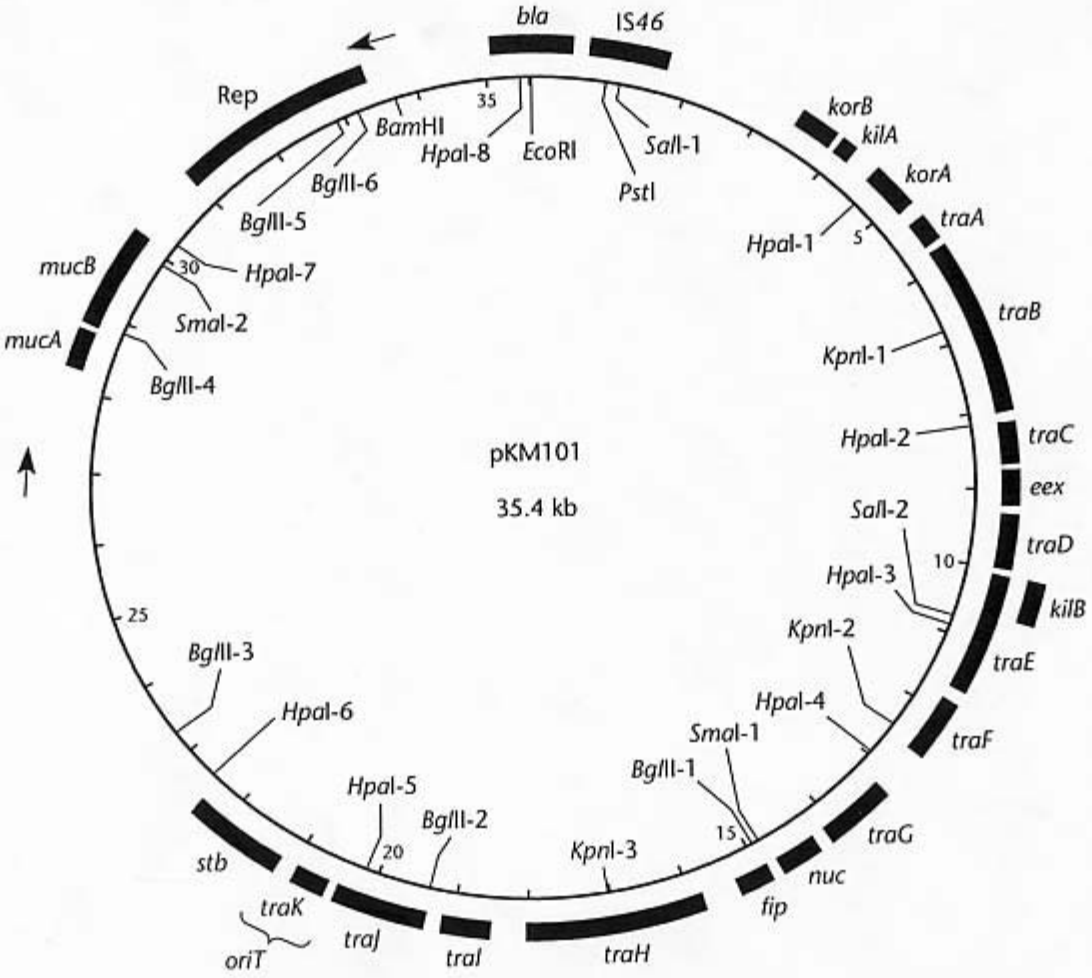
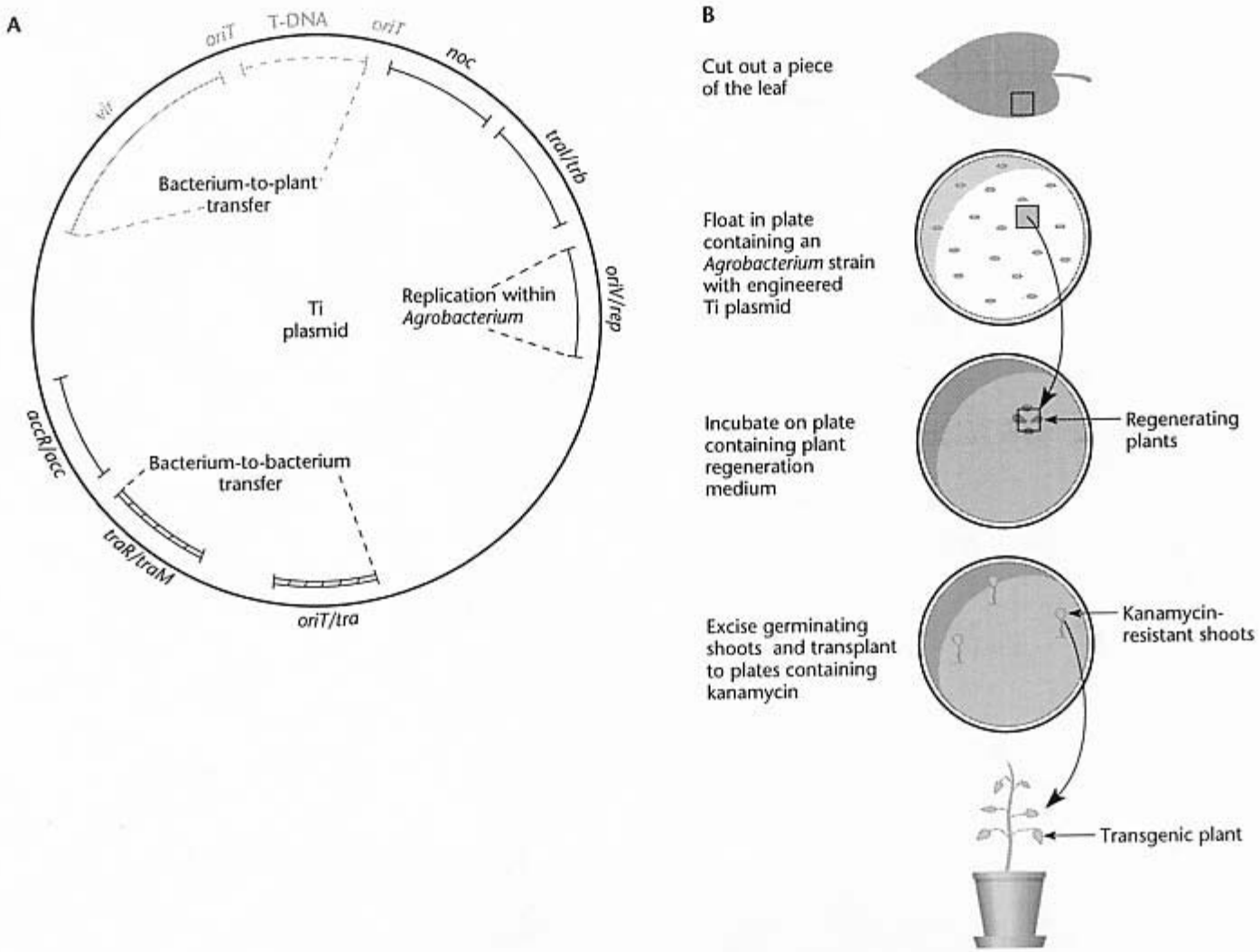
Figure 5.1


bla
IS46
Rep
35
BamHI
HpaI-8
EcoRI
SalI-1
PstI
BglII-6
BglII-5
korB
kilA
korA
traA
HpaI-1
5
mucB
30
HpaI-7
SmaI-2
mucA
BglII-4
traB
KpnI-1
pKM101
35.4 kb
HpaI-2
traC
eex
SalI-2
traD
10
HpaI-3
kilB
KpnI-2
traE
25
BglII-3
HpaI-4
HpaI-6
SmaI-1
traF
BglII-1
HpaI-5
BglII-2
15
traG
stb
20
KpnI-3
nuc
traK
fip
traJ
traI
traH
oriT

Box 5.1


A
oriT
T-DNA
oriT
noc
vir
traI/trb
Bacterium-to-plant transfer
Ti plasmid
Replication within Agrobacterium
oriV/rep
accR/acc
Bacterium-to-bacterium transfer
traR/traM
oriT/tra
B
Cut out a piece of the leaf
Float in plate containing an Agrobacterium strain with engineered Ti plasmid
Incubate on plate containing plant regeneration medium
Regenerating plants
Excise germinating shoots and transplant to plates containing kanamycin
Kanamycin-resistant shoots
Transgenic plant

Box 5.1 cont.

C

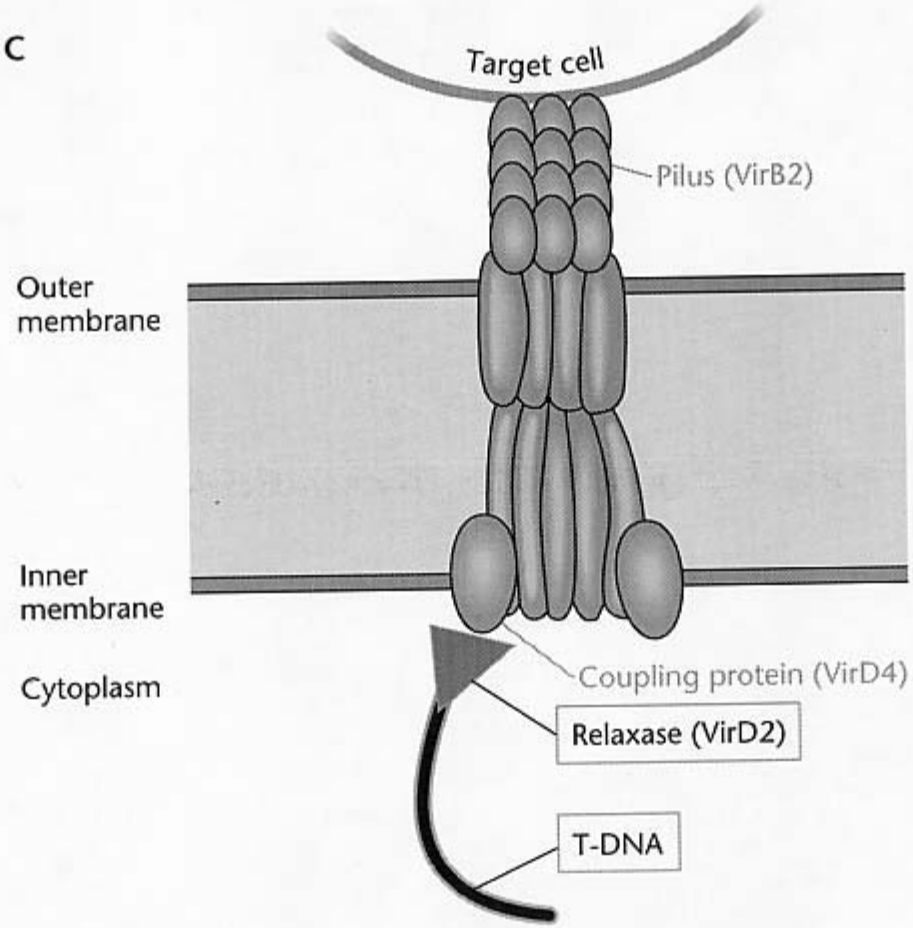
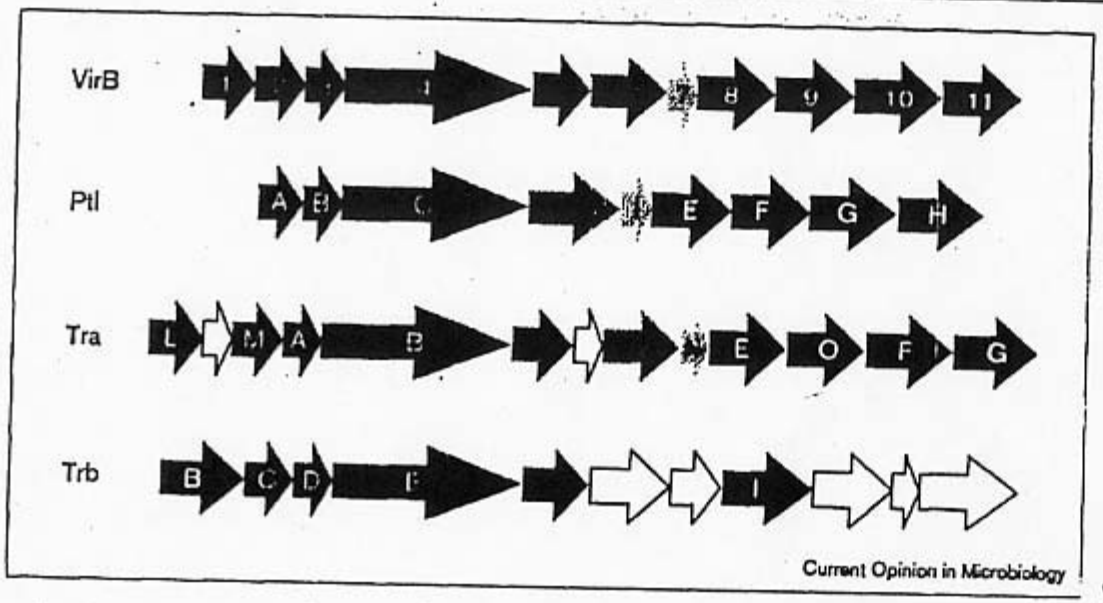

Target cell
Pilus (VirB2)
Outer membrane
Inner membrane
Cytoplasm
Coupling protein (VirD4)
Relaxase (VirD2)
T-DNA

Figure 1



Alignment of genes encoding type IV transporter systems. These systems include the VirB system of *A. tumefaciens*, the Ptl system of *B. pertussis*, the Tra system of the IncN plasmid pKM101 and the Trb genes of the Tra2 region of the IncP plasmid RP4. Arrows of the same color represent homologous genes. Unfilled arrows represent genes that have no homologue.

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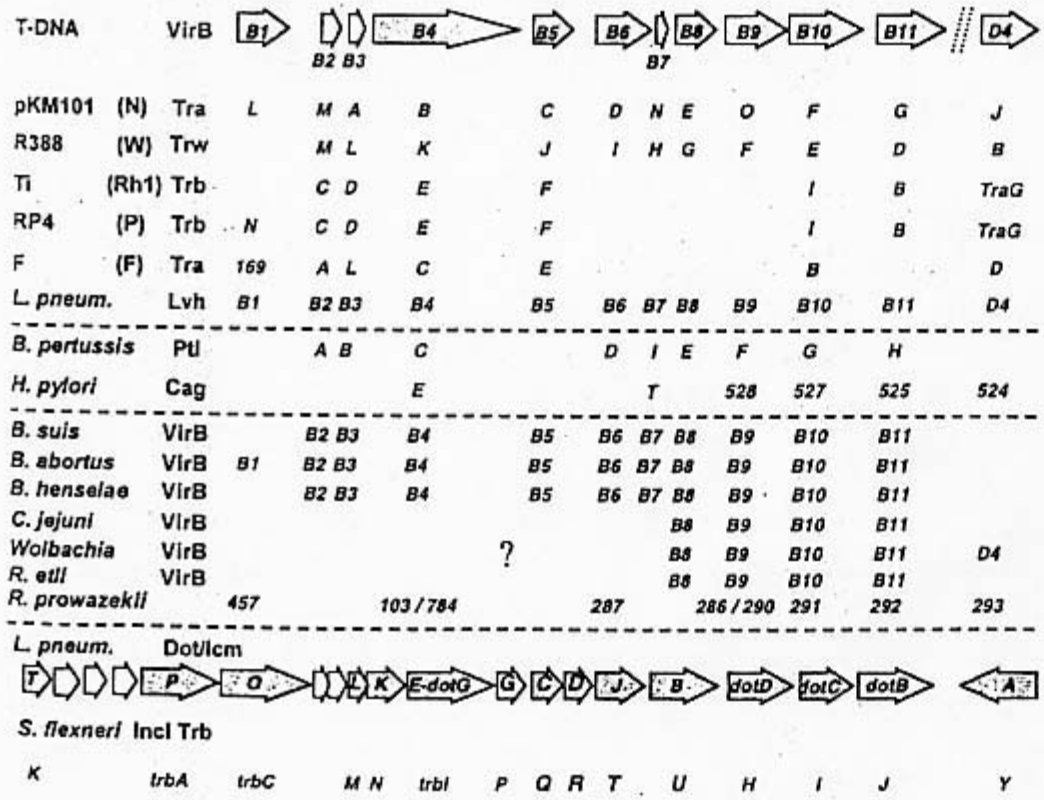

Fig. 2. The type IV systems known or postulated to translocate macromolecular substrates intercellularly. The *A. tumefaciens virB* gene products shown across the top assemble as the T-DNA transfer system. The next three groups of type IV systems, separated by dashed lines, are composed of homologues of some or all of the VirB proteins. The top group corresponds to systems shown to transfer DNA between bacteria, the *B. pertussis* and *H. pylori* systems deliver known substrates (PT and CagA respectively) to mammalian cells, and the third group corresponds to systems whose substrates are presently unknown but are postulated to be effector proteins. The symbol (?) denotes the absence of sequence information in the database for other *virB* genes in these bacteria. The *L. pneumophila dot/icm* gene products shown across the bottom are homologues of the *Shigella flexneri* CollB-P9 (IncI) transfer proteins. This system can conjugally transfer DNA, but its proposed role in virulence is to export effector proteins.