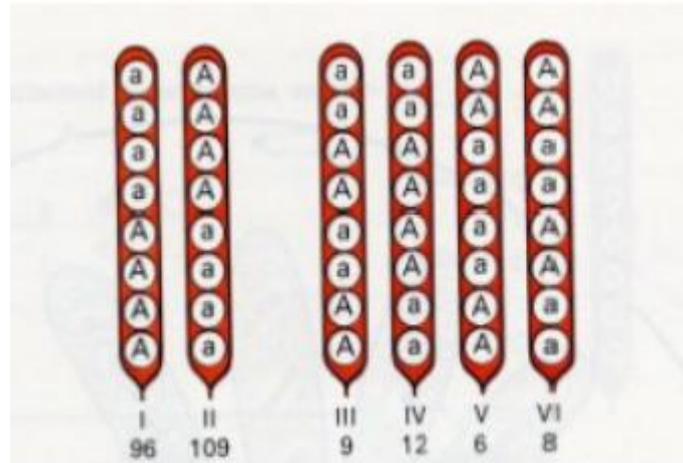


**Exercise 01:**

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:

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

D( 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)

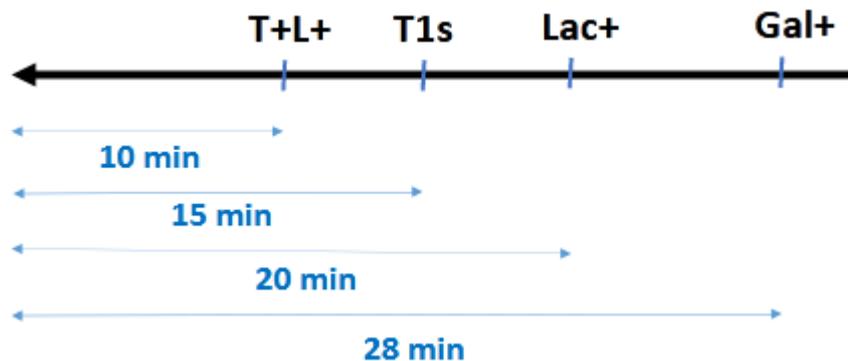
20 min: (T+L+) (Gal-) (Lac+) ( Strr ) (T1s)

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**

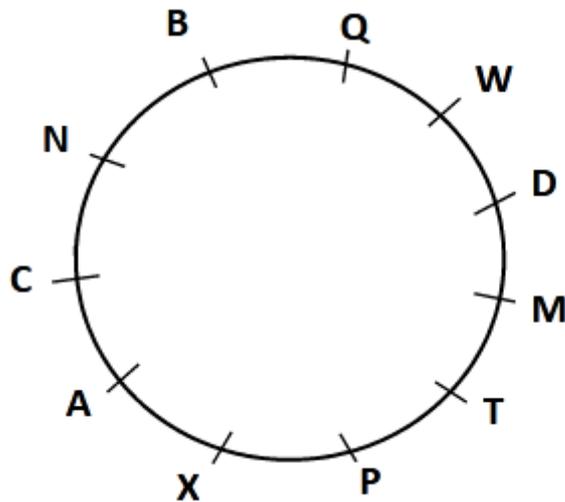
**Strain 2: AXPTM**

**Strain 3: BNCA X**

**Strain 4: BQWDM**

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

**Answer to exercise 4**



**Exercise 5**

In a Hfr XF<sup>-</sup> cross, leu<sup>+</sup> 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<sup>-</sup> auxotrophic for all markers considered, what is the order of the markers in a cross where among the selected leu<sup>+</sup> recombinants, 27% are ile<sup>+</sup>, 13% mal<sup>+</sup>, 82% thr<sup>+</sup>, and 1% trp<sup>+</sup>?

**Answer to exercise 4**

