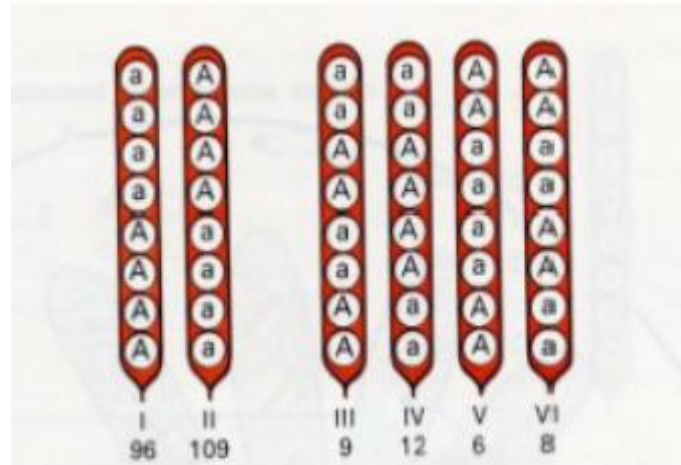


Exercise 01:

In *Neurospora crassa* the conidia (spores) of wild lines are pink (A). Another type of conidium (mutant) called albino (a) are white.

The cross between these two strains (A) x (a) produces the following asci:



- Classify the asci.
- Evaluate the gene-centromere distance.

Solution to the exercise

- Classification of asci:

Asci I and II are pre-reduced asci.

Asci III, IV, V, VI are post-reduced asci.

- Evaluation of the gene- centromere distance:

The following law applies :

$$R\% = \text{Distance (gène- centromère)} = \frac{\text{Nb d'asques post-réduits}/2}{\text{Totale des asques}} \times 100$$

$$D (\text{gene-centromere}) = \frac{(9+12+6+8)}{2} \times 100 = 7.29 \text{ cM}$$

Exercise 2

Consider the crossing of an auxotrophic strain for methionine (met) of sign a by a wild strain

A. Classify the asci produced and conclude (distance between a and met).

Asque 1	Asque 2	Asque 3
a met	a met	a +
a met	a +	a +
A +	A met	A met
A +	A +	A met
140	68	4

Solution to exercise 2

Classification of tetrads:

Ascus 1: DP

Ascus 2: T

Asque 3: DR

Conclusion

DP > DR so the genes are linked.

Calculation of distance between the two genes:

The following law applies:

$$D/ \text{gène-gène} = \frac{\sum \text{DR} + \sum \text{T}/2}{\text{Totale (DR + DP+ T)}} \times 100$$

$$D(\text{ met , a})= \frac{4+ 68/2}{140+68+4} \times 100 = 17.92 \text{ cM}$$

Exercise 3

We mix a strain of E.coli K12 Hfr carrying the markers (T+ L +) : power to synthesize threonine and leucine, (T1s): sensitive to phage T1, (Lac+): fermenting lactose, (Gal +):

fermenting galactose, (Strs): sensitive streptomycin and an F- strain carrying the markers (TL-), (T1r), (Lac-), (Gal-), and (Strr). Conjugation is stopped at the times indicated opposite and samples are plated for each time on media that allow screening of recombinants. The results are:

10 min: (T+L+) (Gal-) (Lac-) (Strr) (T1r)

15 min: (T+L+) (Gal-) (Lac-) (Strr) (T1s)

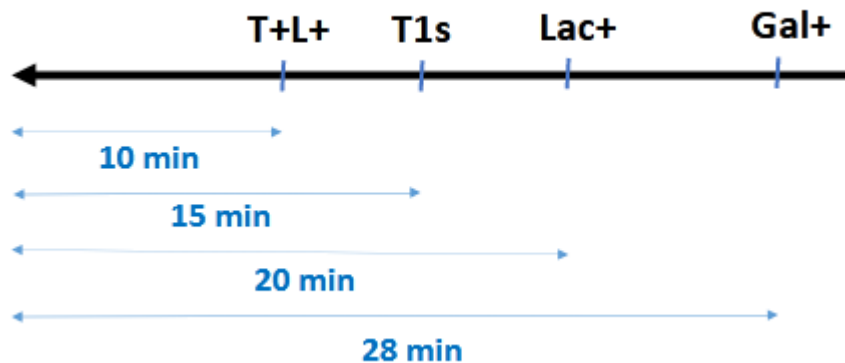
20 min: (T+L+) (Gal-) (Lac+) (Strr) (T1s)

28 min: (T+L+) (Gal+) (Lac+) (Strr) (T1s)

Determine the order of genes (T+L+) (Gal+) (Lac+) (T1s).

Answer to exercise 3

The order of genes:



Exercise 4

Hfr strains transfer a series of genetic markers in the order shown below:

Strain 1: QWDMT

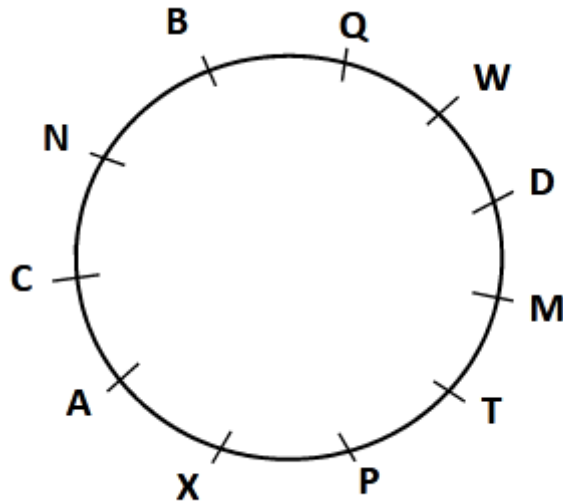
Strain 2: AXPTM

Strain 3: BNCAX

Strain 4: BQWDM

All these Hfr strains are derived from the same F⁺ strain, what is the order of the markers on the circular chromosome of the original F⁺?

Answer to exercise 4



Exercise 5

In a Hfr XF⁻ cross, leu⁺ is the first marker to enter, but the order of the other markers is unknown. If the Hfr strain is wild-type and the F⁻ auxotrophic for all markers considered, what is the order of the markers in a cross where among the selected leu⁺ recombinants, 27% are ile⁺, 13% mal⁺, 82% thr⁺, and 1% trp⁺?

Answer to exercise 4

