Wild type cdc28 mutant cdc7 mutant

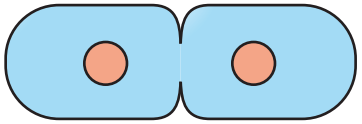
What is the basic organization of the cell cycle ?

Are the steps of the cycle mechanistically linked ?
"substrate-product" model

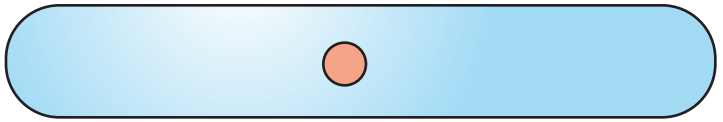
Is there an autonomous "cell cycle clock" ?

Opposite effects of cdc2 alleles in S. pombe

$cdc2^{+}$ (wild type)



$cdc2^{-}$ (recessive)



$cdc2^{D}$ (dominant)

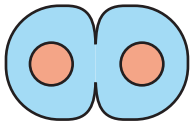


Figure by MIT OCW.

There is there an autonomous "cell cycle clock"
which is composed of cyclin + CDK

The amount of cyclins oscillates
throughout the cell cycle

However, the steps of the cycle are linked
by negative feedback loops
known as "checkpoint control" pathways

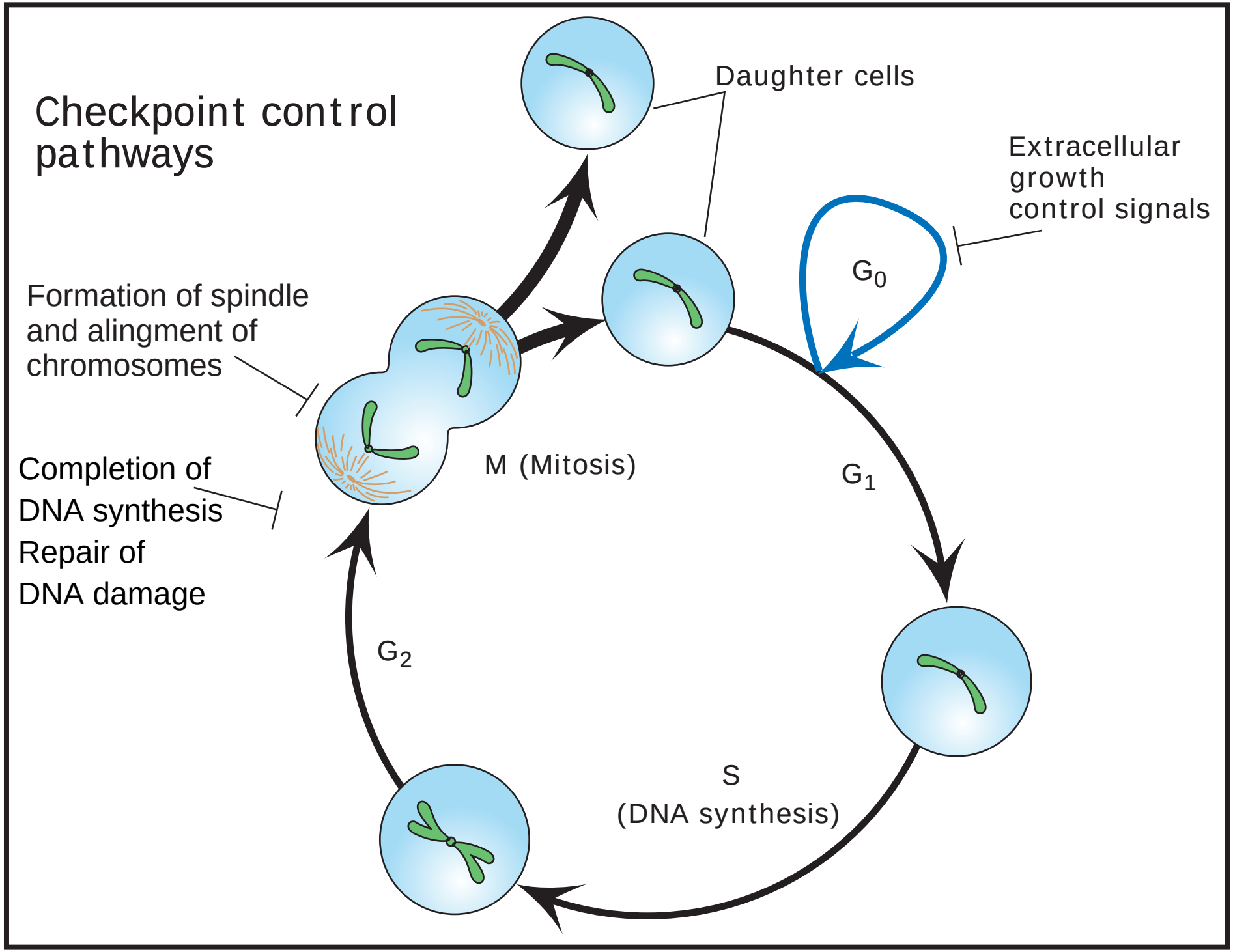


Figure by MIT OCW.

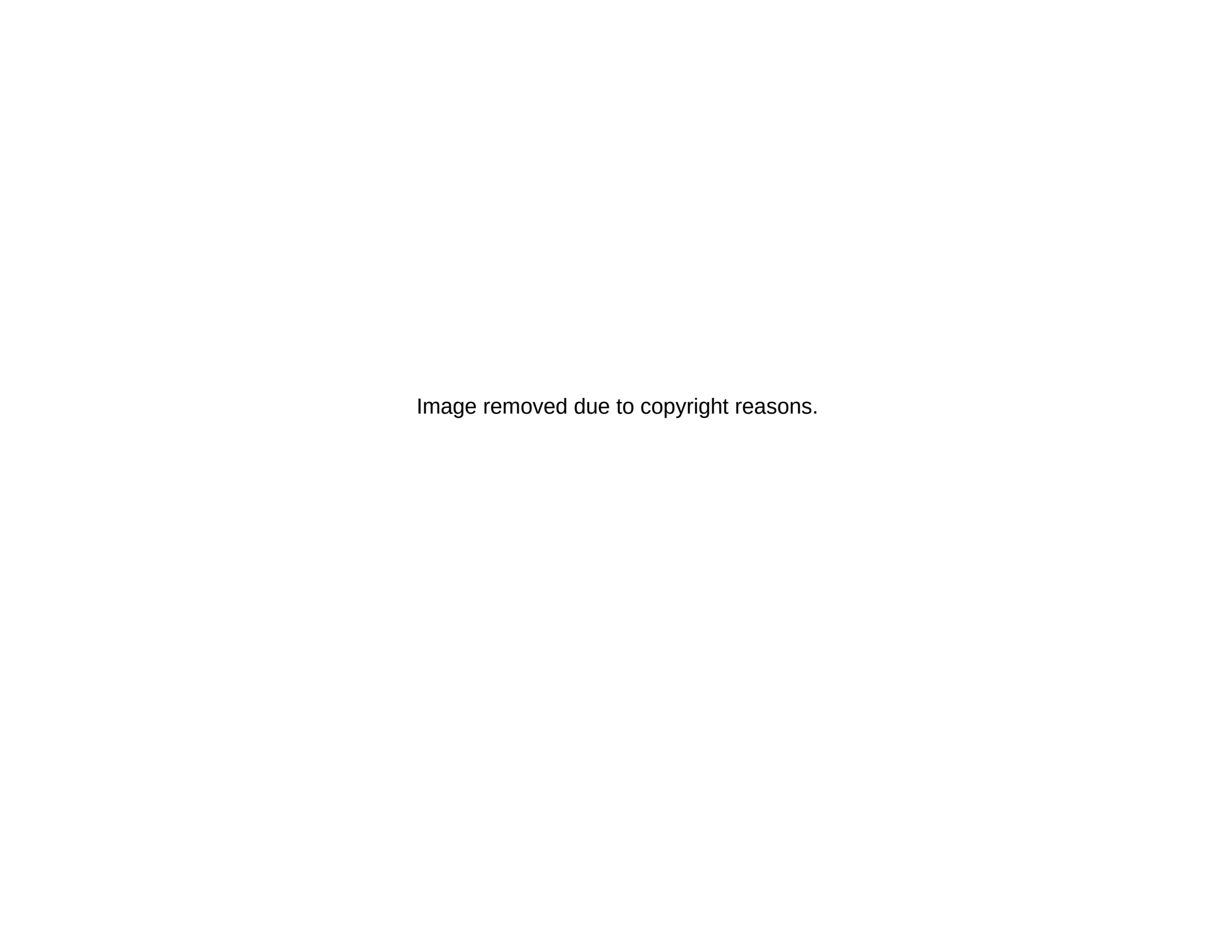


Image removed due to copyright reasons.

General types of oncogenic mutations

Activation of growth control pathways
signaling quiescent cells to divide inappropriately

Inactivation of checkpoints
allowing cells with damaged DNA or misaligned chromosomes
to divide allowing high mutation rates and chromosome imbalances

Inactivation of DNA repair genes
allowing high mutation rates causing other oncogenic mutations