LAC OPERON REGULATORY MUTANTS

	uninduced			induced		
	Z	Y	A	Z	Y	A
$I^+ O^+ Z^+ Y^+ A^+$	<.1	<1	<1	100	100	100
$I^- O^+ Z^+ Y^+ A^+$	100	100	100	100	100	100
$I^+ O^c Z^+ Y^+ A^+$	25	25	25	100	100	100
$I^+_{p\downarrow} O^+ Z^+ Y^+ A^+$	<.1	<1	<1	6	6	5
$I^+ O^+ Z^p Y^+ A^+$	<.1	<1	<1	<.1	18	11

Figure 12.5

A

lacp

+1

−35 −10

O_3

−82

O_1

+11

O_2

+401

B

−35 TTTAT

−10

O_3

O_1

Figure 12.4

Absence of lactose

lacl   *lacp* *lacO* *lacZ* *lacY* *lacA*

OFF

LacI

Presence of lactose

lacl   *lacp* *lacO* *lacZ* *lacY* *lacA*

RNA Pol

ON

LacI

Allolactose
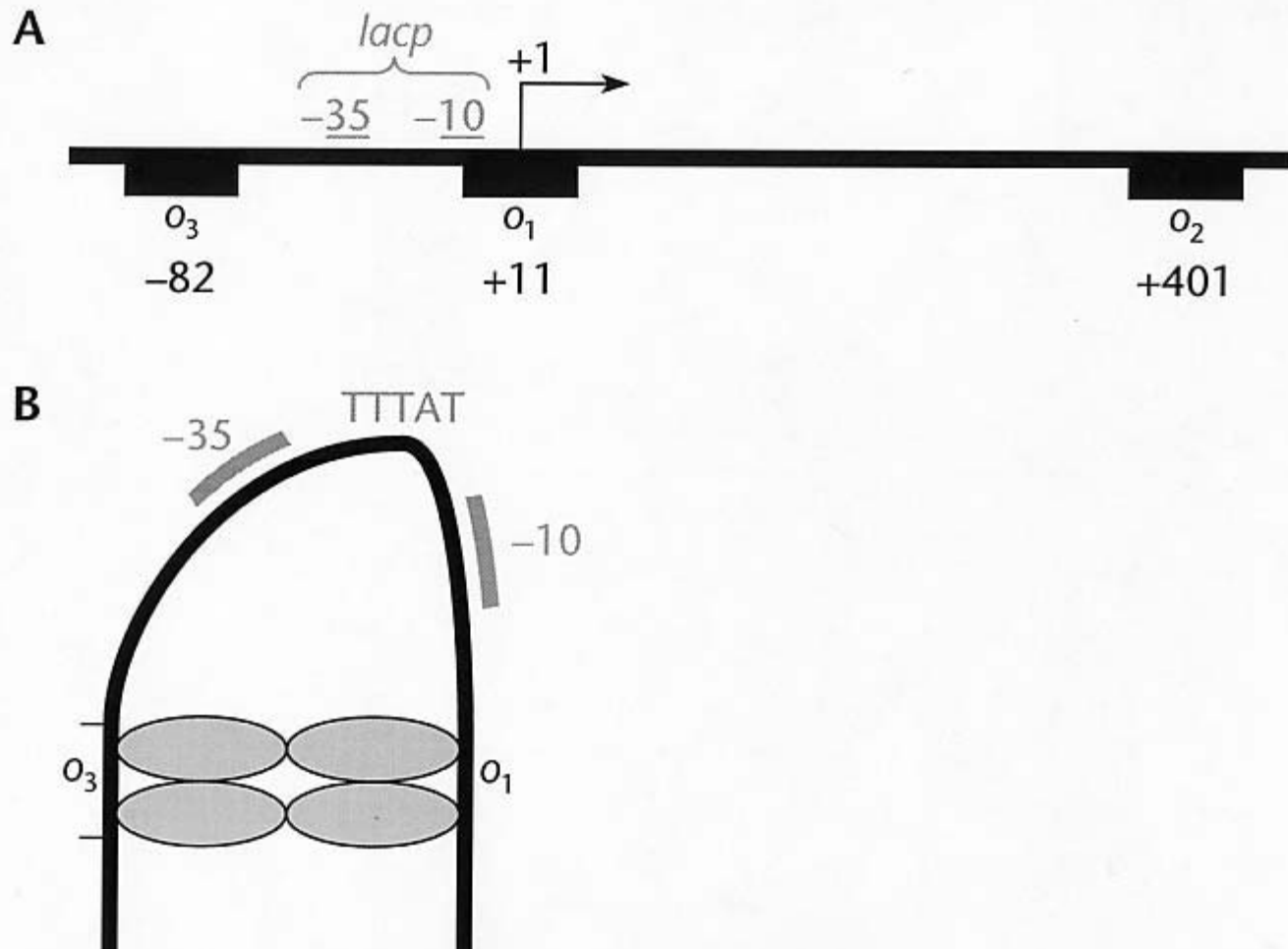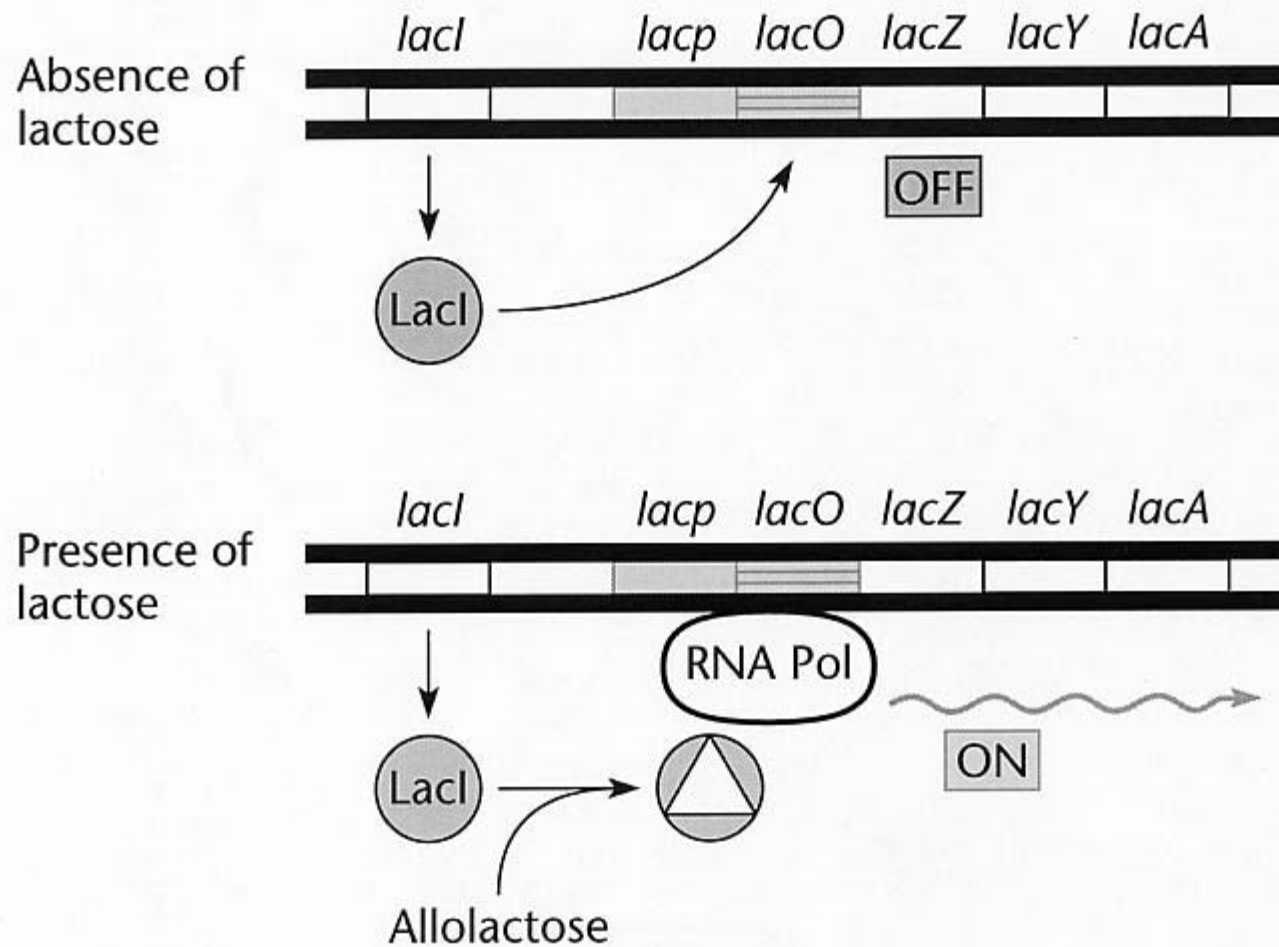
Table 12.1

TABLE 12.1	Genetic behavior of *lac* mutations	
Mutation	**Inducibility**	**Complementation behavior**
lacZ	Noninducible	Recessive; *trans*-acting
lacI	Constitutive	Recessive; *trans*-acting
lacI^s	Noninducible	Dominant; *trans*-acting
lacI^{-d}	Constitutive	Dominant; *trans*-acting
lacI^q	Inducible[a]	Dominant; *trans*-acting
lacO^c	Constitutive	Dominant; *cis*-acting
lacP	Noninducible	Recessive; *cis*-acting

[a] Tighter on-off control.

Figure 12.3

A   Merodiploid
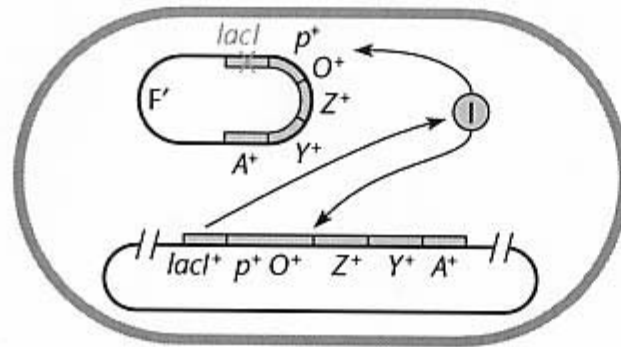
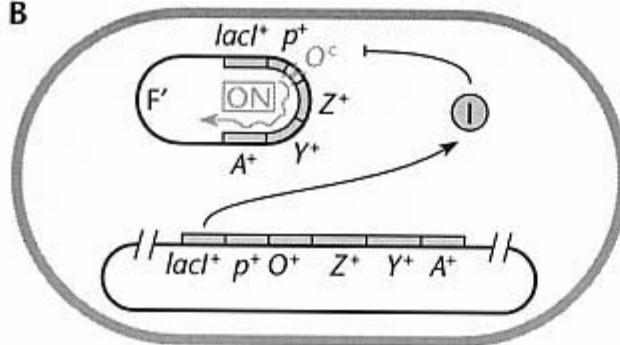Phenotype

Lac⁺ inducible

Interpretation

lacI is recessive

B

Lac constitutive
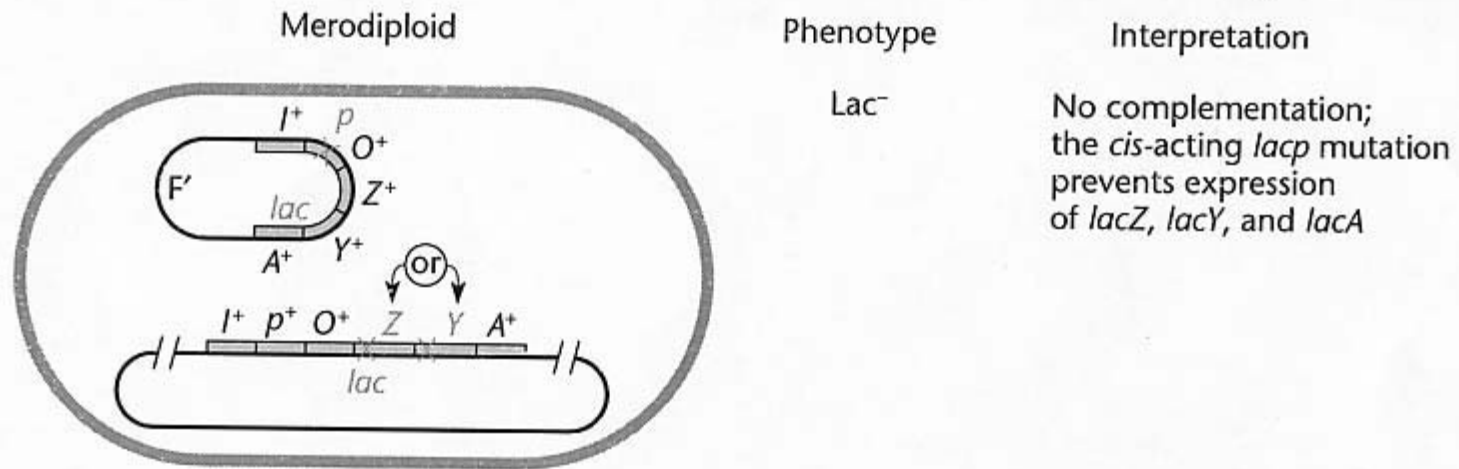
lacOᶜ is dominant
and *cis* acting

Figure 12.2

Merodiploid	Phenotype	Interpretation
	Lac⁻	No complementation; the *cis*-acting *lacp* mutation prevents expression of *lacZ*, *lacY*, and *lacA*

Figure 12.6

RNA polymerase interaction region

CAP-binding site

Repressor-binding site

TTTACA

TATGTT

ACTCGCGTTGCGTTAATTACACTCAATCGAGTGAGTAATCCGTCGGGTCCGAAATGTGAAATACGAAGGCCCAGCATACAACACACCTTAACACTCGCCTATTGTTAAAGTGTGTCCTTTGTCGATACTGGTAC

Stop

-35 region

-10 region

+1

fMet Thr Met

mRNA start site

→ lacI

P

o₁

lacZ →

Repressor coding region   -80   -70   -60   -50   -40   -30   -20   -10   +1   +10   +20

Promoter

Operator

β-Galactosidase coding region