Table 8.1

TABLE 8.1 Some λ gene products and their function

Gene product	Function
N	Antitermination protein acting at t_L^1, t_R^1, and t_R^2
O, P	Initiation of λ DNA replication
Q	Antitermination protein acting at t_R'
CI	Repressor; protein inhibitor of transcription from p_L and p_R
CII	Activator of transcription of cI and *int*
CIII	Stabilizer of CII
Cro	Protein inhibitor of CI synthesis
Gam	Protein required for rolling-circle replication
Red	Proteins involved in λ recombination
Int	Integrase; protein required for site-specific recombination with chromosome
Xis	Excisase; protein forms complex with Int and functions in excision of prophage

Table 8.2

TABLE 8.2 Some sites involved in phage λ transcription and replication[a]

Sites	Function
p_L	Left promoter
p_R, p_R'	Right promoters
o_L	Operator for leftward transcription; binding sites for CI and Cro repressors
o_R	Operator for rightward transcription; binding sites for CI and Cro repressors
t_L^1, t_L^2	Termination sites of leftward transcription
t_R^1, t_R^2, t_R'	Termination sites of rightward transcription
nutL	N utilization site for leftward transcribing RNA Pol (i.e., the site at which N binds to RNA Pol)
nutR	N utilization site for rightward transcribing RNA Pol
qut	Q utilization site for antitermination at p_R'
p_{RE}	Promoter for repressor establishment; activated by CII
p_{RM}	Promoter for repressor maintenance; activated by CI
p_I	Promoter for *int* transcription; activated by CII
POP′	Attachment site (*attλ*)
cos	Cohesive ends of λ genome (12-bp single-stranded ends in linear genome anneal to form circular genome after infection)

[a]In λ, essential genes have single-letter names while nonessential genes have more conventional three-letter names.

Figure 8.1

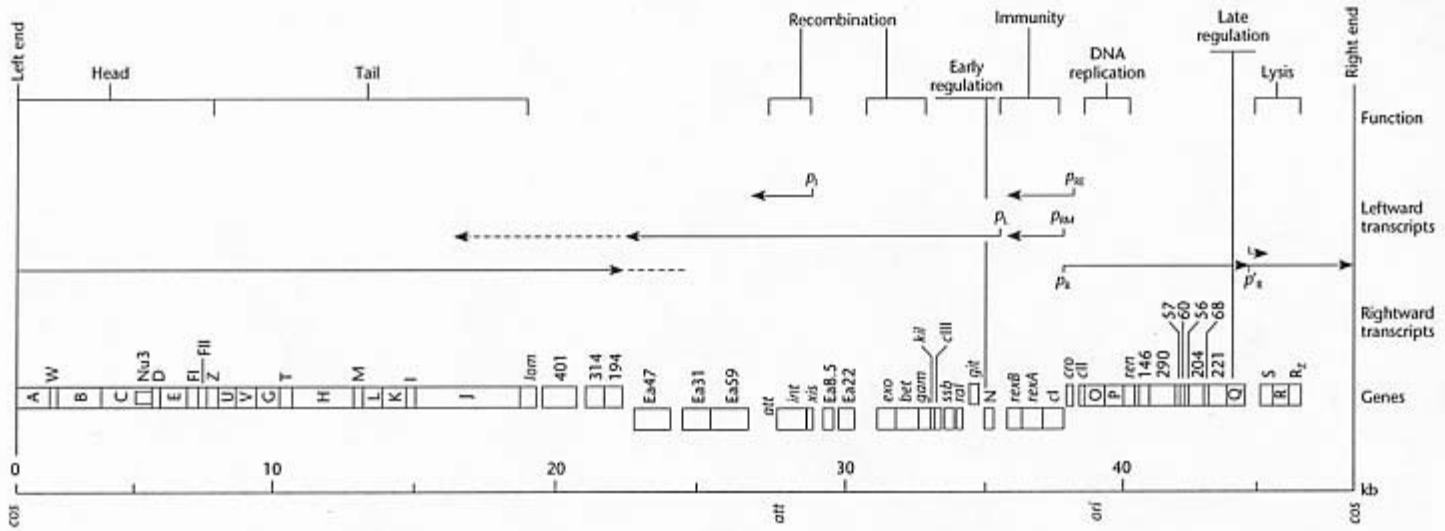

Left end
Head
Tail
Recombination
Early regulation
Immunity
DNA replication
Late regulation
Lysis
Right end
Function
Leftward transcripts
Rightward transcripts
Genes
kb
0
10
20
30
40
cos
att
ori
cos

Figure 8.2

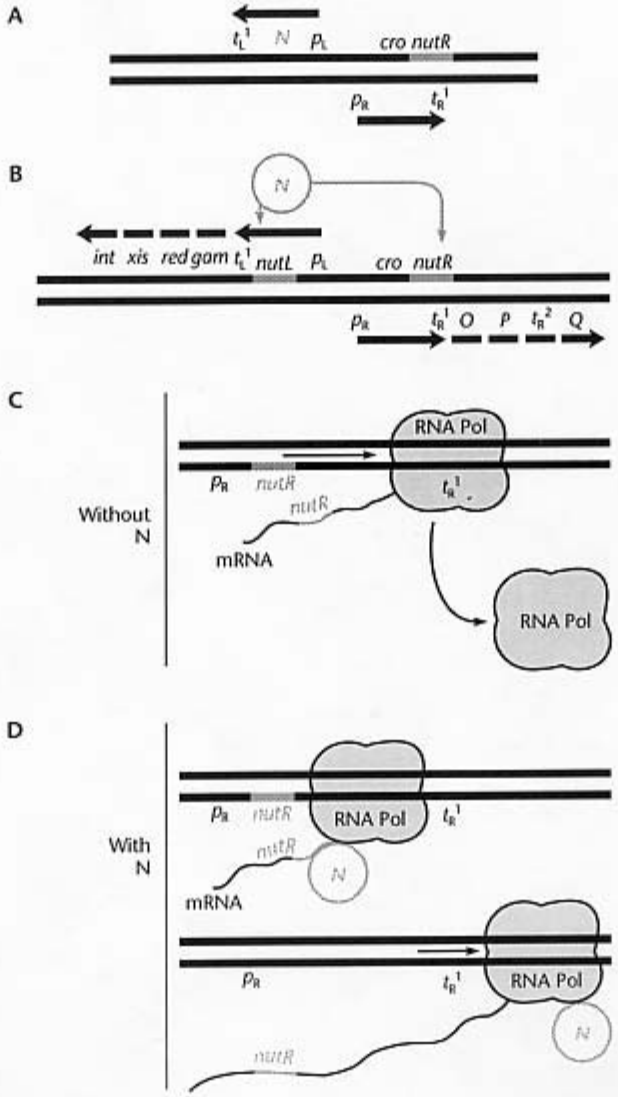

A
t_L^1 N P_L cro nutR
P_R t_R^1
B
N
int xis red gam t_L^1 nutL P_L cro nutR
P_R t_R^1 O P t_R^2 Q
C
Without N
RNA Pol
P_R nutR
nutR
t_R^1
mRNA
RNA Pol
D
With N
P_R nutR
RNA Pol
t_R^1
nutR
N
mRNA
P_R
t_R^1
RNA Pol
N
nutR

Figure 8.3

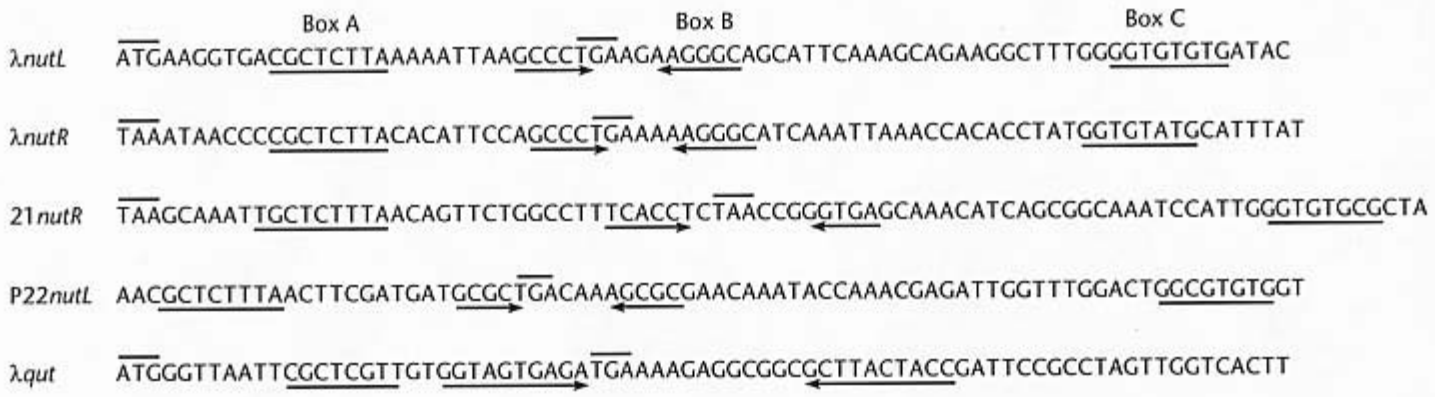

Box A
Box B
Box C
λnutL ATGAAGGTGACGCTCTTAAAAATTAAGCCCTGAAGAAGGGCAGCATTCAAAGCAGAAGGCTTTGGGGTGTGTGATAC
λnutR TAAATAACCCCGCTCTTACACATTCCAGCCCTGAAAAAGGGCATCAAATTAAACCACACCTATGGTGTATGCATTTAT
21nutR TAAGCAAATTGCTCTTTAACAGTTCTGGCCTTTCACCTCTAACCGGGTGAGCAAACATCAGCGGCAAATCCATTGGGTGTGCGCTA
P22nutL AACGCTCTTTAACTTCGATGATGCGCTGACAAAGCGCGAACAAATACCAAACGAGATTGGTTTGGACTGGCGTGTGGT
λqut ATGGGTTAATTCGCTCGTTGTGGTAGTGAGATGAAAAGAGGCGGCGCTTACTACCGATTCCGCCTAGTTGGTCACTT

Figure 8.4

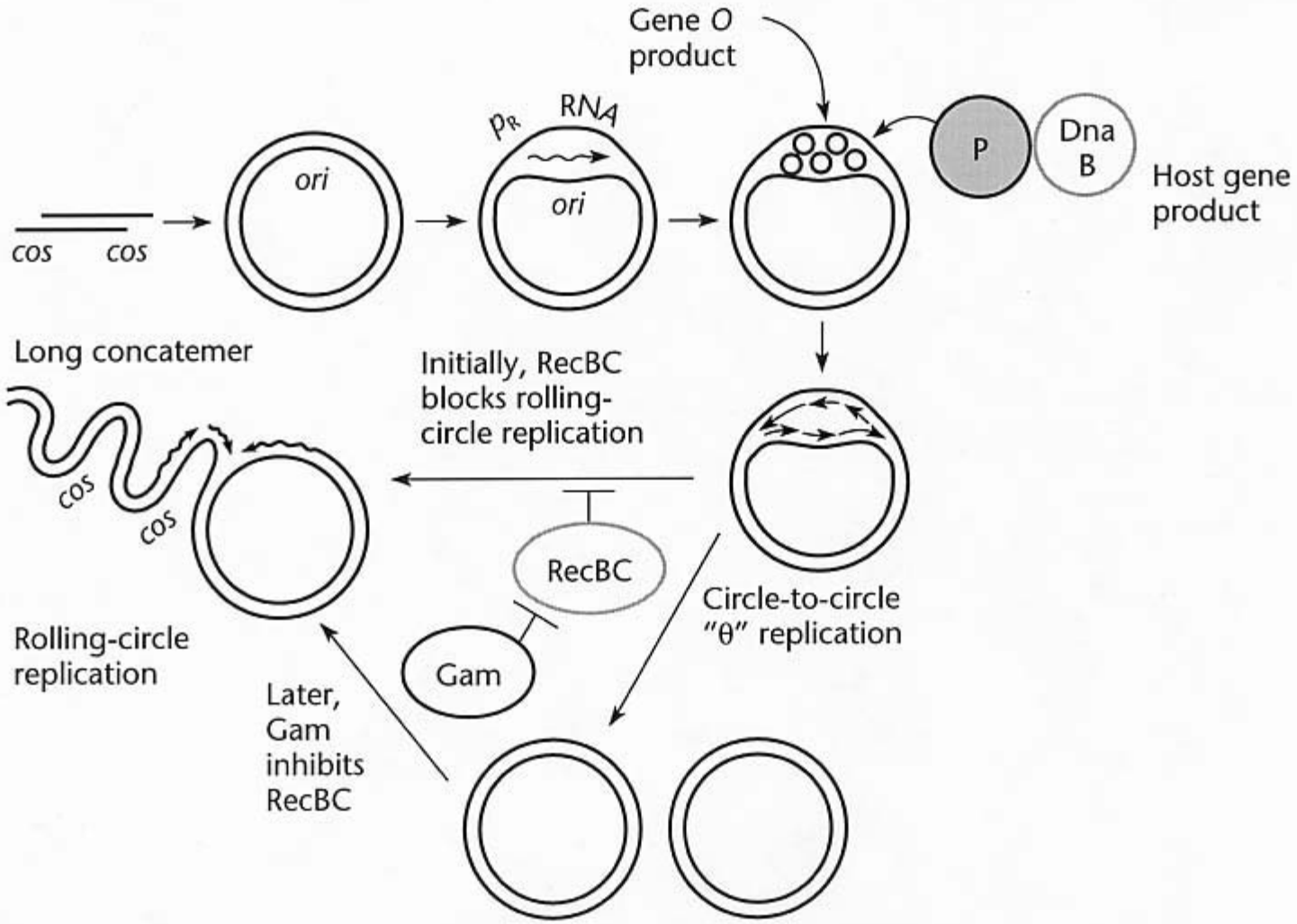

Gene O product
P
Dna B
Host gene product
p_R
RNA
ori
ori
cos
cos
Long concatemer
Initially, RecBC blocks rolling-circle replication
cos
cos
RecBC
Gam
Rolling-circle replication
Circle-to-circle "θ" replication
Later, Gam inhibits RecBC

Figure 8.5

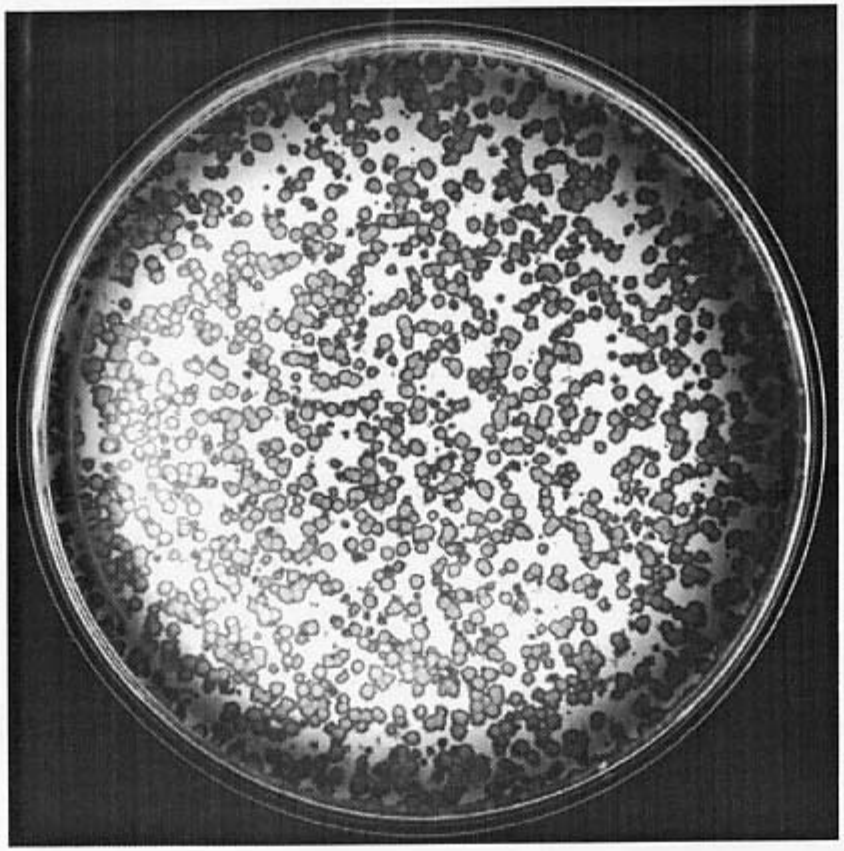


Figure 8.6

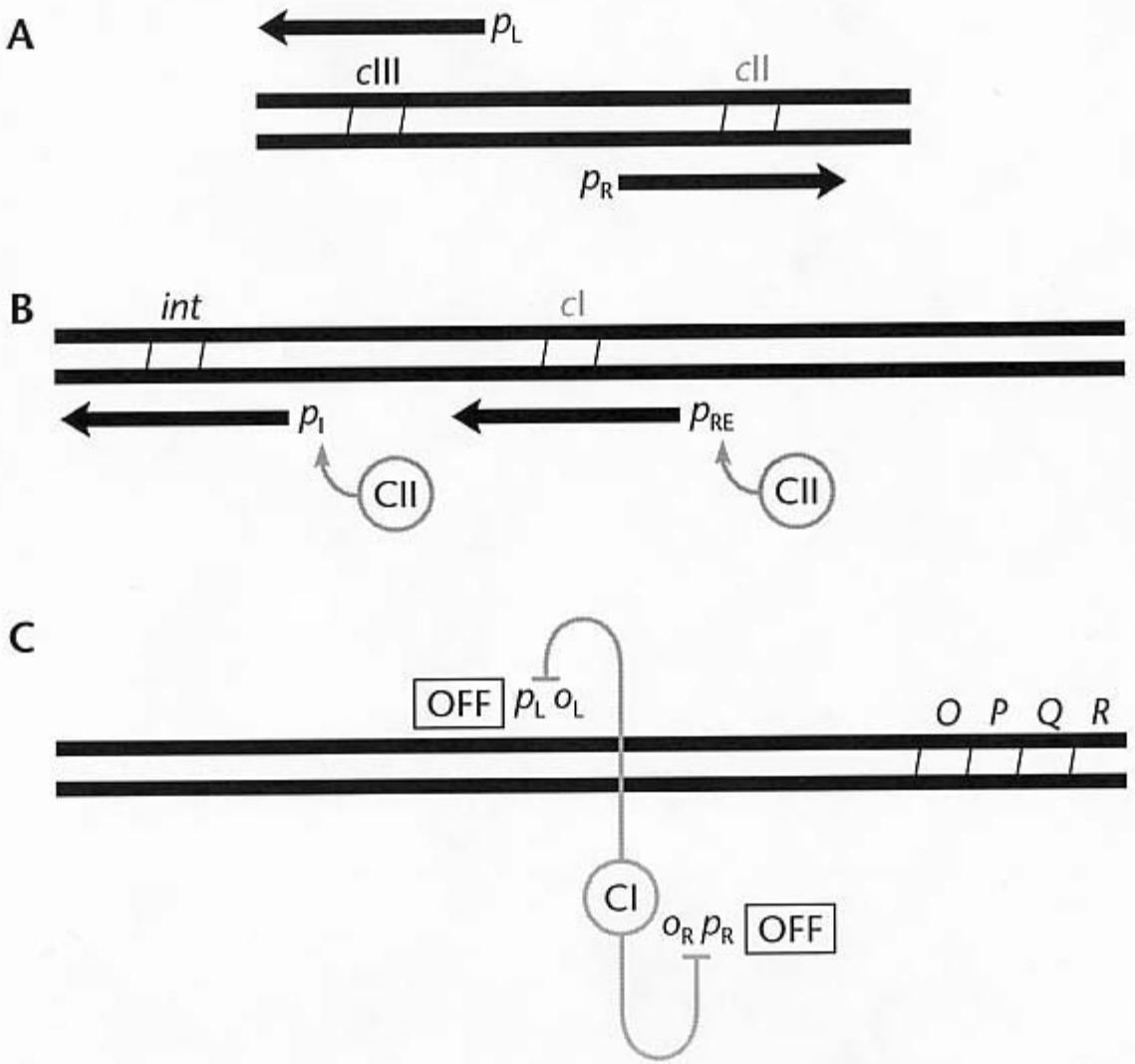
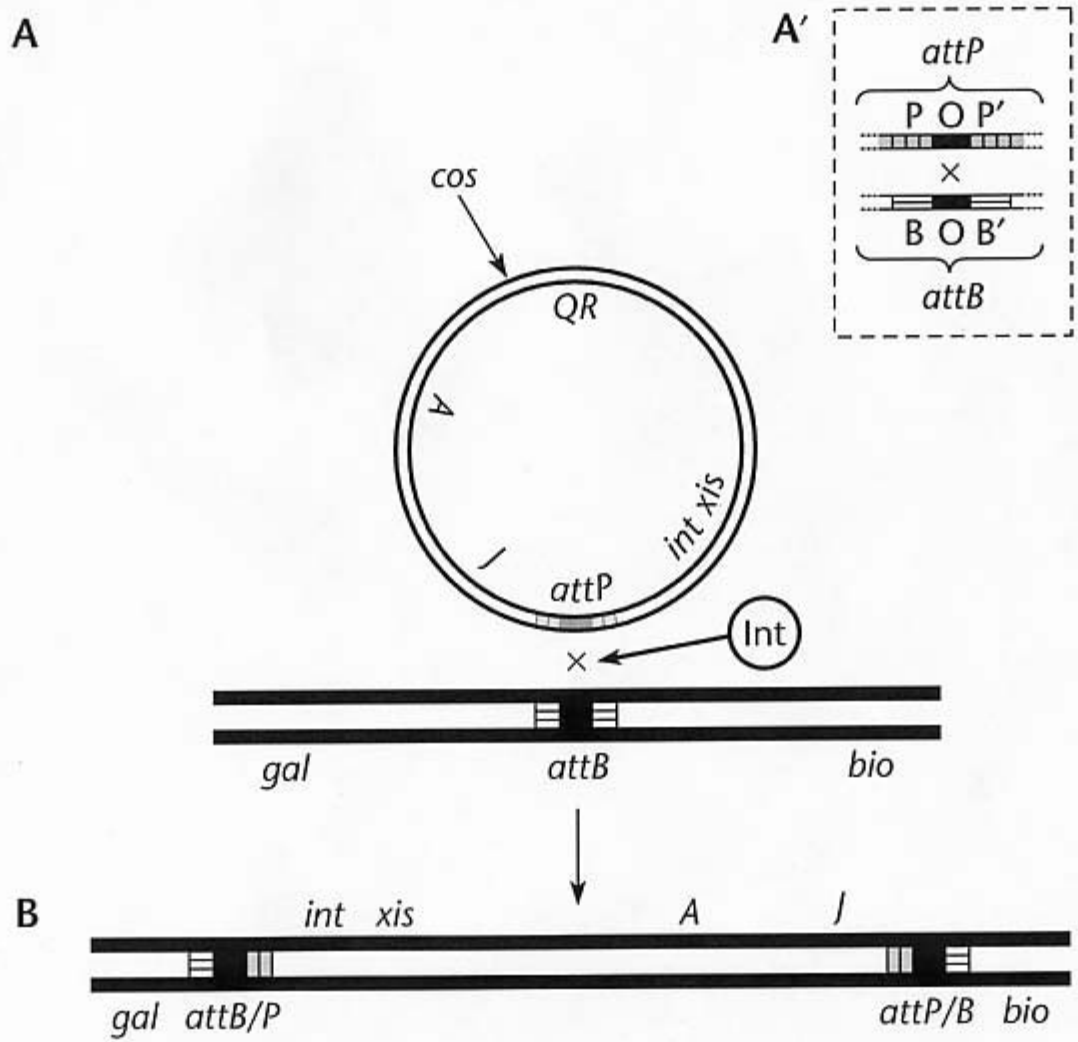

A
p_L
cIII
cII
p_R
B
int
cI
p_I
p_{RE}
CII
CII
C
OFF
p_L o_L
O P Q R
CI
o_R p_R
OFF

Figure 8.7


A
A′
attP
P O P′
×
B O B′
attB
cos
QR
A
int xis
J
attP
Int
×
gal
attB
bio
B
int xis
A
J
gal attB/P
attP/B bio