

AGROBACTERIUM TUMEFACIENS

Ti PLASMID

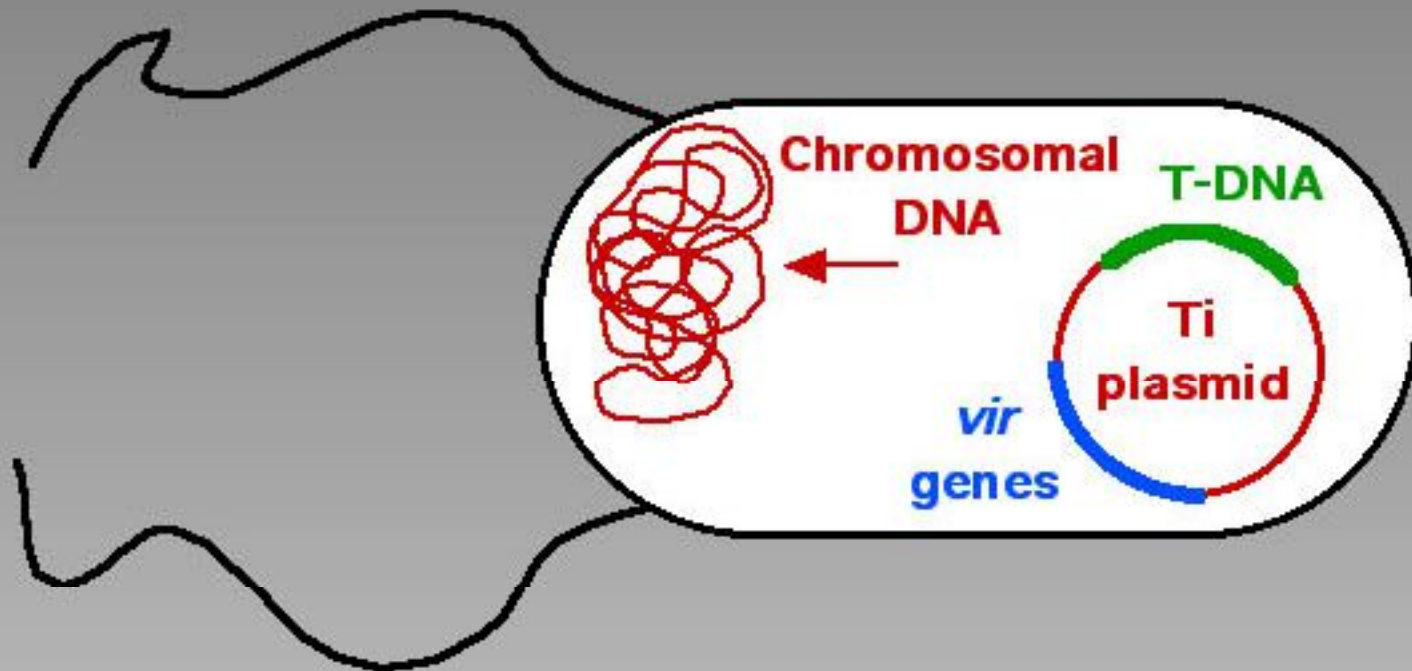


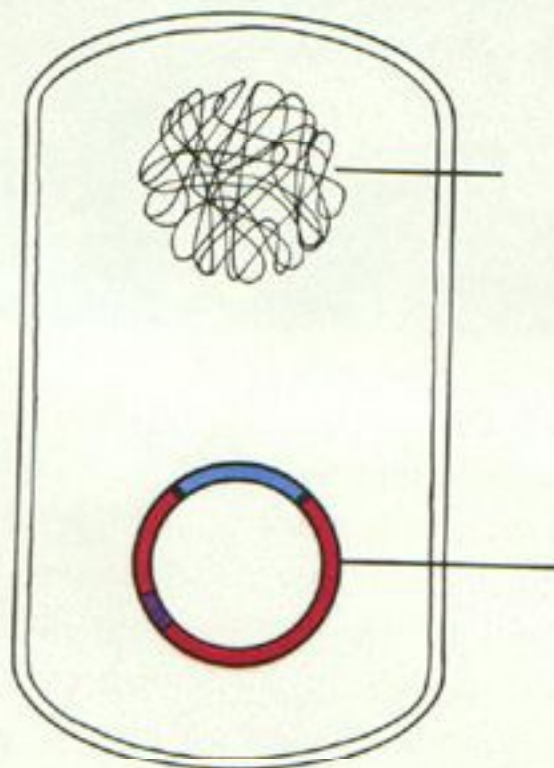
US Middle School IFLI Project
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Agrobacterium tumefaciens

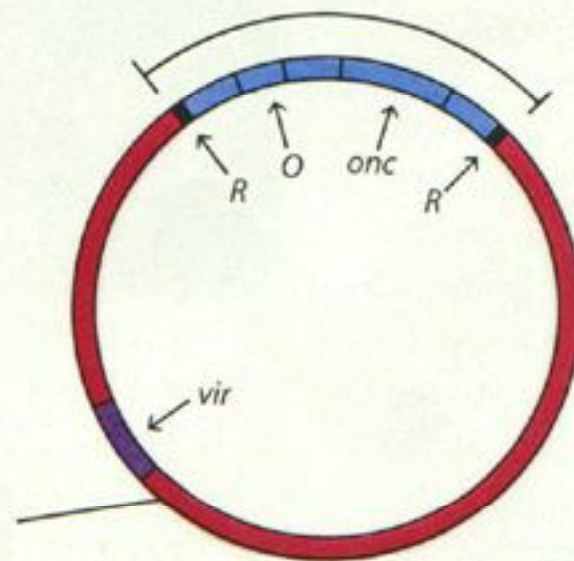
Agrobacterium tumefaciens is a naturally occurring soil bacterium. Most strains carry a plasmid (the **Ti plasmid**) which gives the bacterium the capacity to transfer part of the plasmid (the **T-DNA**) to a plant.



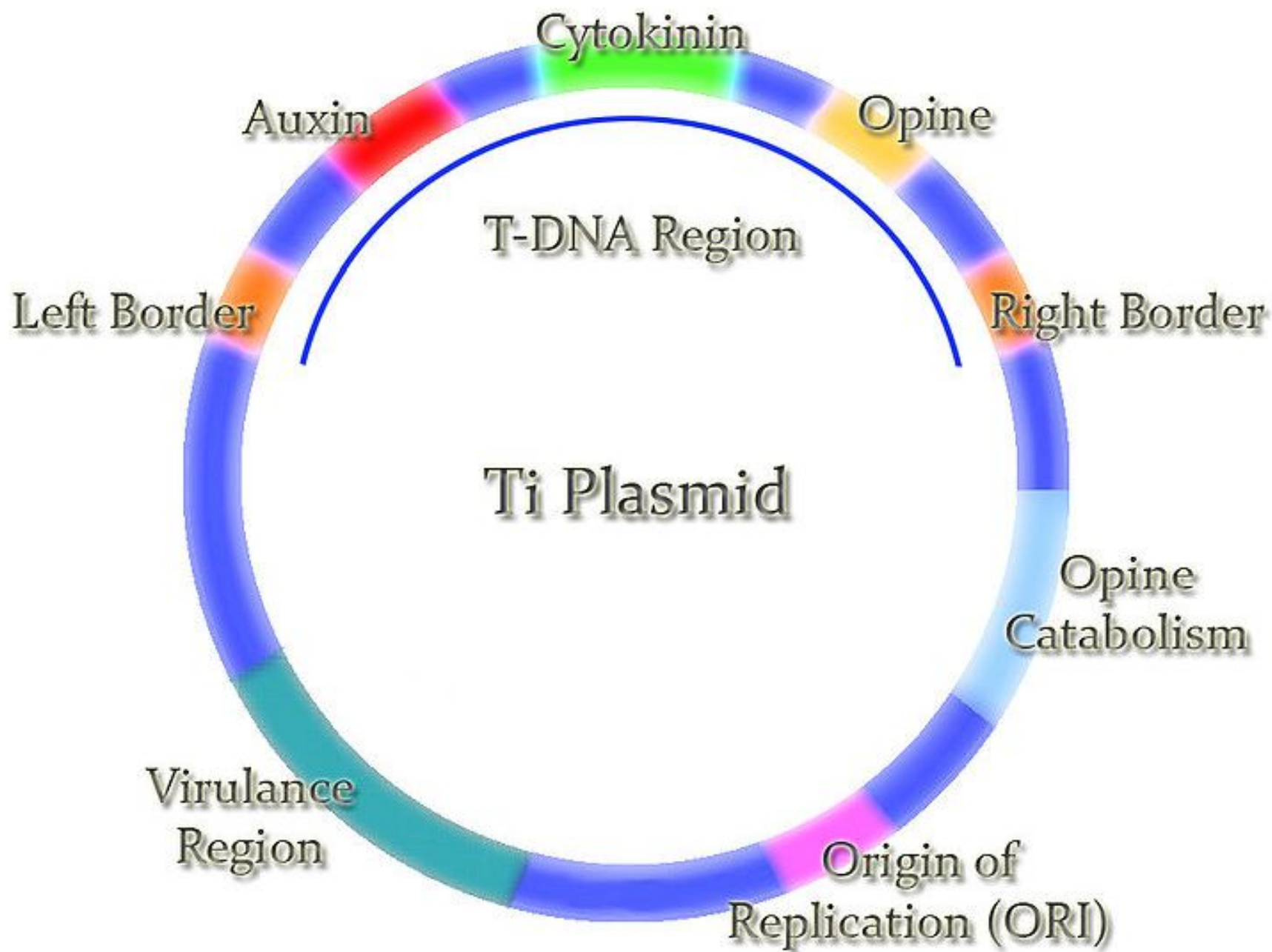


Agrobacterium tumefaciens

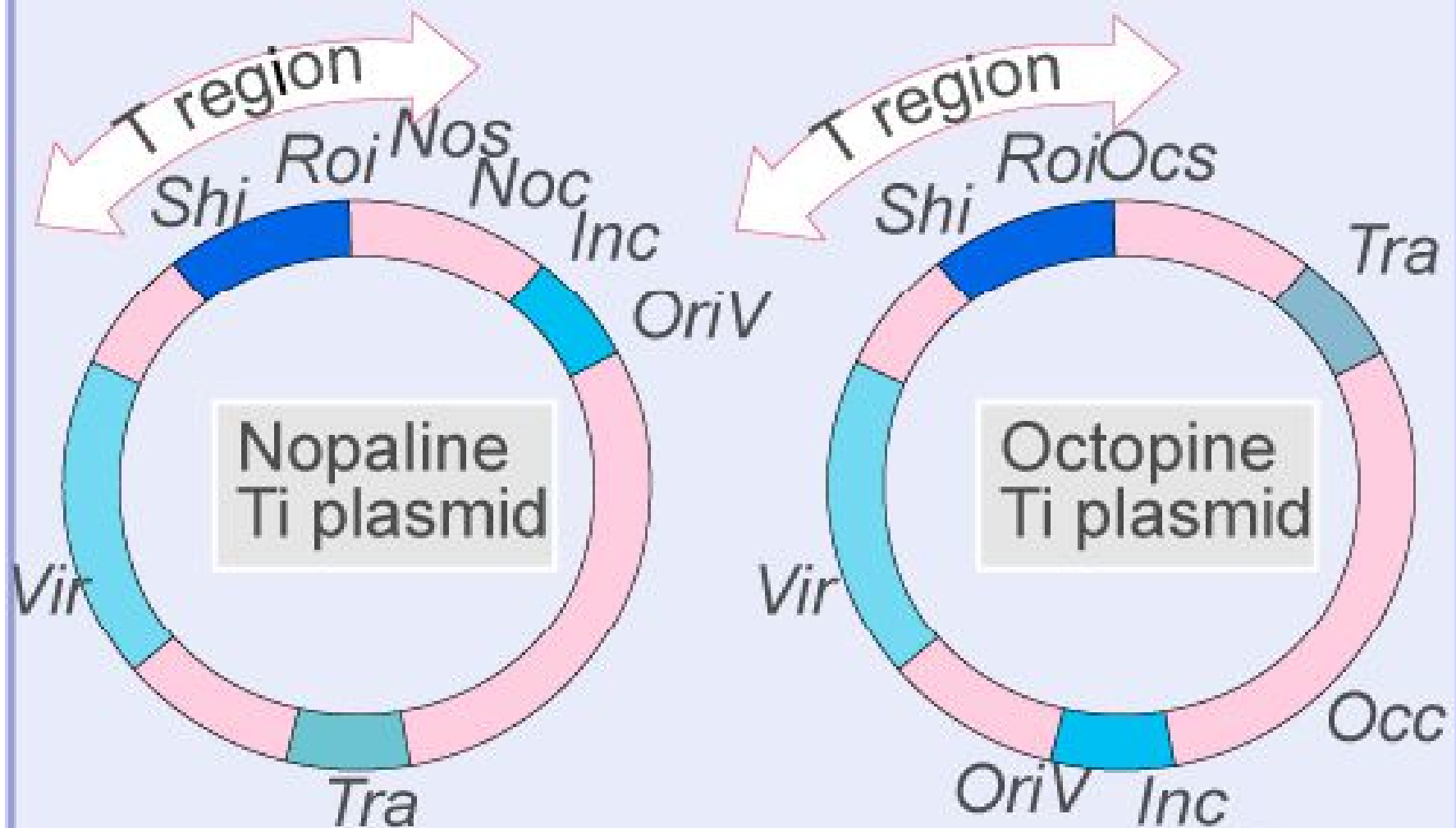
(a)



(b)



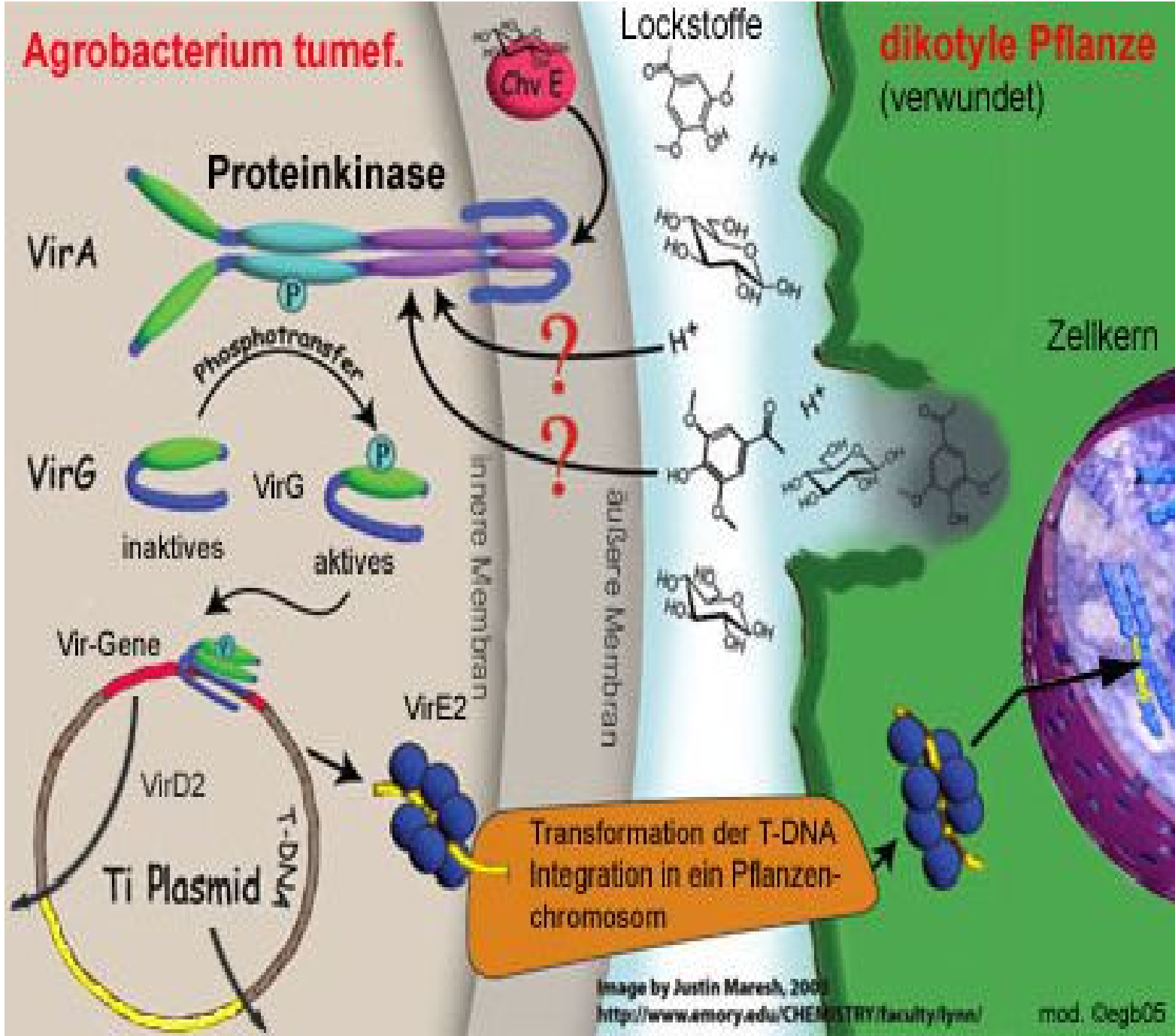
Nopaline & octopine plasmids are similar

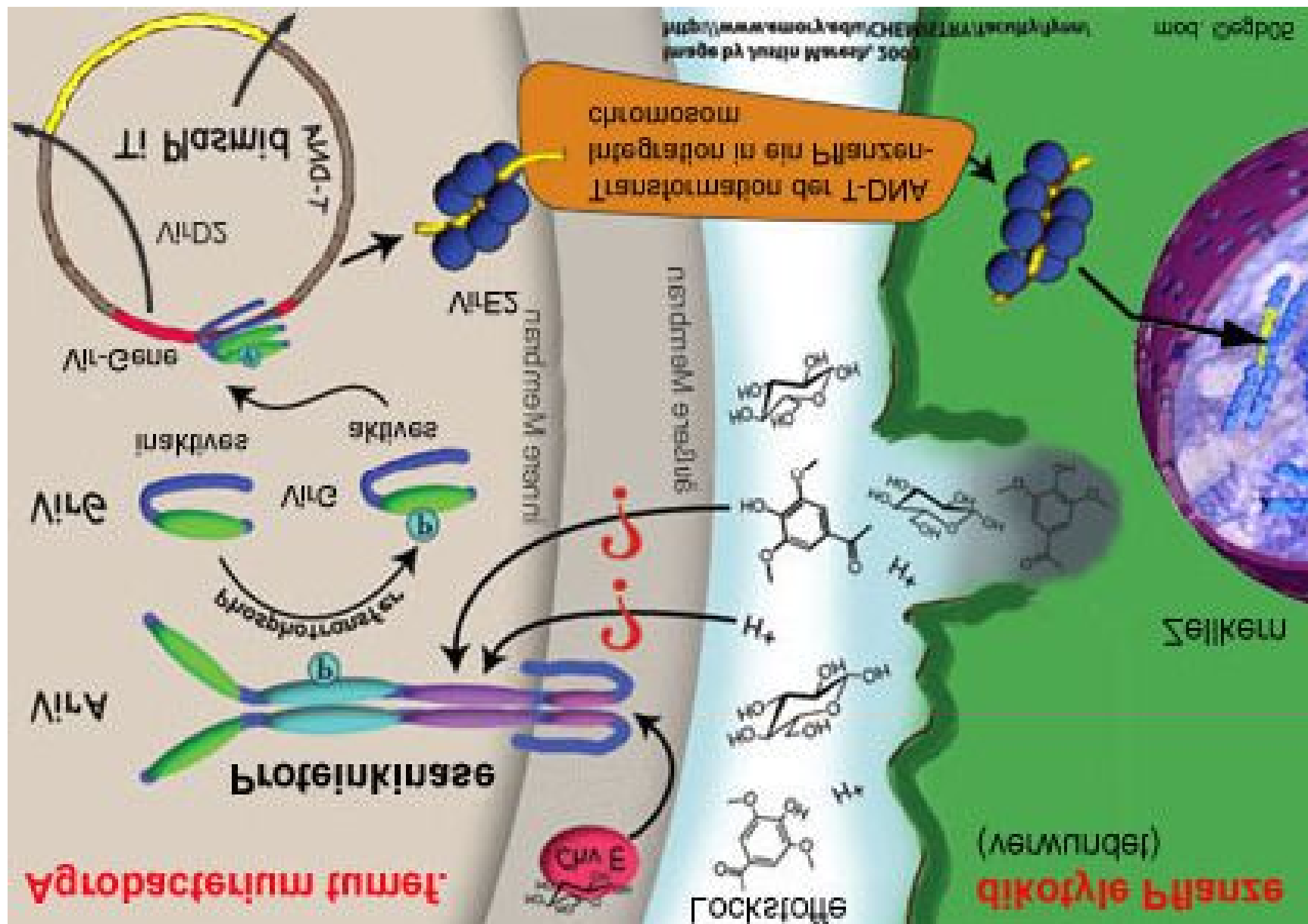


Agrobacterium tumef.

Lockstoffe

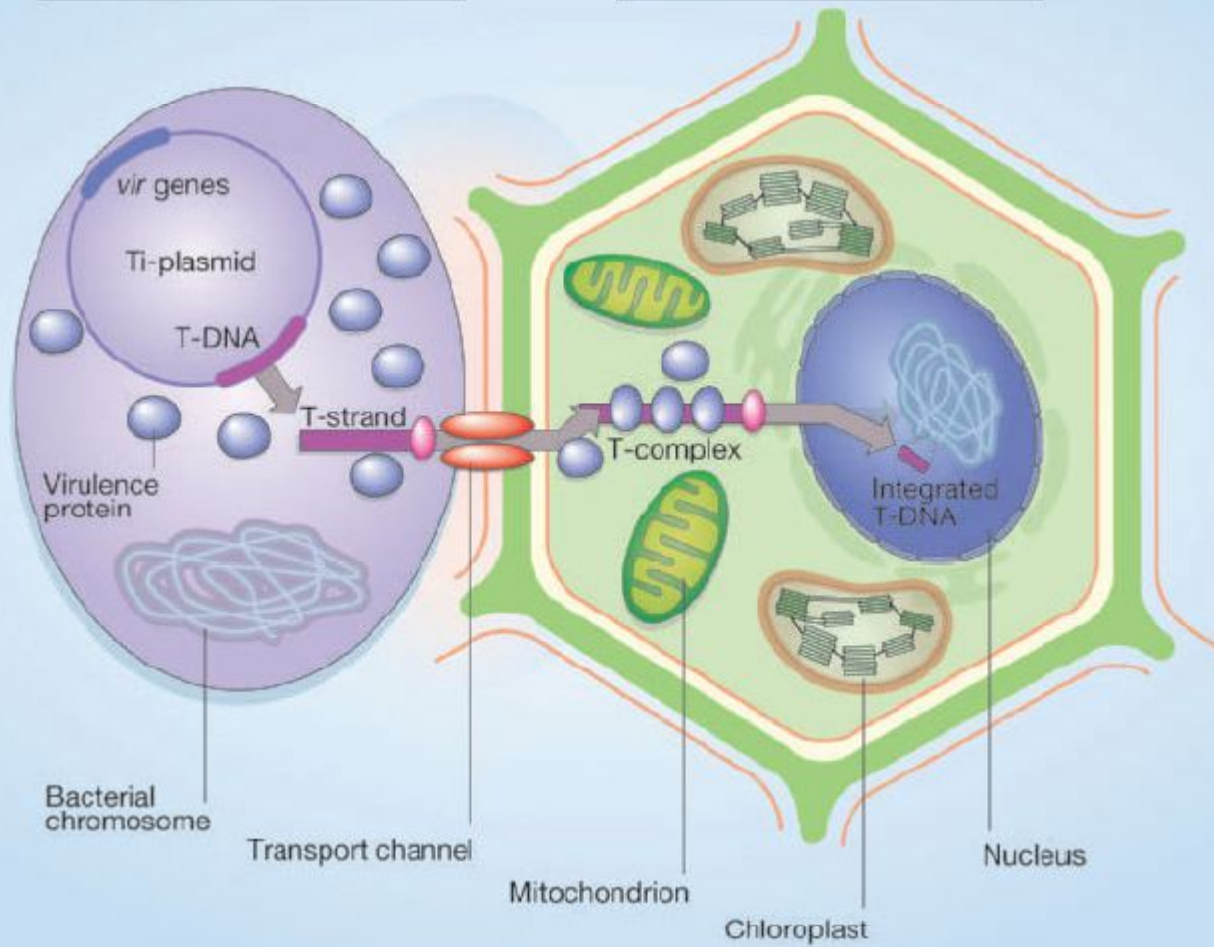
dikotyle Pflanze
(verwundet)



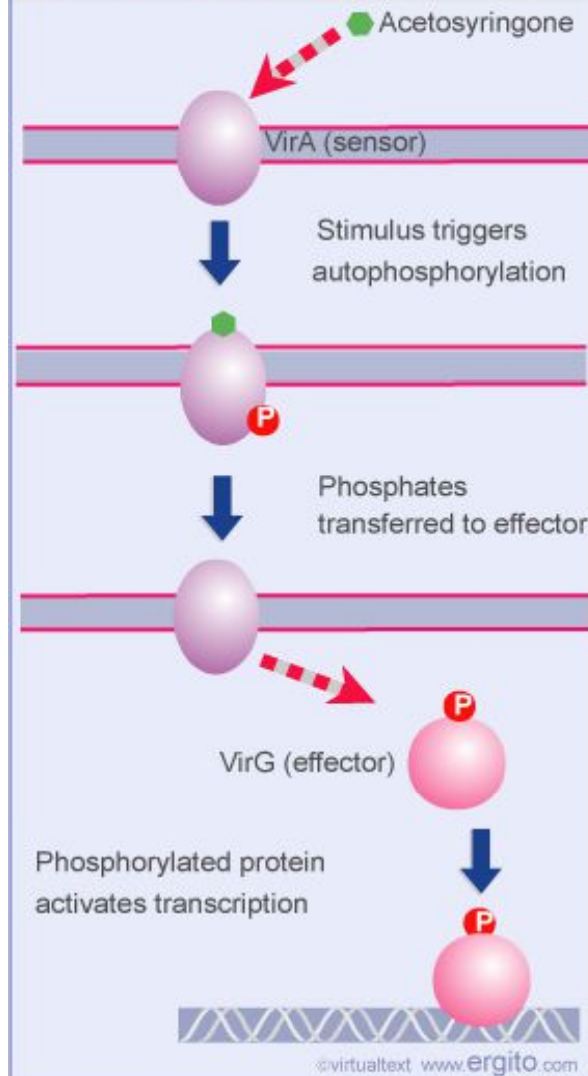


Agrobacterium tumefaciens

Plant cell



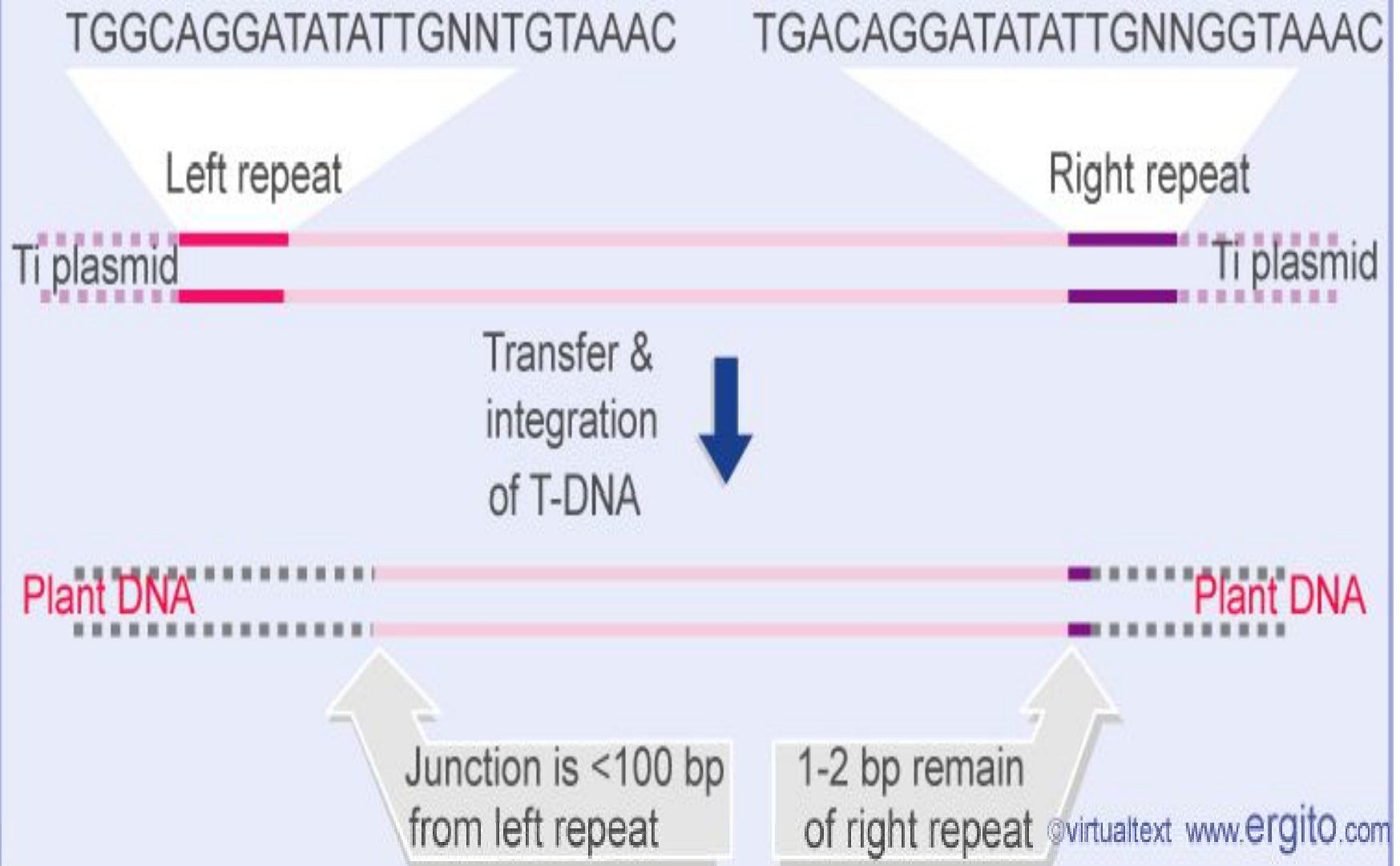
VirA-VirG is a two-component system



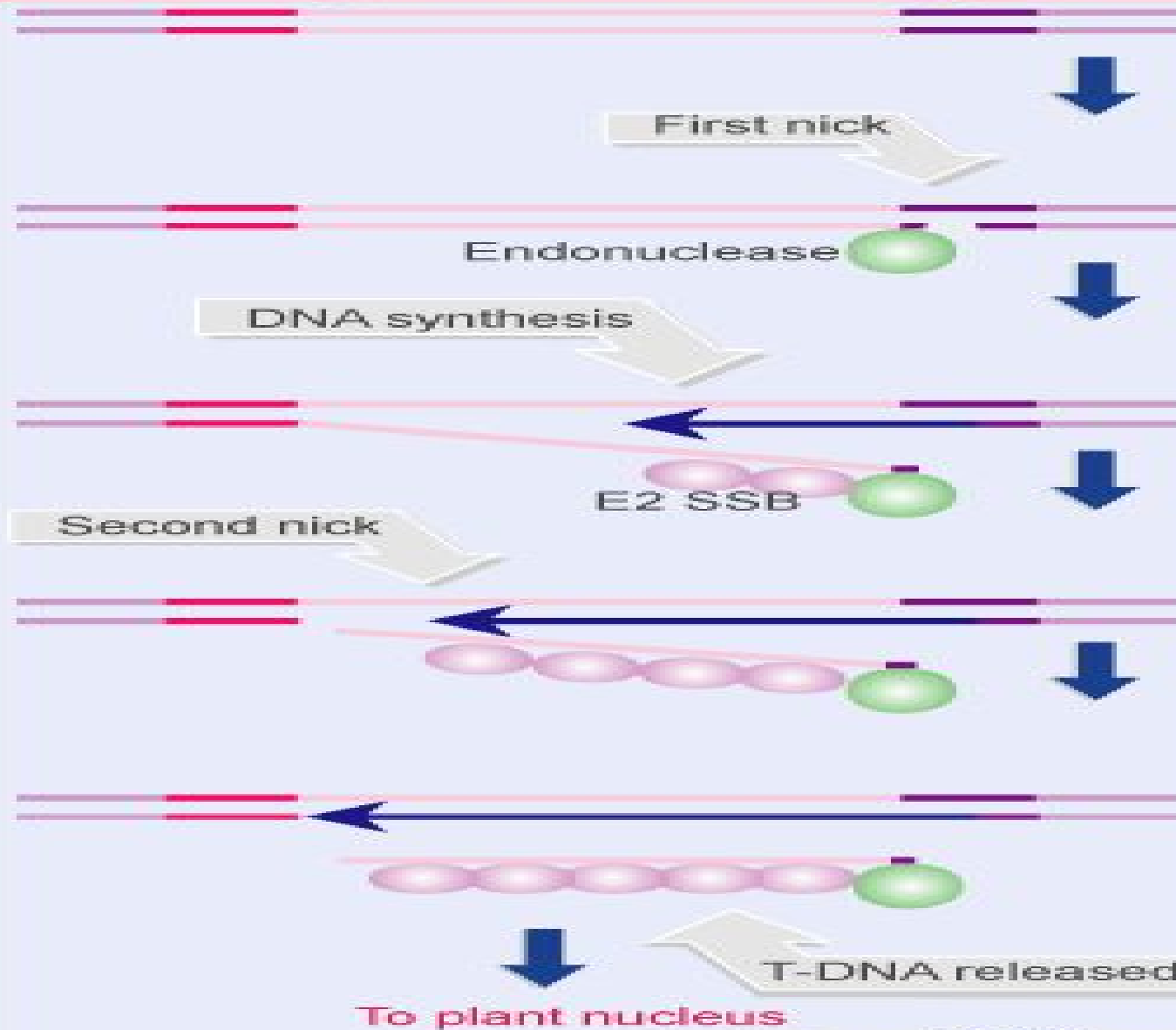
vir genes transfer T-DNA to the plant nucleus

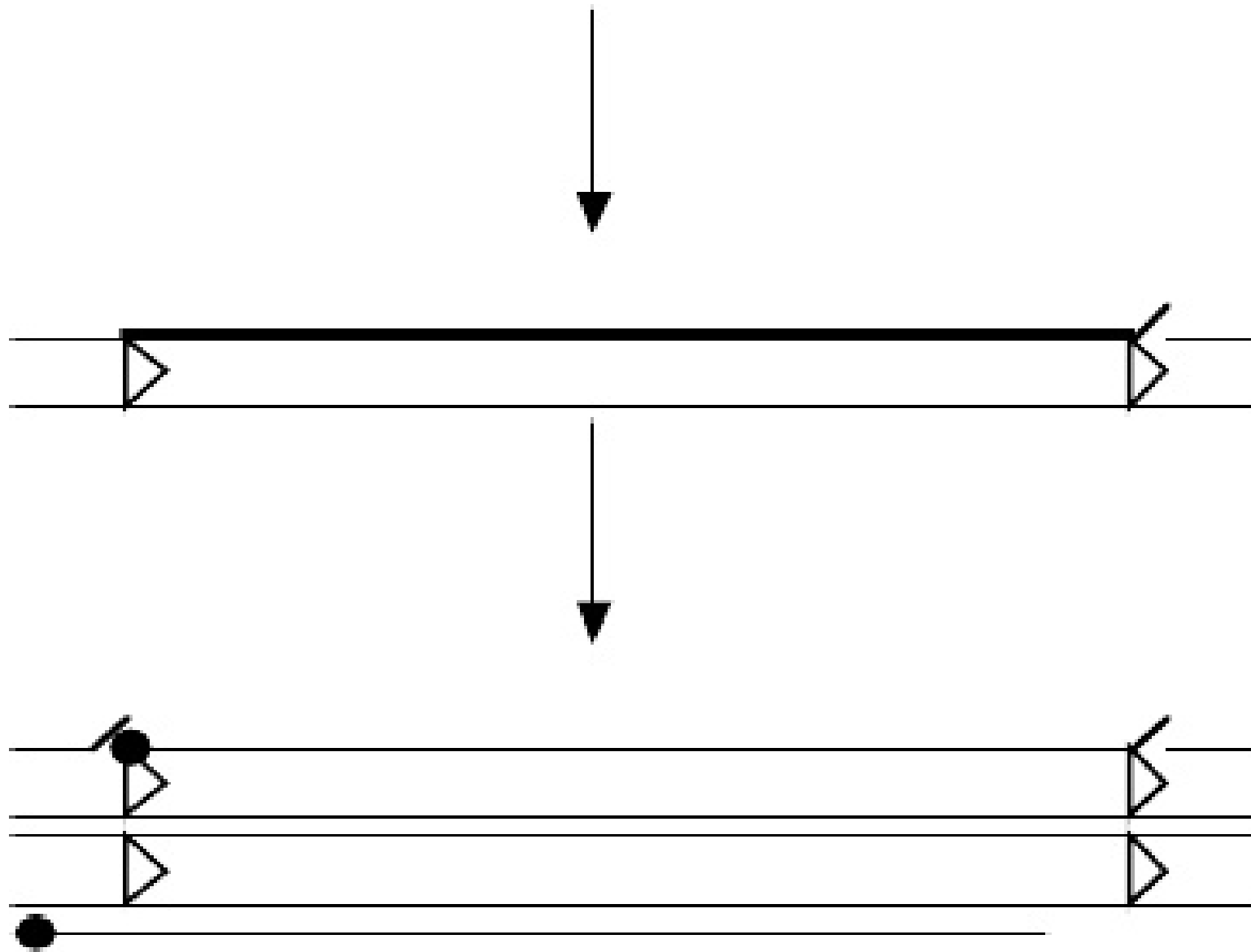
Locus	<i>virA</i>	<i>virB</i>	<i>virG</i>	<i>virC</i>	<i>virD</i>	<i>virE</i>
Proteins	VirA	VirB1-11	VirG	VirC1-2	VirD1,D2	VirE2
Basal	low		low			
Induced		high	high	high	high	high
Location	membr.	membr.	Cyto.	Cyto.	Nuc.	Nuc.
Function	receptor for acetyl-syringone		induces transcription of other <i>vir</i> genes			
						
						
	Involved in conjugation					
	Binds overdrive DNA					
	D2 nuclease nicks T-DNA					
	ssDNA binding protein					

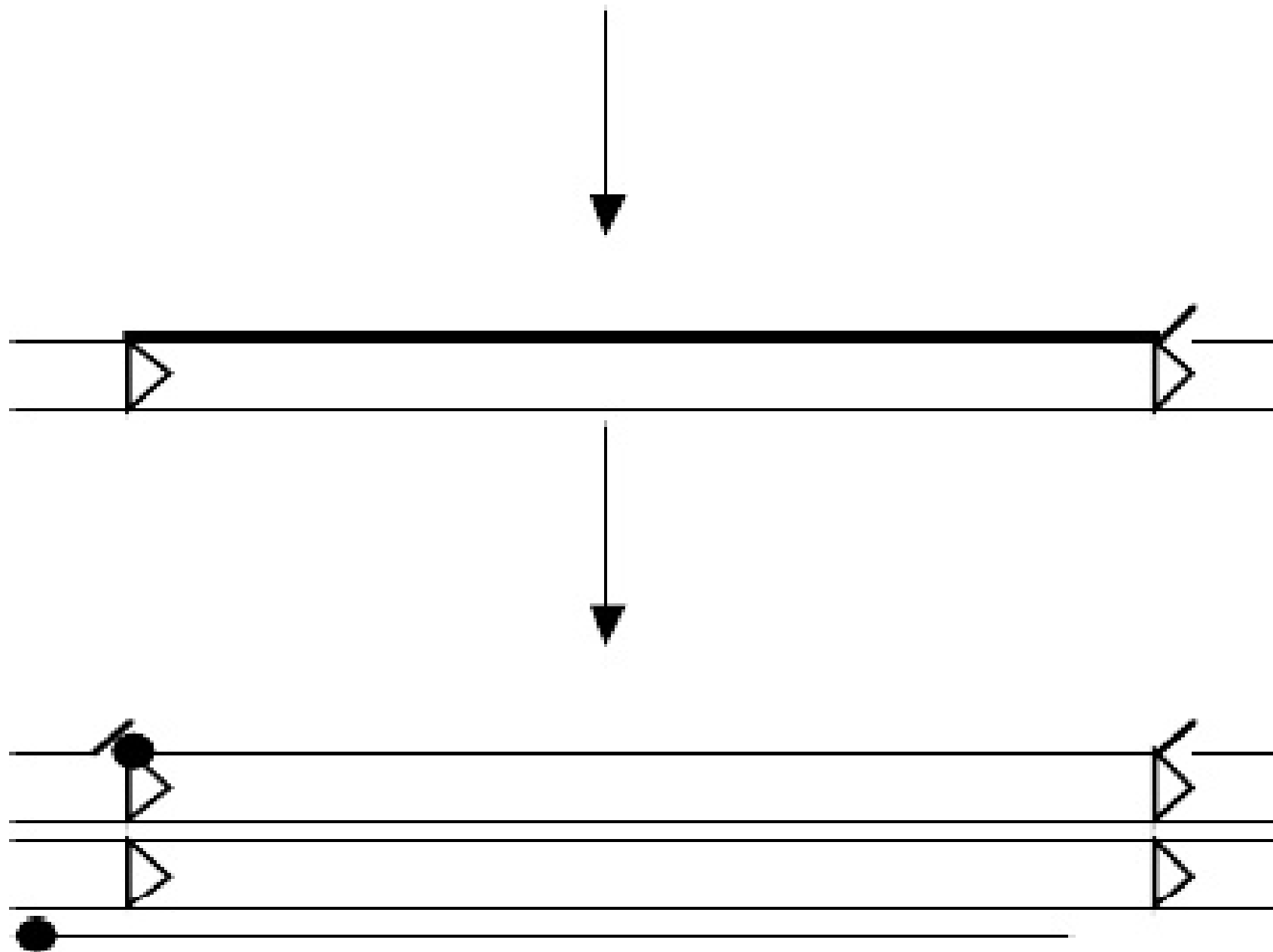
T-DNA is bounded by direct repeats

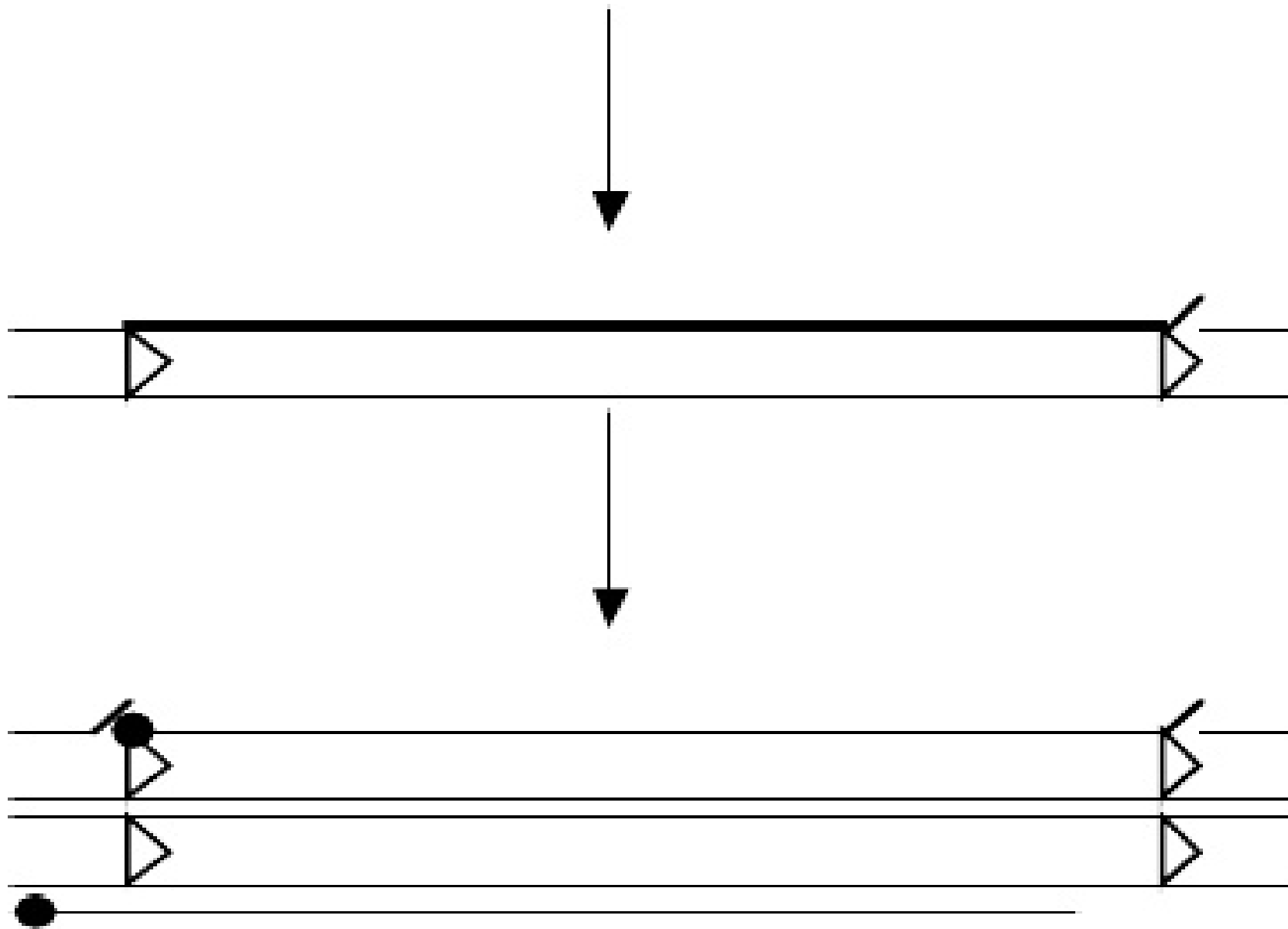


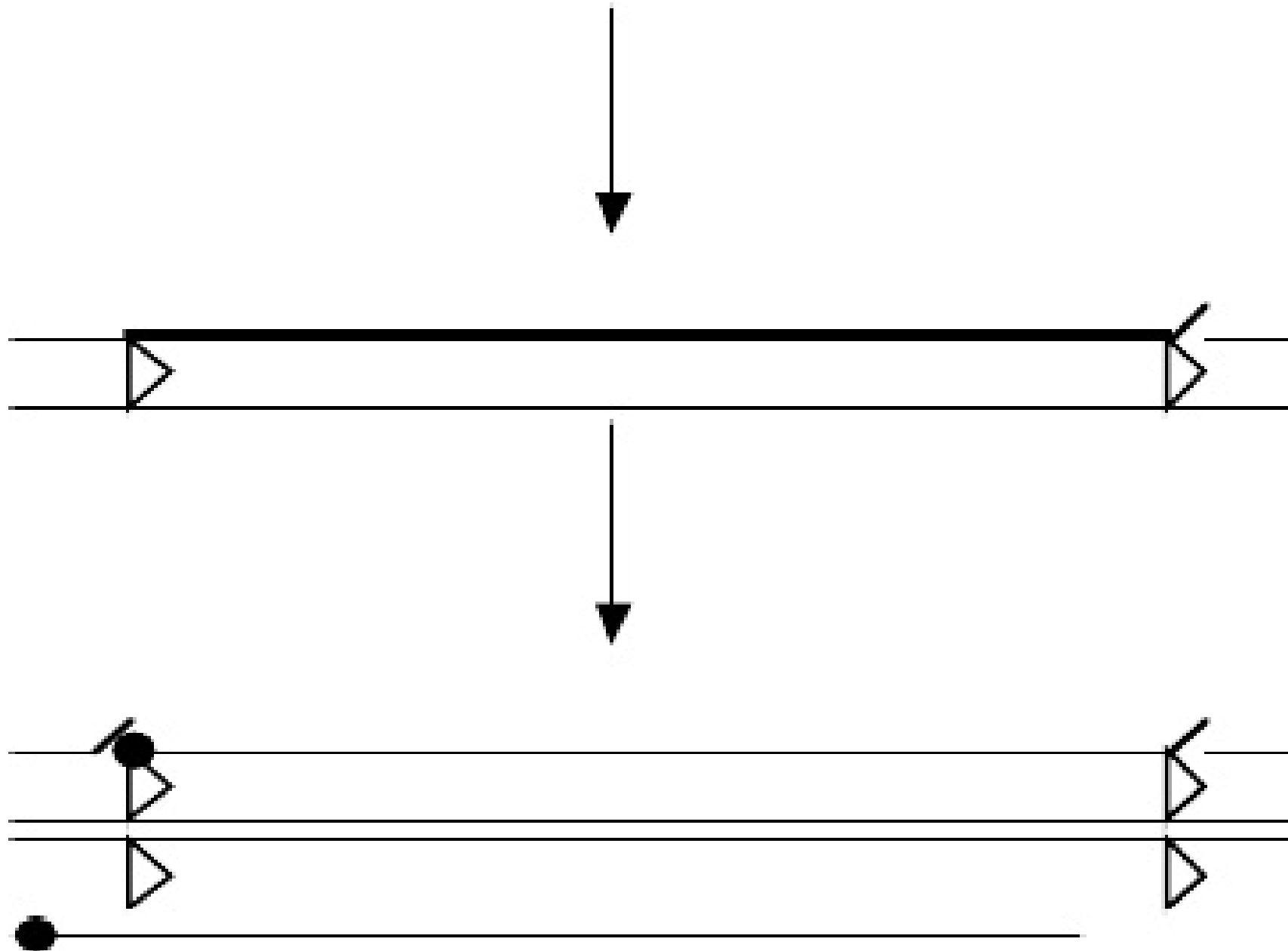
T-DNA is generated like a rolling circle











T-DNA integrates into the plant genome

Agrobacterium

Plant cell

Ti plasmid

T-DNA

Genome

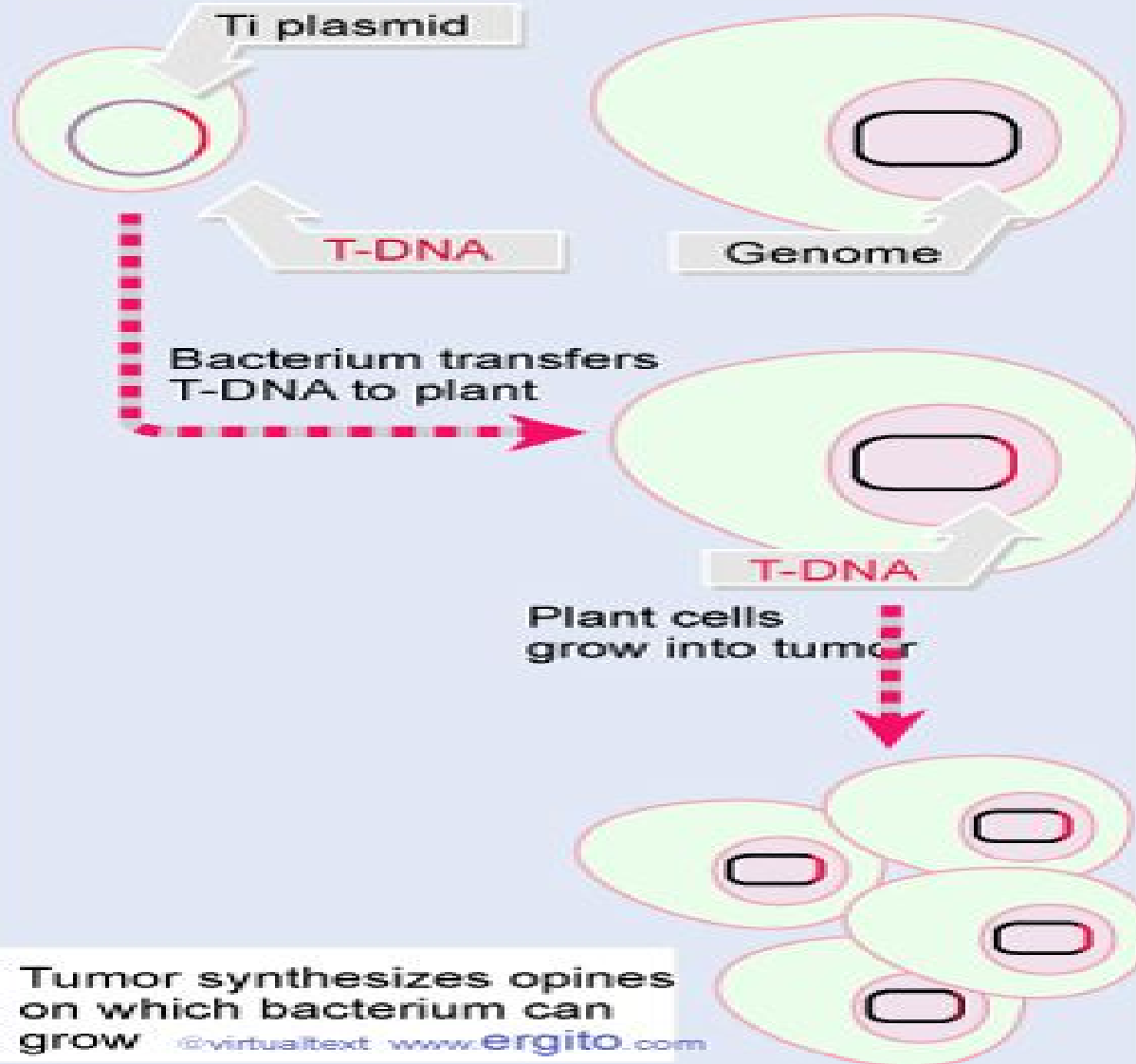
Bacterium transfers
T-DNA to plant

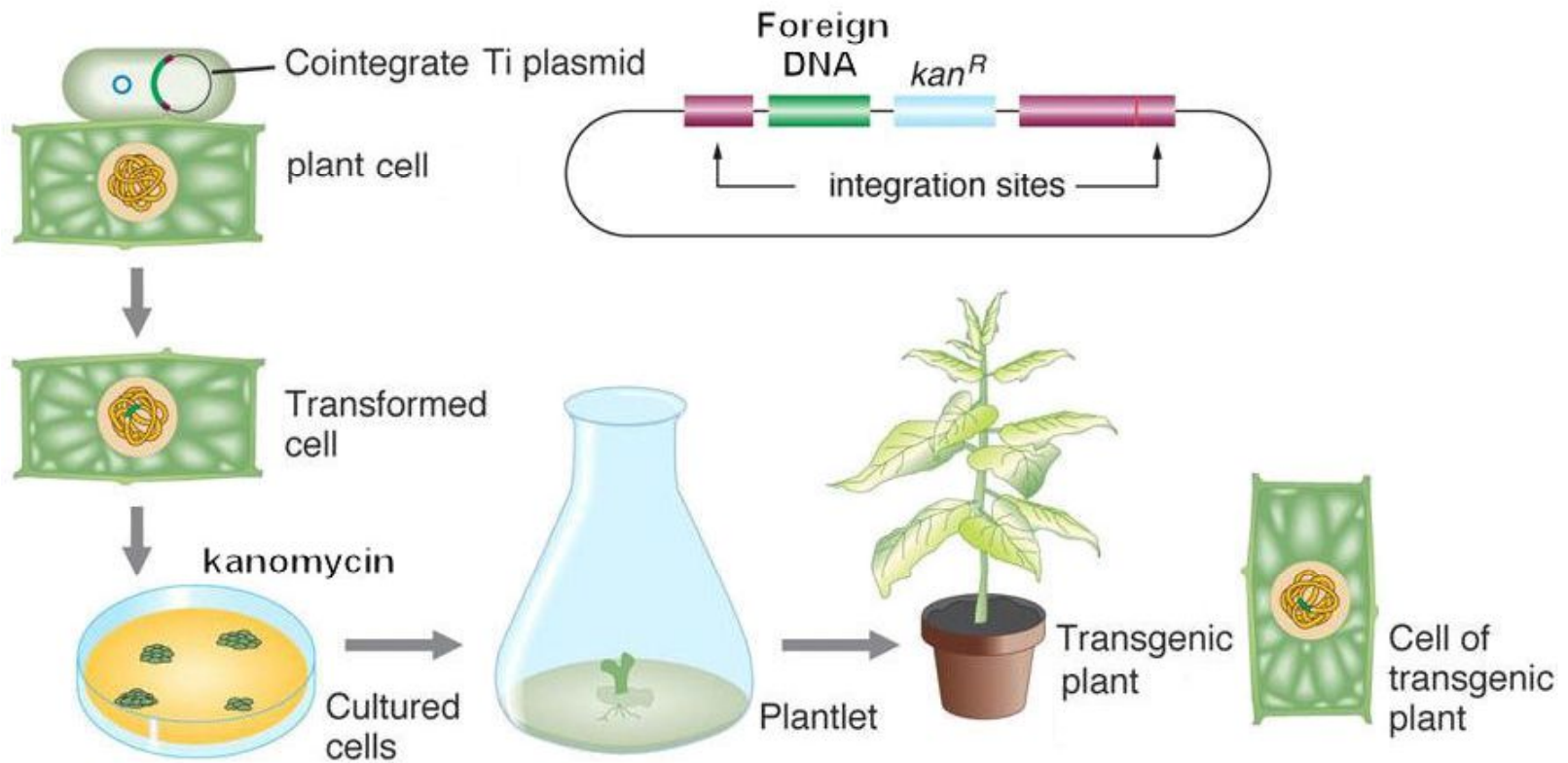
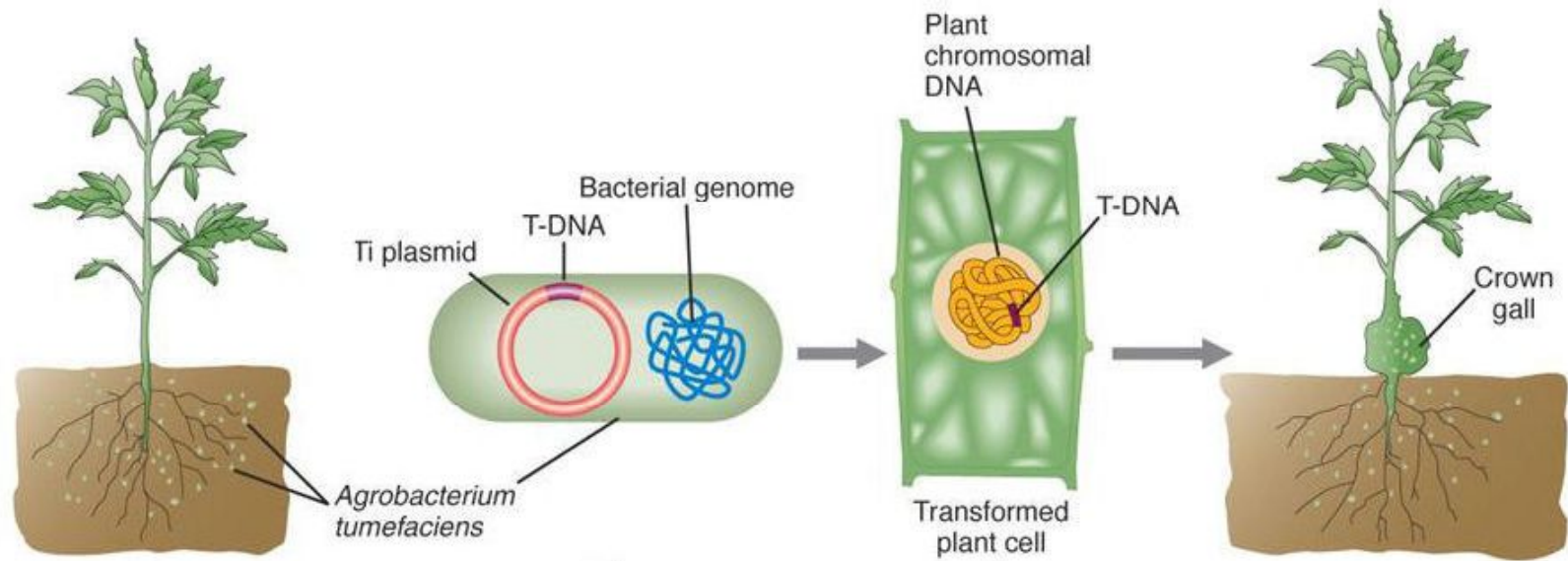
T-DNA

Plant cells
grow into tumor

Tumor synthesizes opines
on which bacterium can
grow

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Ti genes function in bacteria and in plants

Locus	Function	Ti Plasmid
<i>vir</i>	DNA transfer into plant	all
<i>shi</i>	shoot induction	all
<i>roi</i>	root induction	all
<i>nos</i>	nopaline synthesis	nopaline
<i>noc</i>	nopaline catabolism	nopaline
<i>ocs</i>	octopine synthesis	octopine
<i>occ</i>	octopine catabolism	octopine
<i>tra</i>	bacterial transfer genes	all
<i>Inc</i>	incompatibility genes	all
<i>oriV</i>	origin for replication	all