# GENETIC SYSTEM OF *NEUROSPORA*

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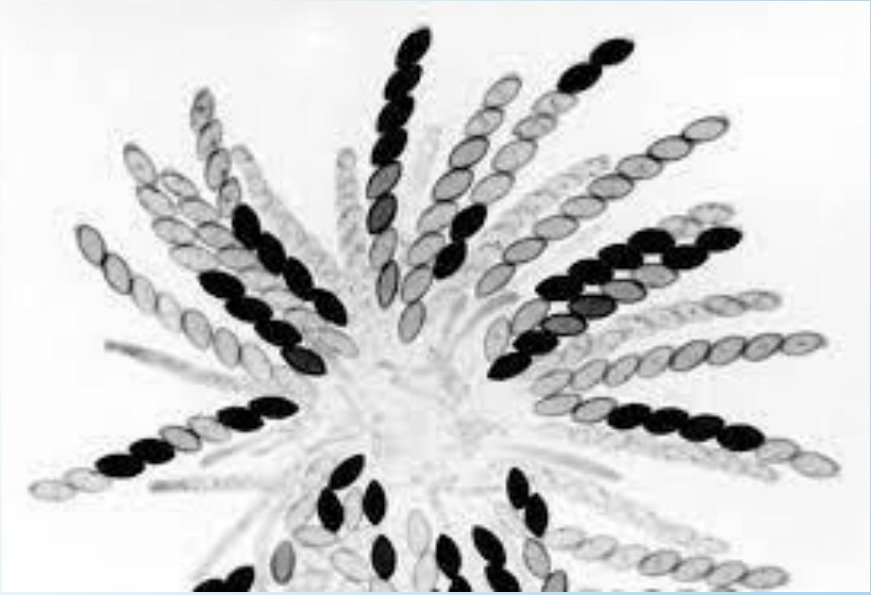
- Organism
- History and Experiments
- Model organism
- Importance of *Neurospora*
- Genome of *Neurospora*
- Genetic study in *Neurospora*

# NEUROSPORA

- Neurospora is the genus of a group of filamentous fungi but the word is most often used as a nickname for the best studied species, N. crassa.
- N. crassa has served as a model eukaryotic organism for nearly a century.
- The name Neurospora apparently came from the nerve-like stripes found on its sexual spores (‘ascospores’)



# NEUROSPORA

| | |
|---|---|
| Domain: | Eukaryota |
| Kingdom: | Fungi |
| Division: | Ascomycota |
| Class: | Sordariomycetes |
| Order: | Sordariales |
| Family: | Sordariaceae |
| Genus: | *Neurospora* |
| Species: | ***N. crassa*** |

# HISTORY

- First documented in 1843 as a contaminant of bakeries in Paris. Neurospora was developed as an experimental organism in the 1920s.
- Subsequent work on Neurospora by Beadle and Tatum in the 1940s established the relationship between genes and proteins, summarized in the ‘one-gene-one-enzyme’ hypothesis.

# NEUROSPORA AS MODEL ORGANISM

- Escherichia coli and yeast ultimately became more popular than Neurospora for studying many basic problems in molecular biology and genetics, Neurospora offers features not found in these and other eukaryotic systems.
- Neurospora's rapid and well-defined sexual cycle, compact genome with small, but cytologically recognizable, chromosomes that can be readily modified using either classical or molecular techniques makes the organism well-suited for genetic studies.
- Neurospora grows fast and is easy to propagate on defined growth media, and because genetic manipulations, such as mutagenesis, complementation tests, and mapping are simple.
- Neurospora is model organism in genetic, biochemical, developmental, and subcellular studies.

# IMPORTANCE OF NEUROSPORA

- Neurospora is a model organism for eukaryotic genetic study with some important feature that lacks in yeast in other organisms.
- The budding yeast, Saccharomyces cerevisiae, has been an invaluable eukaryotic model for studying chromatin structure associated with transcription at euchromatic regions and providing a information of silent chromatin.
- The fission yeast, Schizosaccharomyces pombe has provided invaluable information on the structure and function of heterochromatin, principally found in regions of the centromeres, telomeres, and silent mating-type genes.
- Neurospora has proved to be a remarkably rich source of knowledge that would have been difficult or impossible to gain from other systems.

# GENOME OF NEUROSPORA

- The Neurospora genome is much larger (greater than 40 megabases (Mb)) than that of S. pombe and Saccharomyces cerevisiae (both about 12 Mb).
- A total of 10,082 protein-coding genes (9,200 longer than 100 amino acids) were predicted.
- This constitutes nearly twice as many genes as in S. pombe (about 4,800) and S. cerevisiae (about 6,300), and nearly as many as in D. melanogaster (about 14,300).

# GENETIC AND MOLECULAR STUDY IN NEUROSPORA

- Neurospora has been especially useful for studies of -
  - photobiology,
  - circadian rhythms,
  - population biology,
  - morphogenesis,
  - mitochondrial import,
  - DNA repair and recombination,
  - DNA methylation,
  - gene silencing systems,
  - cytoplasmic streaming

Thankyou