://en.wikipedia.org/wiki/Sexual_reproduction) from a single organism.

In heterothallic fungi, two different individuals contribute nuclei to form a zygote. Examples of heterothallism are included for *[Saccharomyces cerevisiae](https://en.wikipedia.org/wiki/Saccharomyces_cerevisiae" \o "Saccharomyces cerevisiae), [Aspergillus fumigatus](https://en.wikipedia.org/wiki/Aspergillus_fumigatus" \o "Aspergillus fumigatus), [Aspergillus flavus](https://en.wikipedia.org/wiki/Aspergillus_flavus" \o "Aspergillus flavus)*, *[Penicillium marneffei](https://en.wikipedia.org/wiki/Penicillium_marneffei)* and *[Neurospora crassa](https://en.wikipedia.org/wiki/Neurospora_crassa" \o "Neurospora crassa)*.

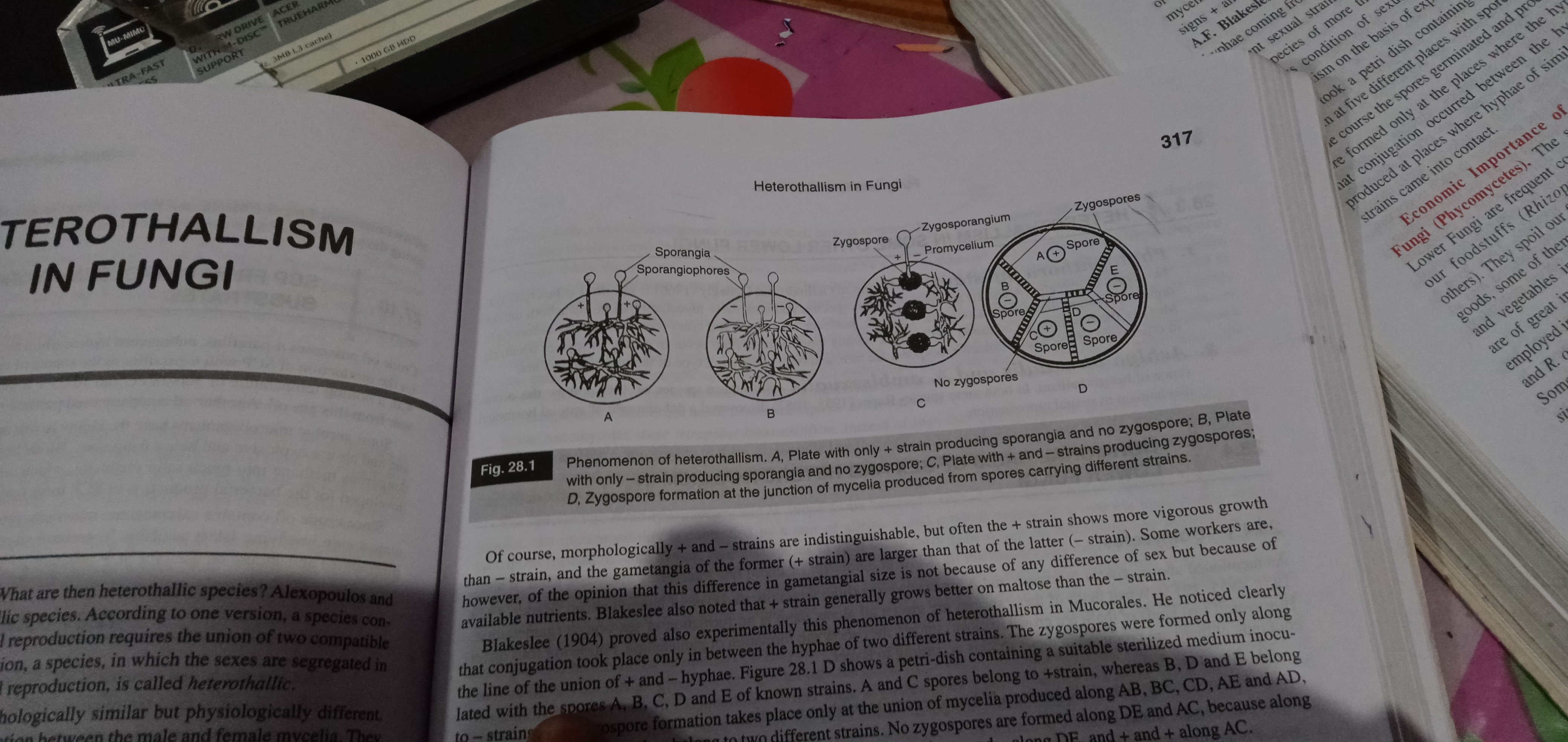
According to Alexopolus and Mims (1979) there are two versions about heterothallic species. According to one version, a species consisting of self –incompatible, which requiring the union of two compatible thalli (mating types), is called heterothallic. According to another version, sexes are segregated in separate thalli, and therefore two different thalli are required for sexual reproduction, is called *heterothallism*

**Heterothallism in Mucorales**

The **Mucorales** is the largest and best studied [order](https://en.wikipedia.org/wiki/Order_(biology)) of [zygomycete](https://en.wikipedia.org/wiki/Zygomycete" \o "Zygomycete) [fungi](https://en.wikipedia.org/wiki/Fungi). Members of this order are sometimes called **pin molds**. Zygomycotina, the name comes from forming special sexual spore is called zygopore.

* **According to Blakeslee (1904) a heterothallic species in Mucorales contains two physiologically and sexually different strains or races. Such races, when grown apart, produce only asexual bodies or sporangia (Fig. 28.1 A, B)**
* **But when they are allowed to come in contact, they fuse and form zygospores (Fig. 28.1 C) along the line of their union.**
* **Blaskeslee named these different strains as + (plus) and – (minus).**

**Blakeslee (1904) proved also experientally this phenomenon of heterothallism in Mucorales. He noticed clearly that conjugation took place only in between the hyphae of two different strains. The zygospore were formed only the line of the union of + and – hyphae. Figure 28.1 D shows a petri dish containing a suitable sterilized medium inoculated with the spores A, B, C,D and E of known strains. A and C spore belong to +strain, whereas B, D, and E belong to – strains. The zygospore formation takes place only at the union of mycelia produced along AB, BC, CD, AE and AD to – strains, because in all cases they belong to two different strains. No zygospores are formed along DE and AC, because along these lines the mycelia strands belong to one and the strain, i.e. – and – along DE, and + and + along AC.**

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**Hormonal basis of sex and heterothallism in lower fungi**

**Oomycetes**

*Achlya bisexualis* and *A. ambisexualis* exhibit a complicated type of heterothallism. When thalli of these species are grown all alone, there is no formation of sex organs (gametangia). However, if two kinds of thalli are grown in close contact, the show the formation of gametangia.

Following four kinds different of thalli are produced in these species according to Raper.

1. Pure male thalli
2. Predominately male thalli having a hidden capacity to produce oogonia.
3. Pure female thalli and
4. Predominantly female thalli having a hidden capacity to produce antherdia.