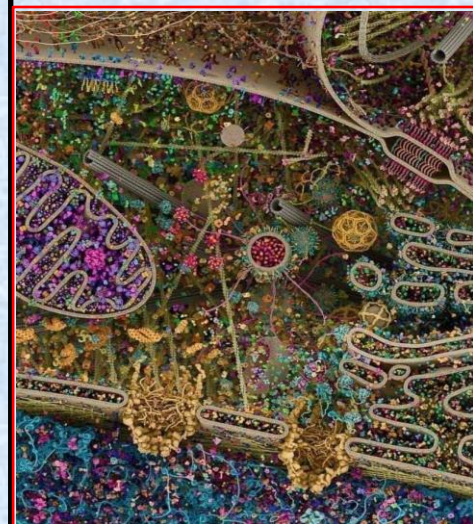


General Animal Biology

Zoo-109

علم الأحياء

109- حين



For Pre-Medical Students



Common First Year

السنة الأولى المشتركة - المسار الصحي

1444-H - 2023

Reference: Campbell, N. A. and Reece, J. B. (2014). *Biology (10th edition)*. Pearson Education. Inc. USA.

عمادة التعليم الإلكتروني والتعلم عن بعد
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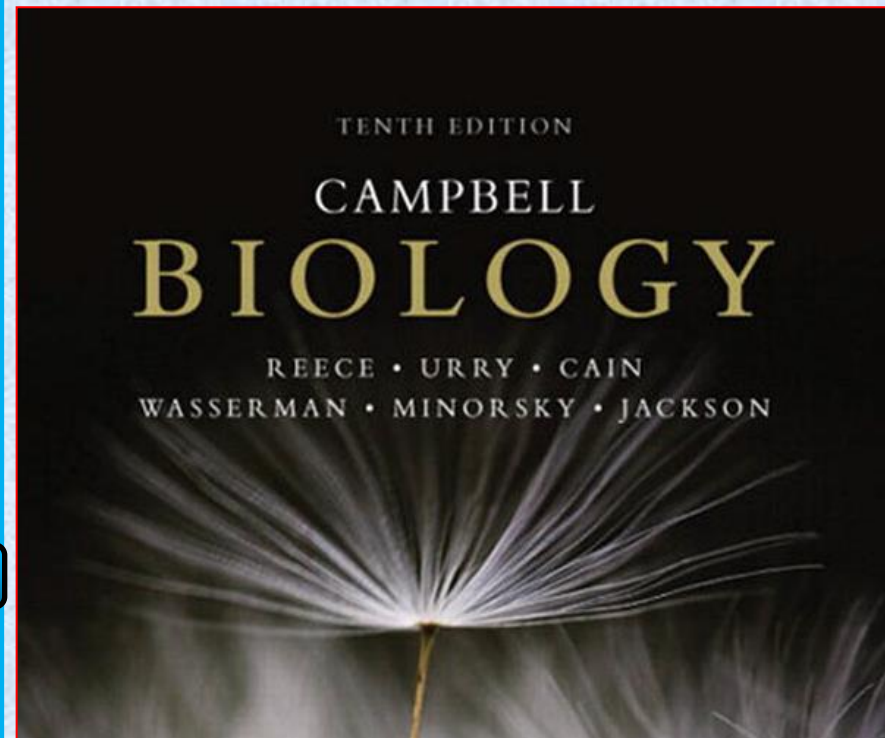
جامعة الملك سعود

جامعة
الملك سعود
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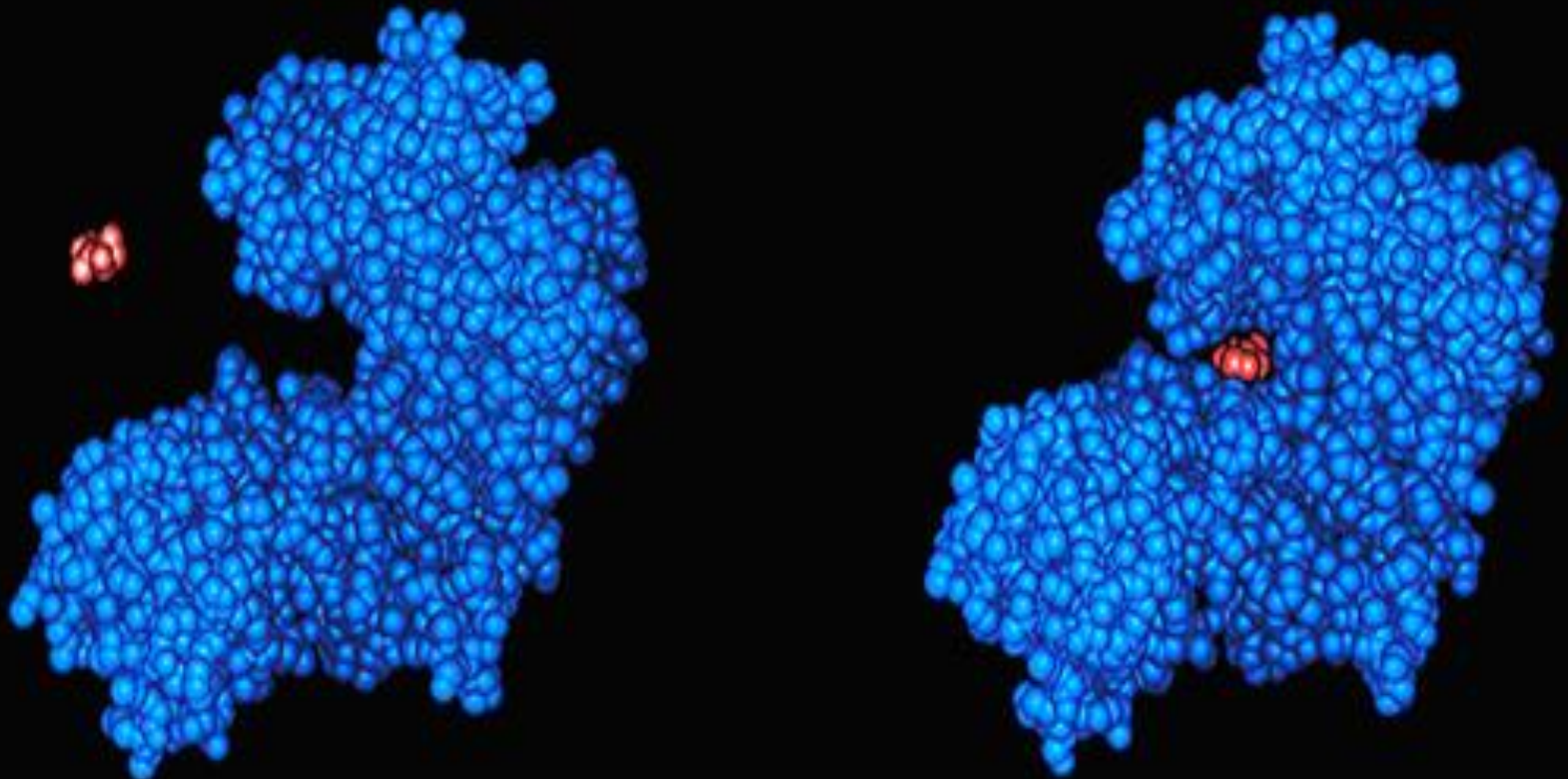
College of Science,
Zoology Department

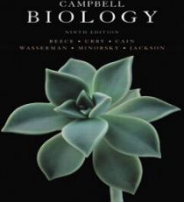
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بِسْمِ اللّٰهِ الرَّحْمٰنِ الرَّحِیْمِ

AN INTRODUCTION TO METABOLISM





Objectives



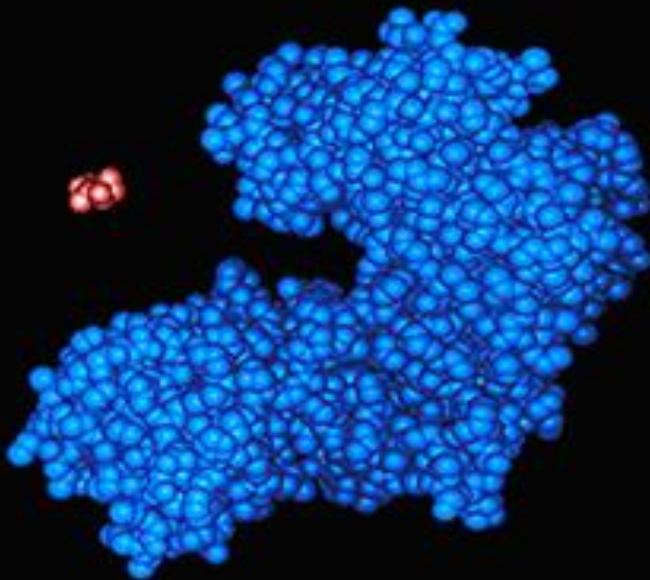
The Control of Metabolism via regulation of enzymes

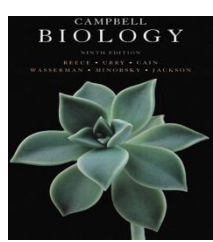
A. Allosteric Regulation of Enzymes

- Allosteric Activation
- Allosteric Inhibition
- Feedback Inhibition

B. Cooperativity regulation.

التحكم في الإنزيم

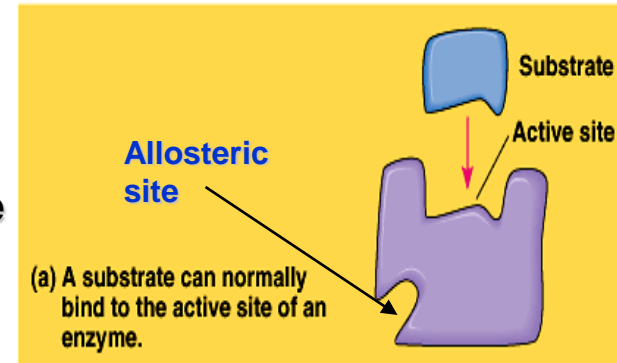




The Control of Metabolism

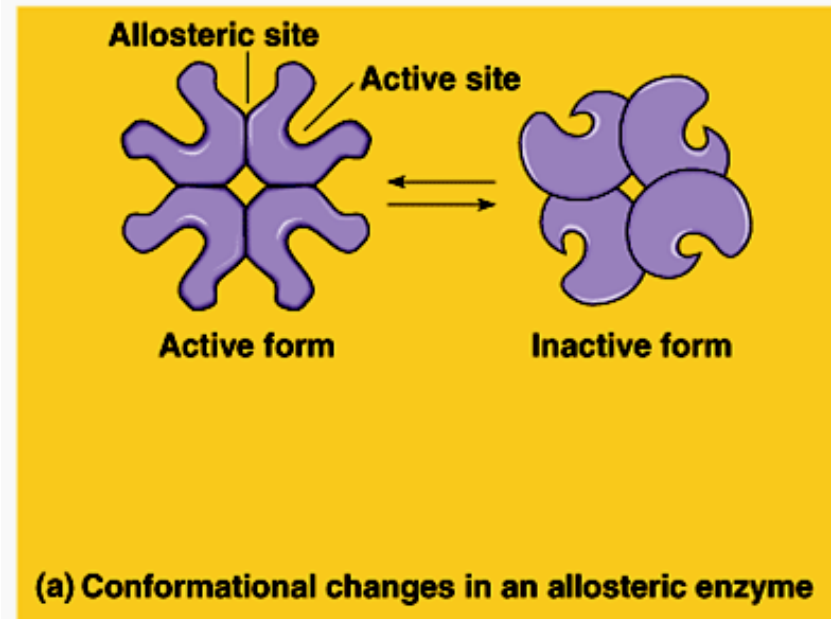


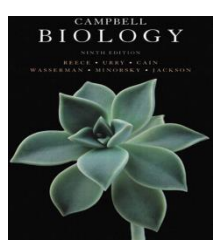
- In many cases, the molecules that naturally regulate enzyme activity behave like reversible noncompetitive inhibitors.
- These molecules often bind weakly to an **allosteric site** which is a specific receptor on the enzyme that is not the active site.
- These molecules can either **inhibit** or **stimulate** enzyme activity.



A)- Allosteric Regulation: التنظيم الألوستيري

- Most allosterically regulated enzymes are constructed of two or more polypeptide chains.
- Each subunit has its own **active site**. The **allosteric sites** are often located where subunits are joined.
- The whole protein exists in two conformational shapes, The **active form**, and the **inactive form**.





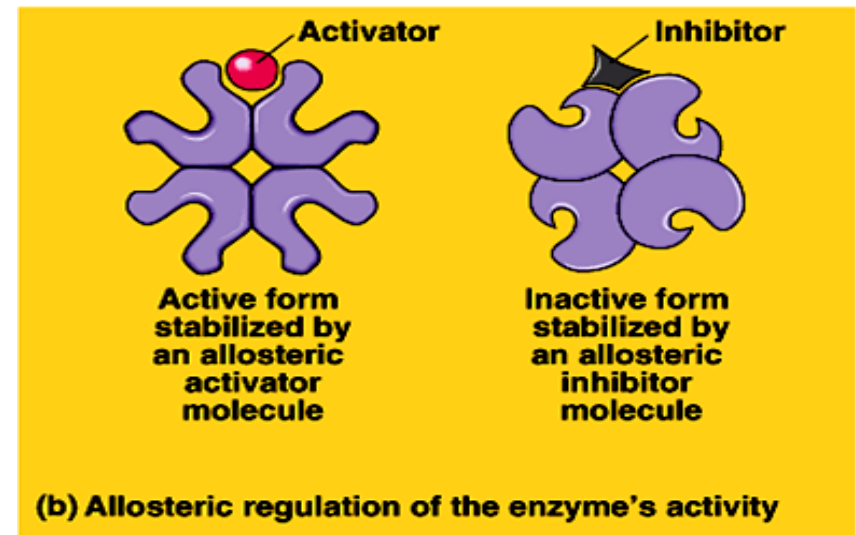
The Control of Metabolism

a)- Allosteric activators منشطات:

It stabilizes the conformation that has a functional active site.

b)- Allosteric inhibitors مثبطات:

It stabilizes the conformation that lacks an active site.



- In many cases, both inhibitors and activators are similar enough in shape that they compete for the same allosteric sites.
- These molecules may be products and substrates of a metabolic pathway.

c)- Feedback inhibition

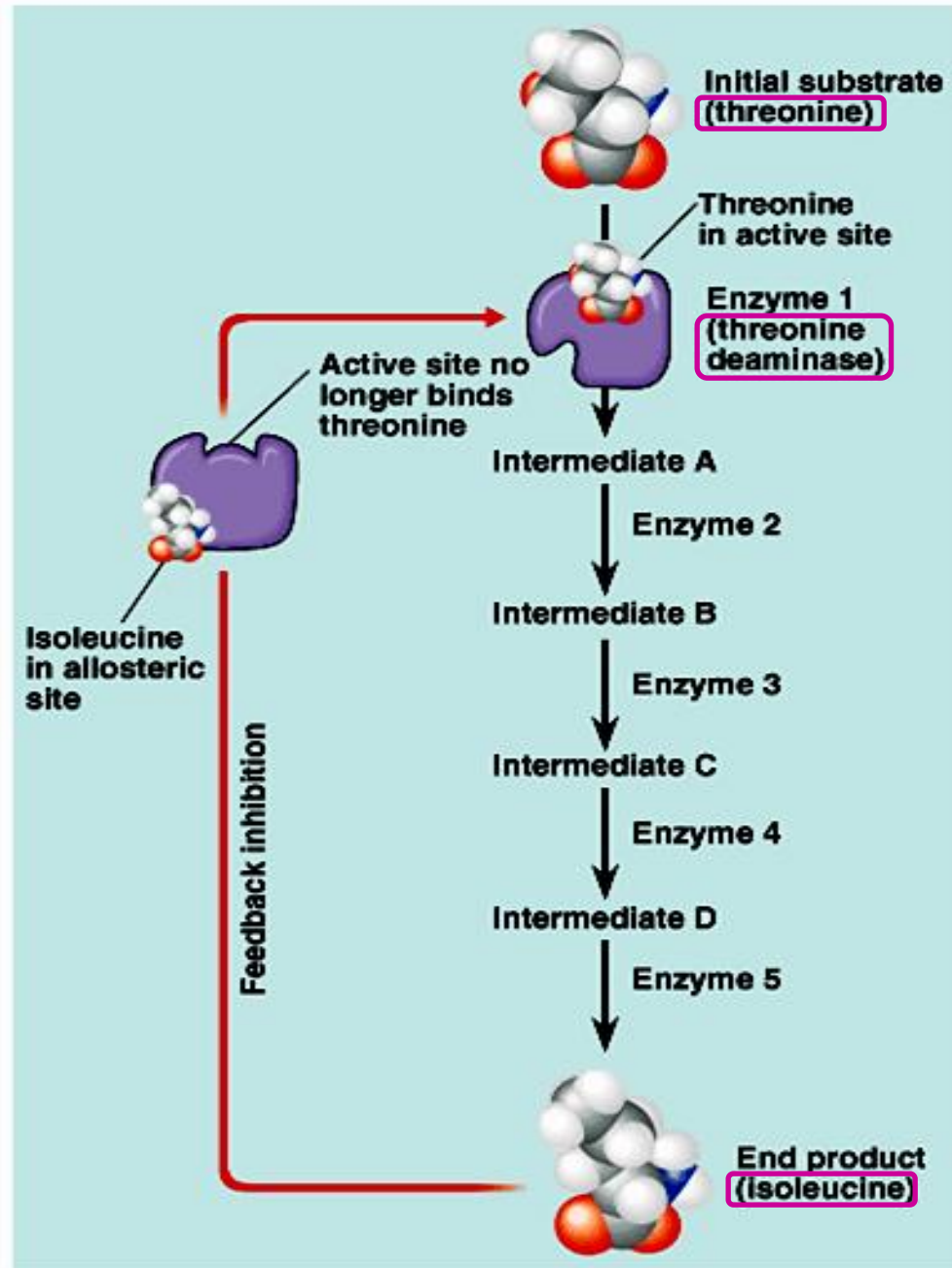
التثبيط بالأثر الراجع:

It is one of the common methods of metabolic control in which a metabolic pathway is turned off **يتوقف** by its end product **النتاج النهائي**.

- **Example:**

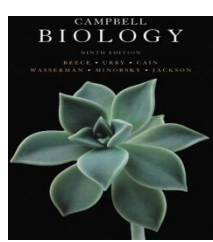
The production of **Isoleucine** from **Threonine** by **Threonine deaminase**:-

- The end product acts as an inhibitor of an enzyme in the pathway.
- When the product is abundant **متوفر**, the pathway is turned off, when rare **قليل** the pathway is active.





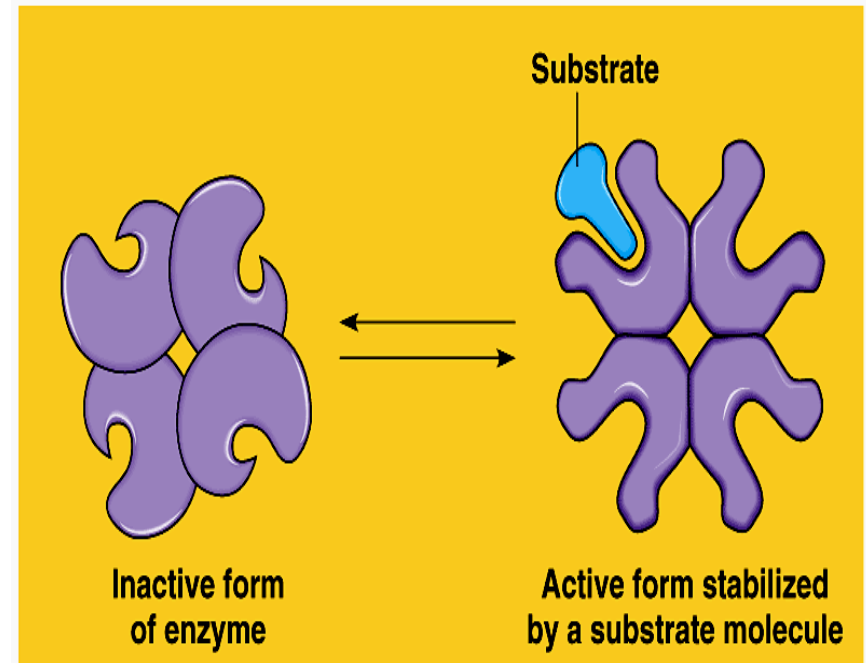
Video: plays in LMS



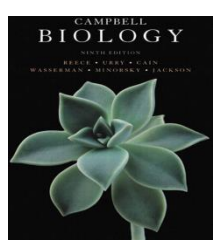
B)- Cooperativity regulation التنظيم التضامني



- It occurs in enzymes with multiple catalytic subunits. binding a substrate to **one active site** stabilizes favorable conformational changes at all other subunits, a process called **cooperativity** التضامنية.



- This mechanism amplifies **يُزيد** the response **استجابة** of enzymes to substrates, making the enzymes accept additional **إضافي** substrates.



Summary of metabolic control



The cell is controlling its metabolism by regulating enzyme activity:

1)- Allosteric Regulation:

Regulatory molecules that bind weakly to an **Allosteric site** of the enzyme (**Allosteric Enzymes**) in order to inhibit or stimulate the enzyme activity

- A)- Allosteric activation.
- B)- Allosteric inhibition
- C)- Feedback inhibition.

2- Cooperativity.

Stabilizes favorable conformational changes at all other subunits to make the enzyme more efficient.

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General Animal Biology
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Thank you very much

شكراً جزيلاً

Zoology Department