生化探索 BioX

生化方程式的加減與『成』『除』

Post-translational Modification

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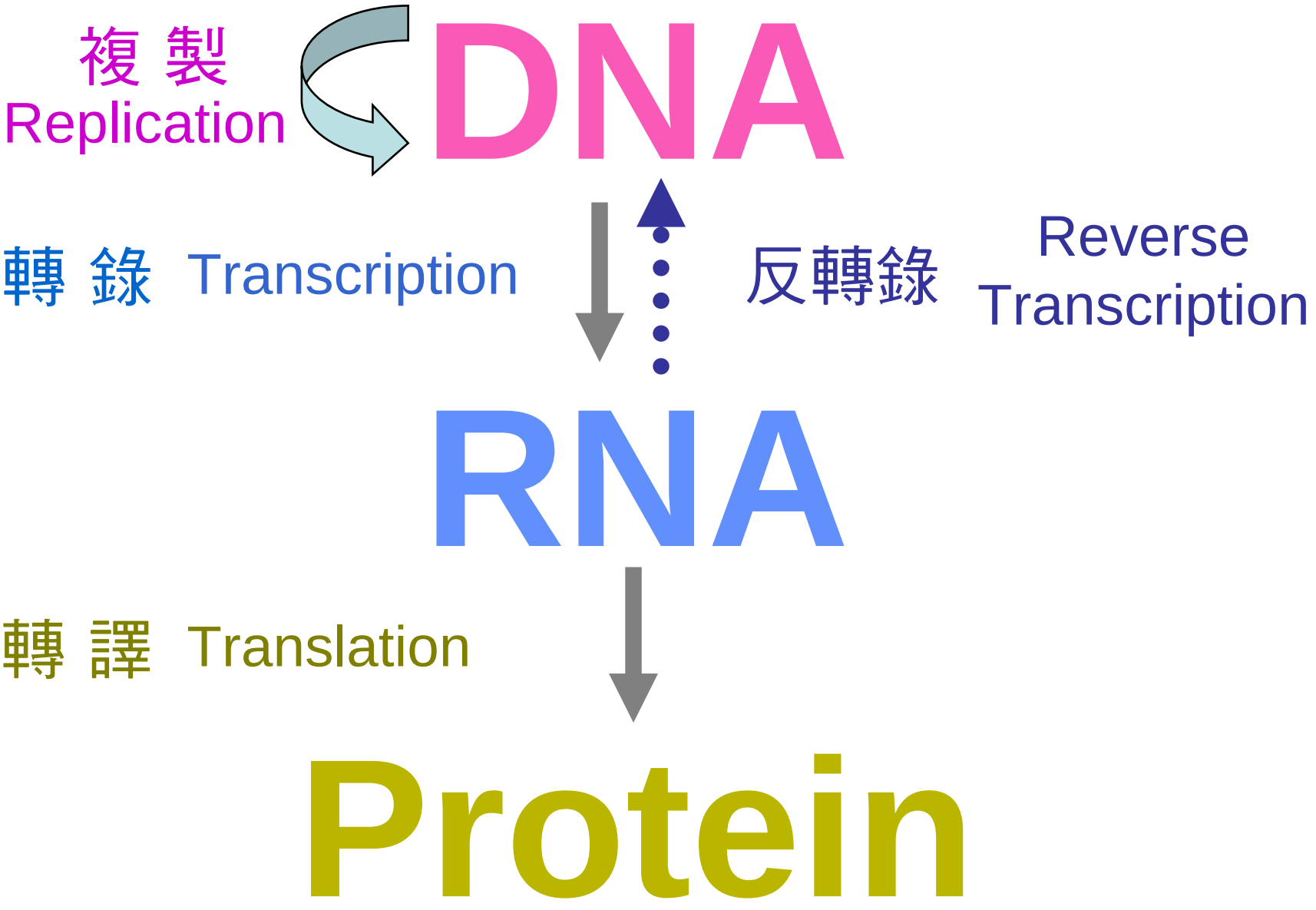
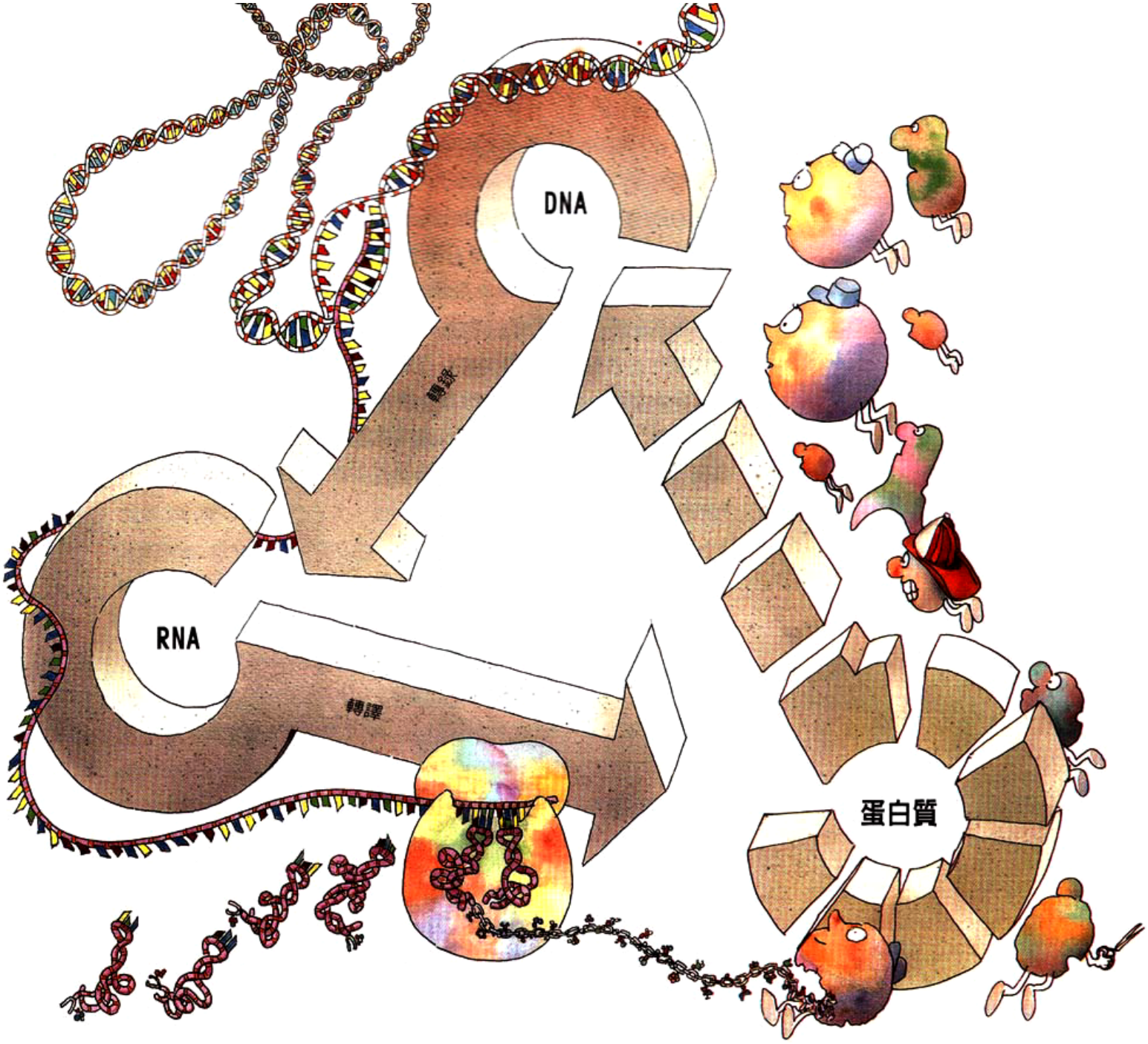
The Extra Episode of Central Dogma: Post-translational Modification

生命的中心法則 *Central Dogma*

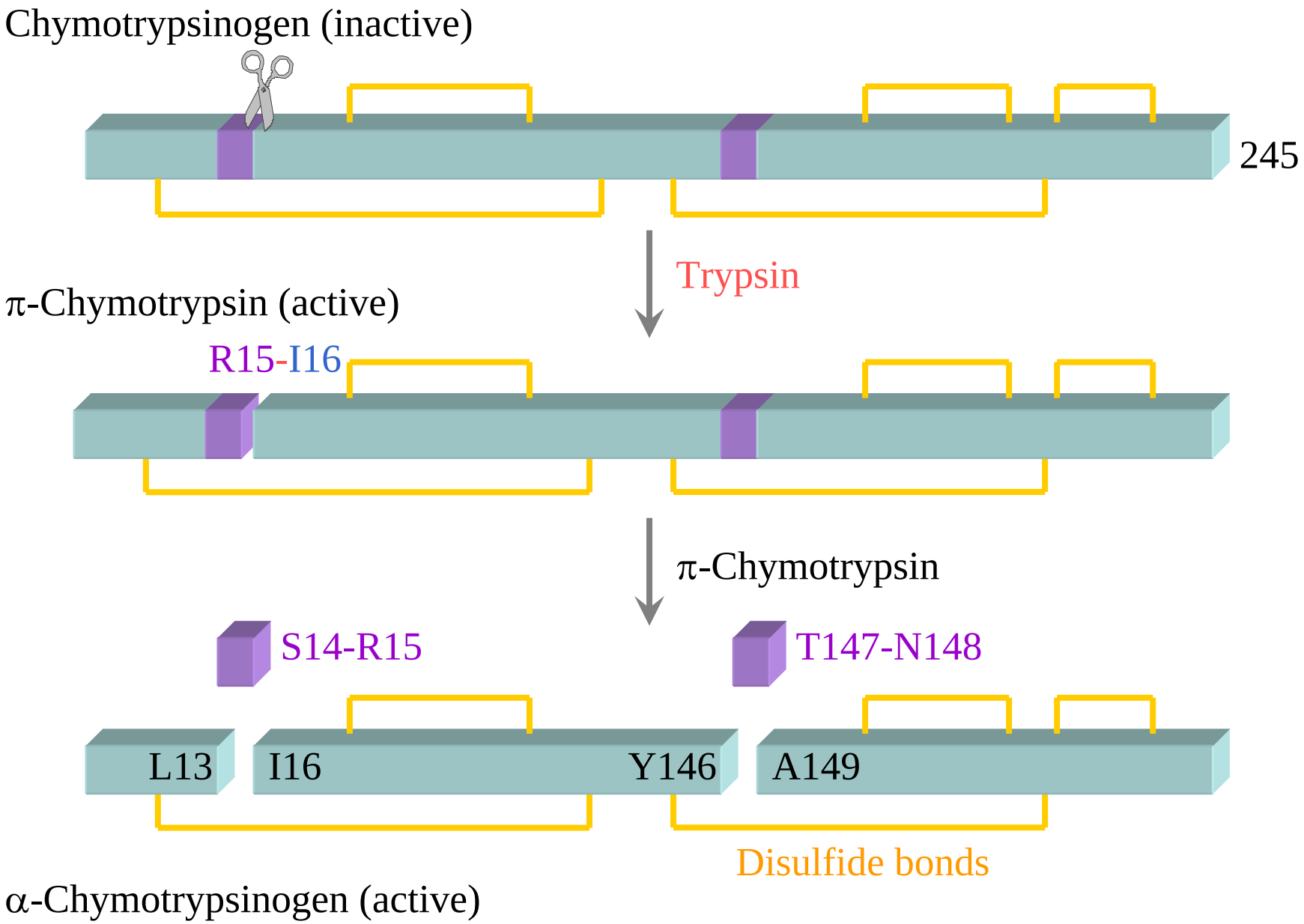


所有生物的前世今生



生命中心法則

Chymotrypsin 要先經裂解後才有活性



Adapted from Campbell (1999) Biochemistry (3d) p.179

磷酸化： 可逆性共價修飾

Fischer, Kreb (1978)

Ser Thr Tyr (His)

OH

蛋白質

Kinase
磷酸化

去磷酸化
Phosphatase

P

蛋白質
構形改變

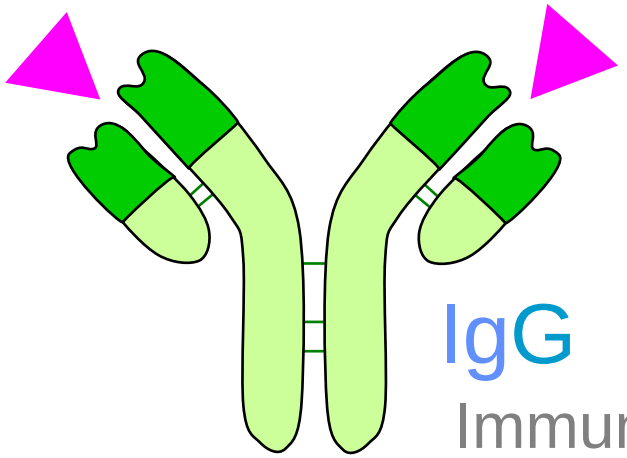
Glycogen phosphorylase b

Glycogen phosphorylase a

非活化型 ⟷ 活化型

活化型 ⟷ 非活化型

抗體是一種蛋白質



IgG

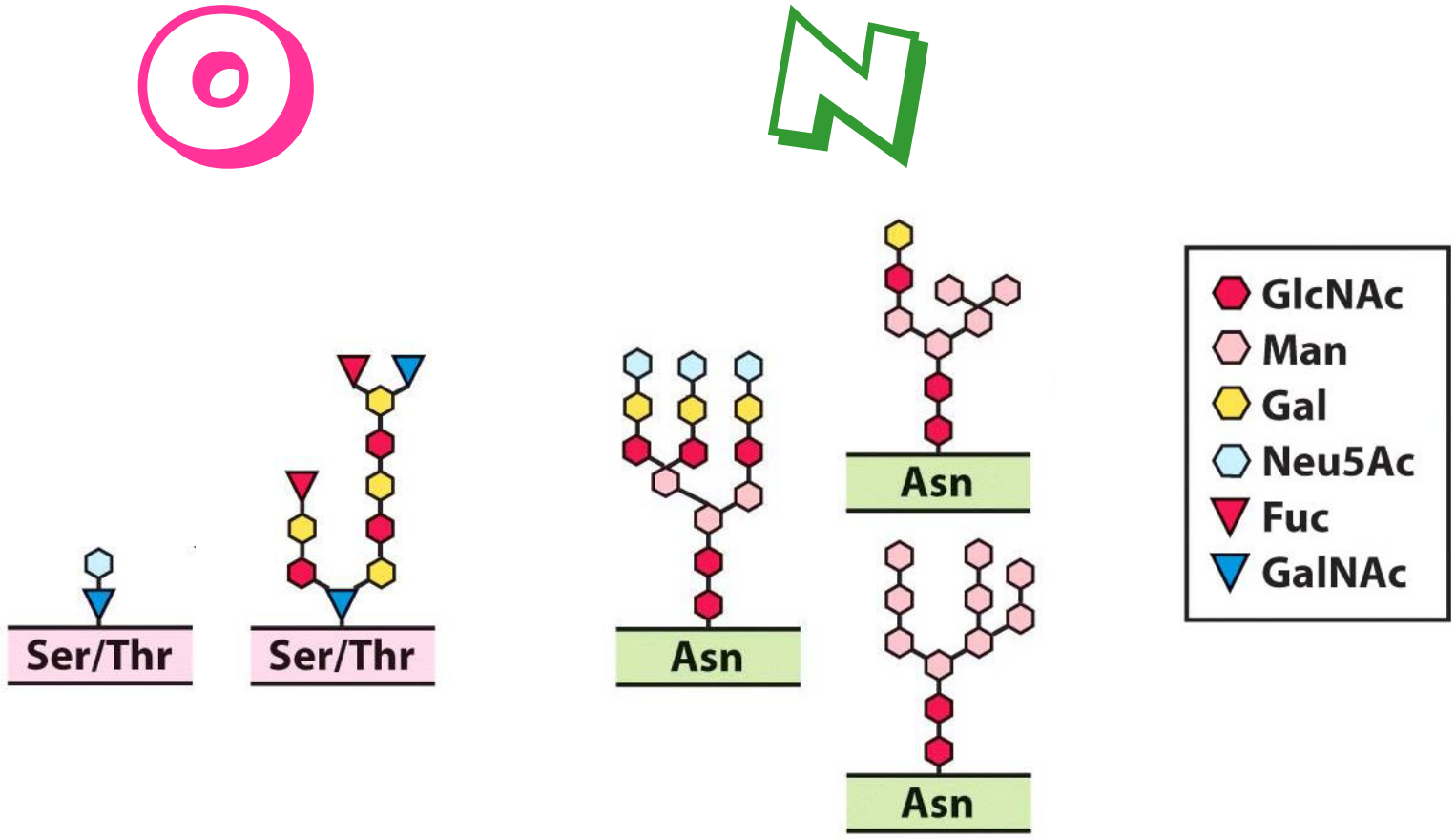
Immunoglobulin

→ 抗體由四條 蛋白質 長短鍊所組成 (兩長兩短)

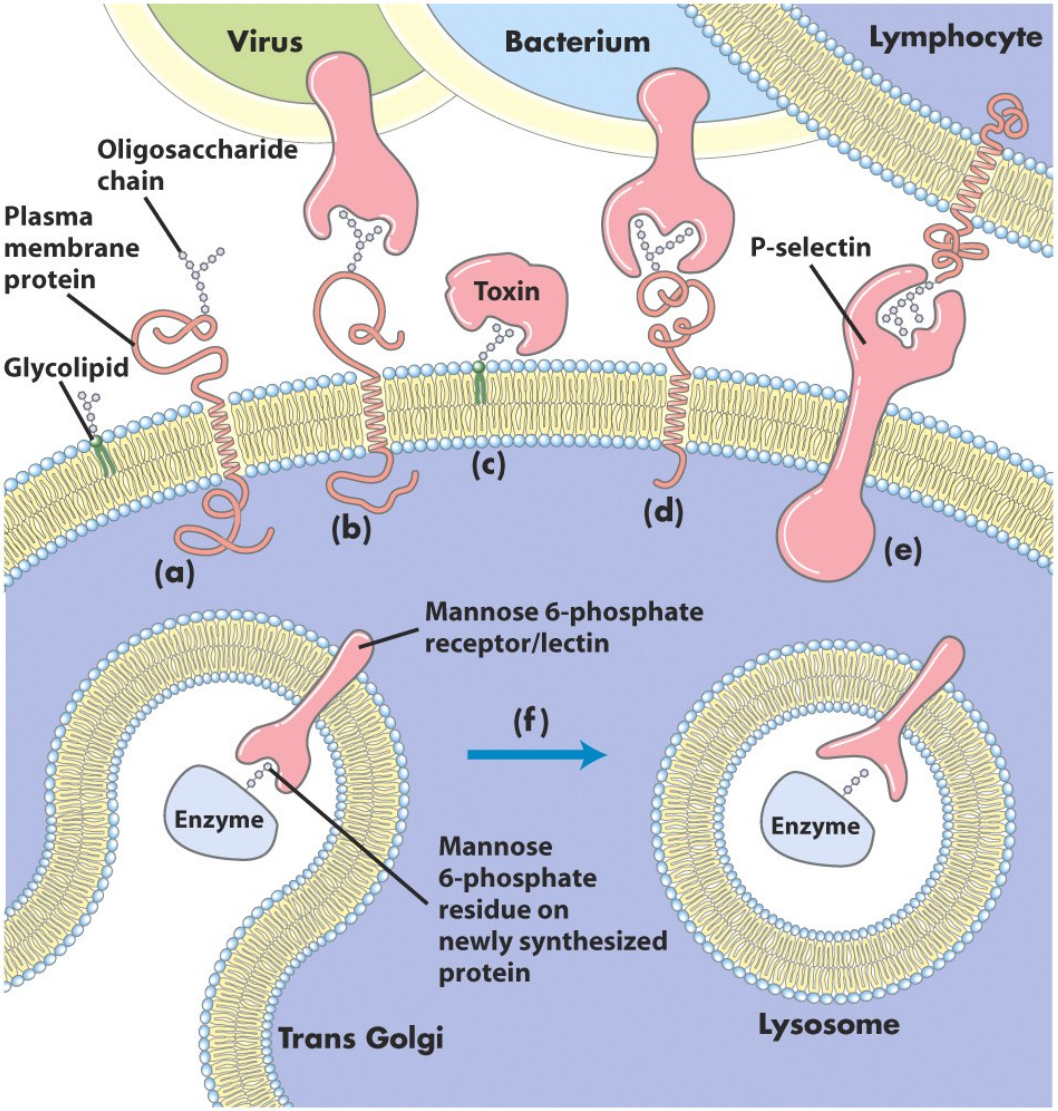
→ 抗體分子上有兩個▼抗原結合區 (二者相同)

→ 抗體與抗原結合具高度專一性

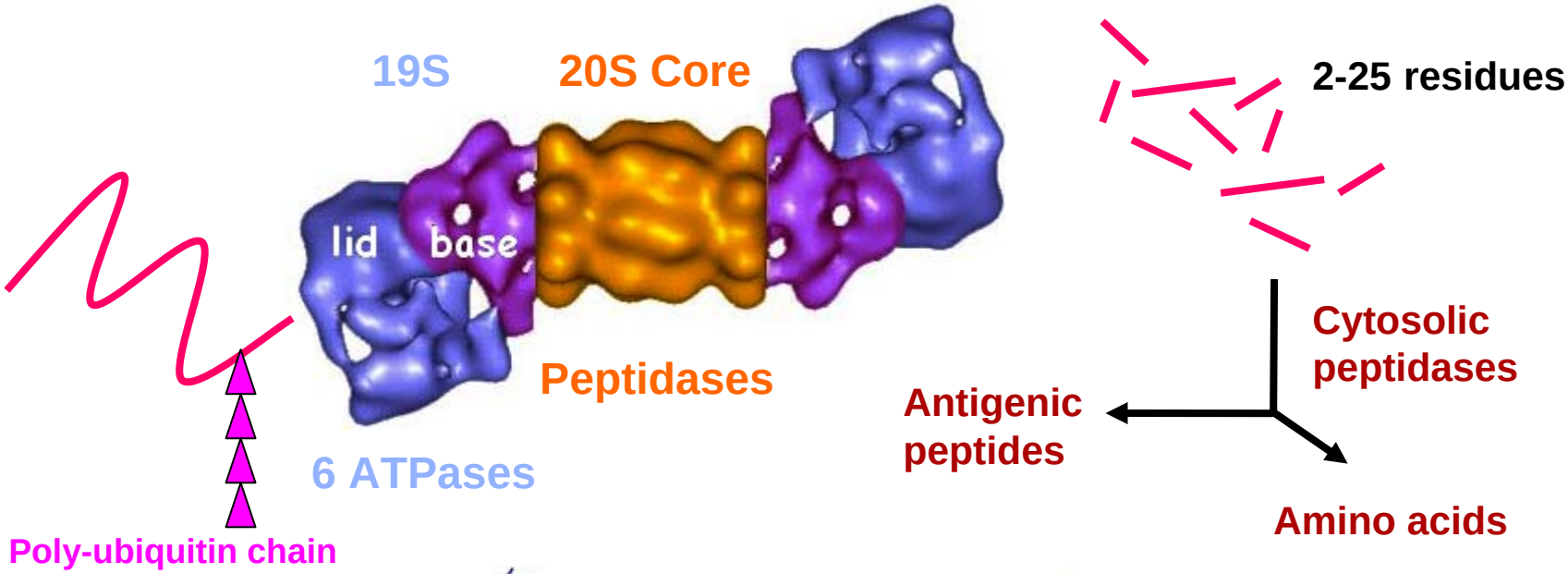
Oligosaccharide linkages in glycoprotein

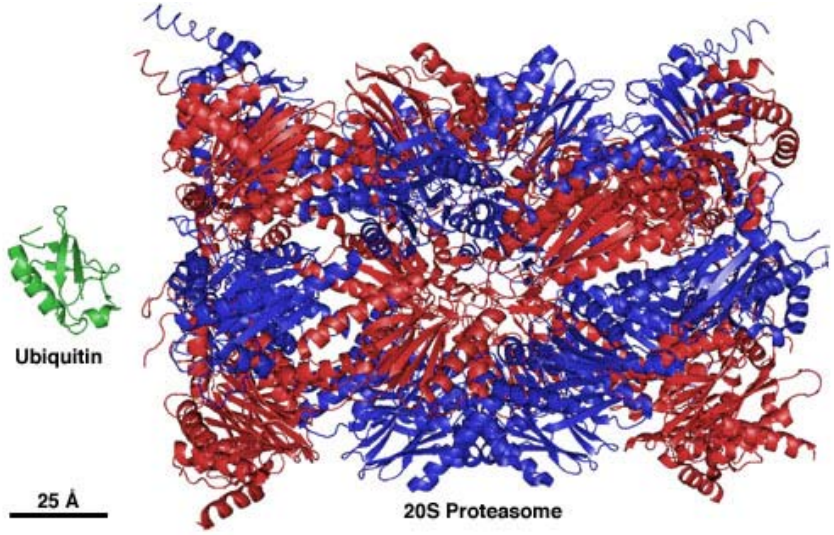


Roles of oligosaccharides in recognition and adhesion at the cell surface



Steps Involved in Protein Degradation

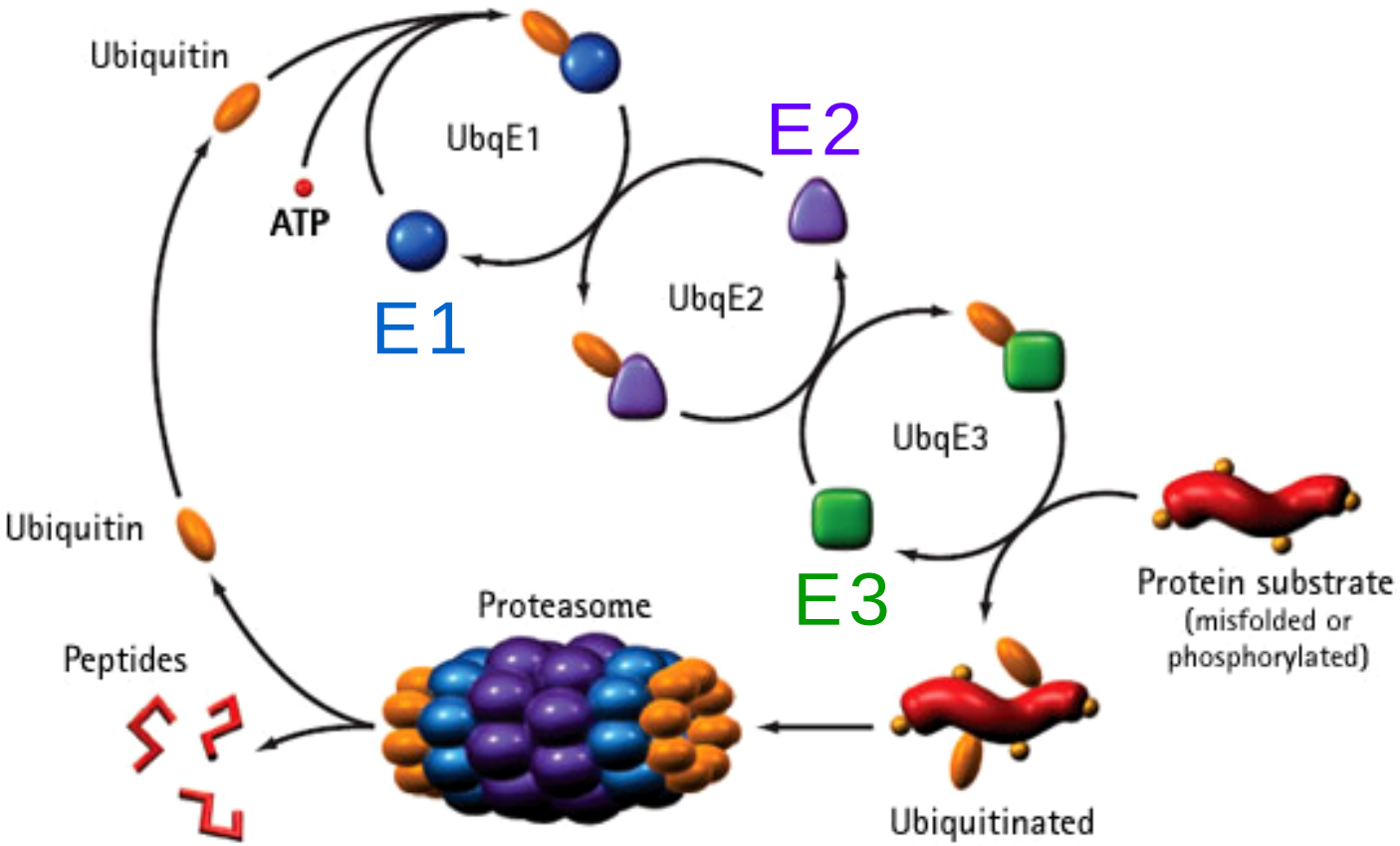




The structure of the molecular chaperone

GroEL GroES-GroEL GroES-GroEL-GroES

The ubiquitination cascade

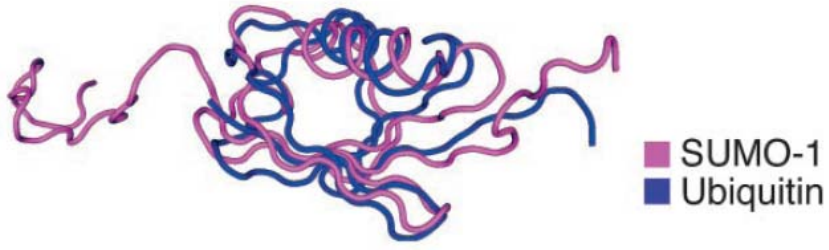


Degradation

Comparison of *ubiquitin* and SUMO

Small Ubiquitin-like Modifier (SUMO)

(a)



(b)

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Ubiquitin                          MQIFVKTLTGKTITLEVEPSDTIENV 26
SUMO-1   MSD----QEAKPSTEDLGDKKEGEYIKLKVIGQDSSEIHFKVKMTTHLKKL 47
SUMO-2   MSE----EKPKEGVK--TEN---DHINLKVAGQDGSVVQFKIKRHTPLSKL 42
SUMO-3   MAD----EKPKEGVK--TENN--DHINLKVAGQDGSVVQFKIKRHTPLSKL 43
Smt3     MSDSEVNQEAKPEVK--PEVKPETHINLKVS-DGSSEIFFKIKKTTPLRRL 48

Ub       KAKIQDKEGIPPDQQRLIFAGKQLEDGRTLSDYNIQKESTLHLVLRLRGG  76
SUMO-1   KESYCQRQGVPMNSLRFLFEGQRIADNHTPKELGMEEEDVIEVYQEQTGG  97
SUMO-2   MKAYCERQGLSMRQIRFRFDGQPINETDTPAQLEMEDEDTIDVFQQQTGG  92
SUMO-3   MKAYCERQGLSMRQIRFRFDGQPINETDTPAQLEMEDEDTIDVFQQQTGG  93
Smt3     MEAFAKRQGKEMDSLRFLYDGIRIQADQTPEDLDMEDNDIIEAHREQIGG  98
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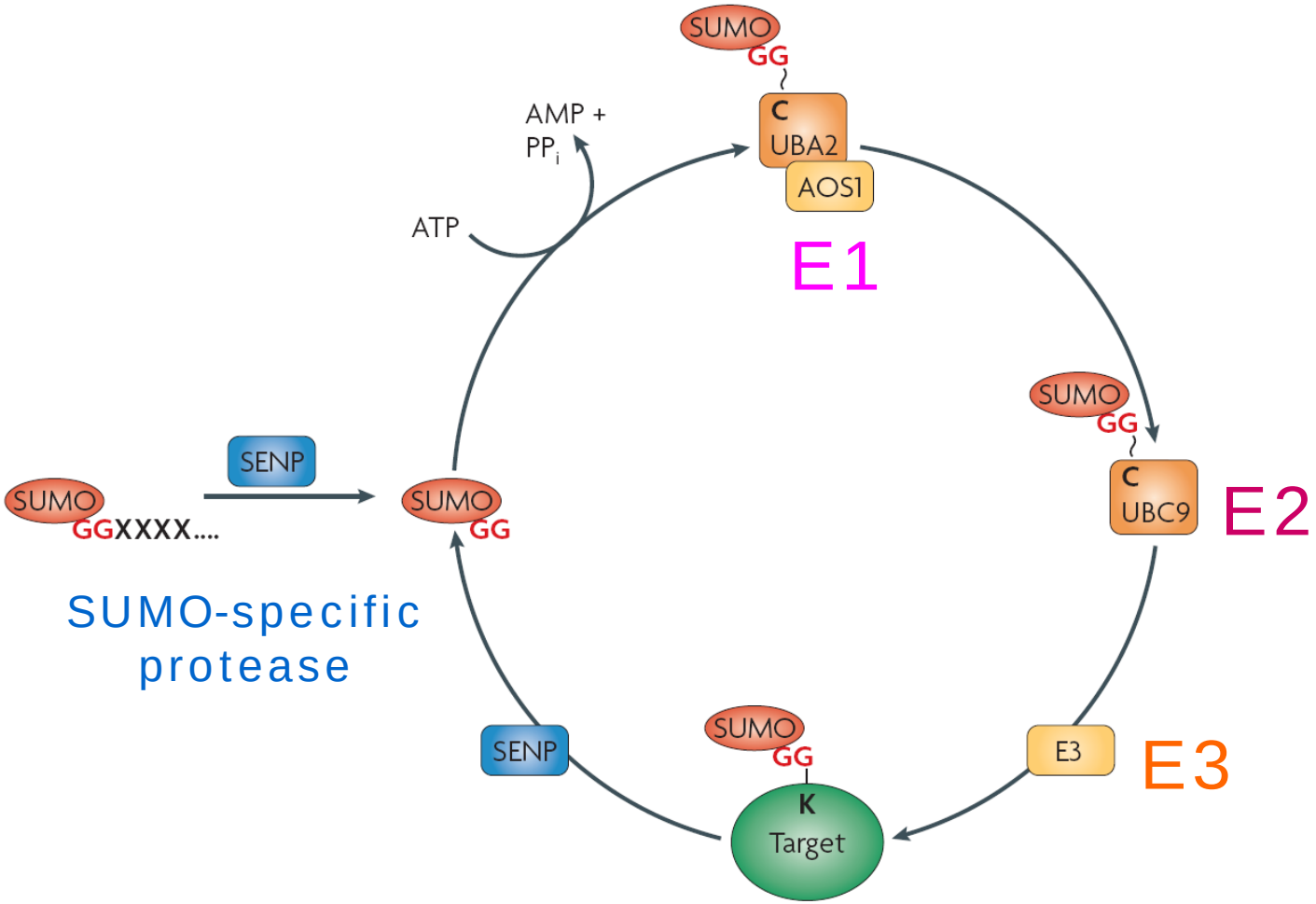
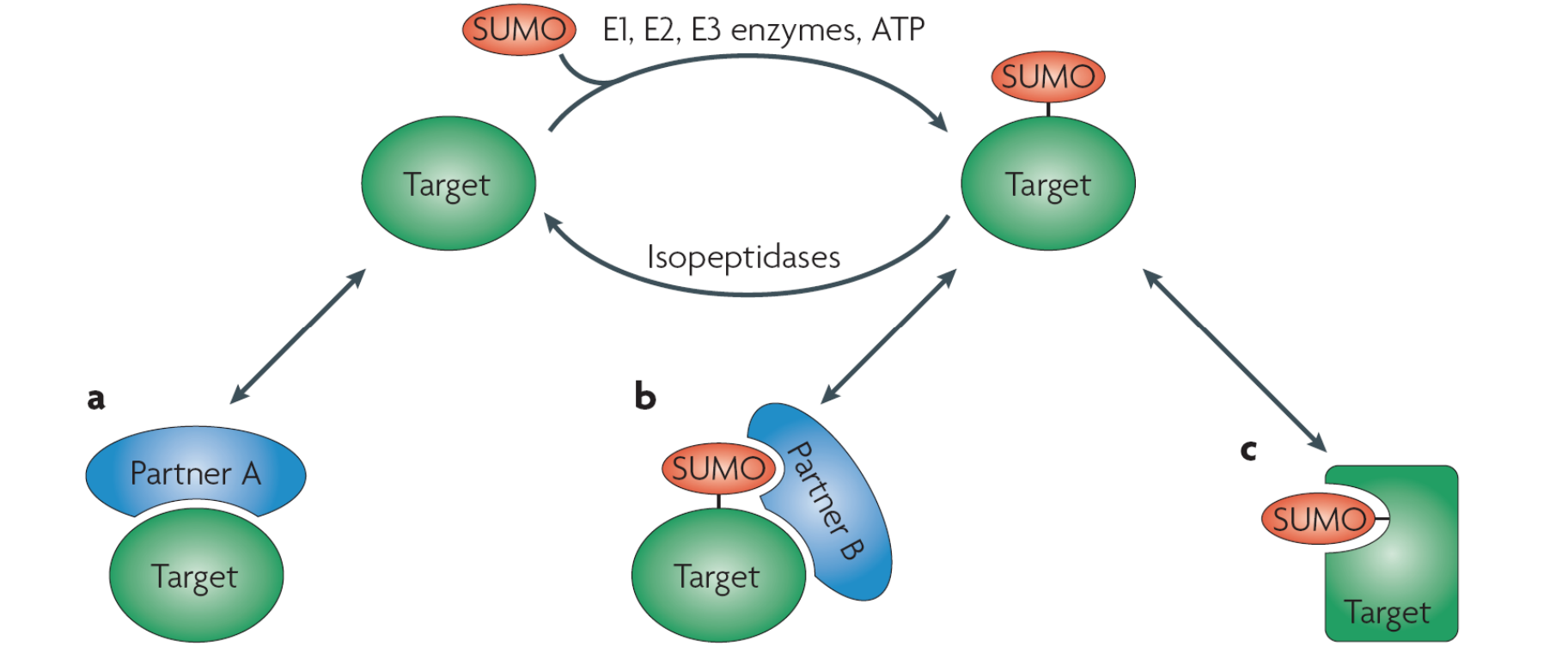
C-terminal GG motif

The mechanism of reversible sumoylation



Molecular consequences of sumoylation



Interfere interaction

Provide a binding site

Conformational change

More active or inactive

SUMO participates in diverse cellular processes

DNA DAMAGE REPAIR

Chromosome segregation

NUCLEAR TRANSPORT

Cell division

Signal transduction

HYPOXIA

Stress response

INFLAMMATORY RESPONSE

Oncogenesis

flowering time in plants