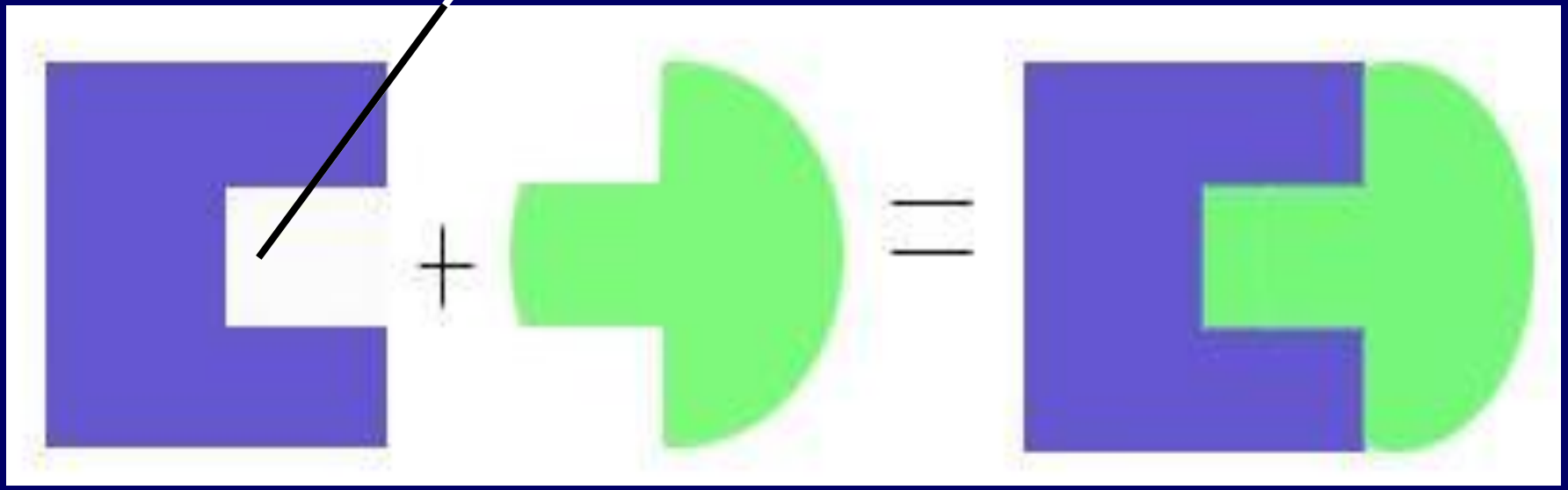
LES ENZYMES.
LES ASPECTS MEDICAUX DE L'ENZYMOLOGIE

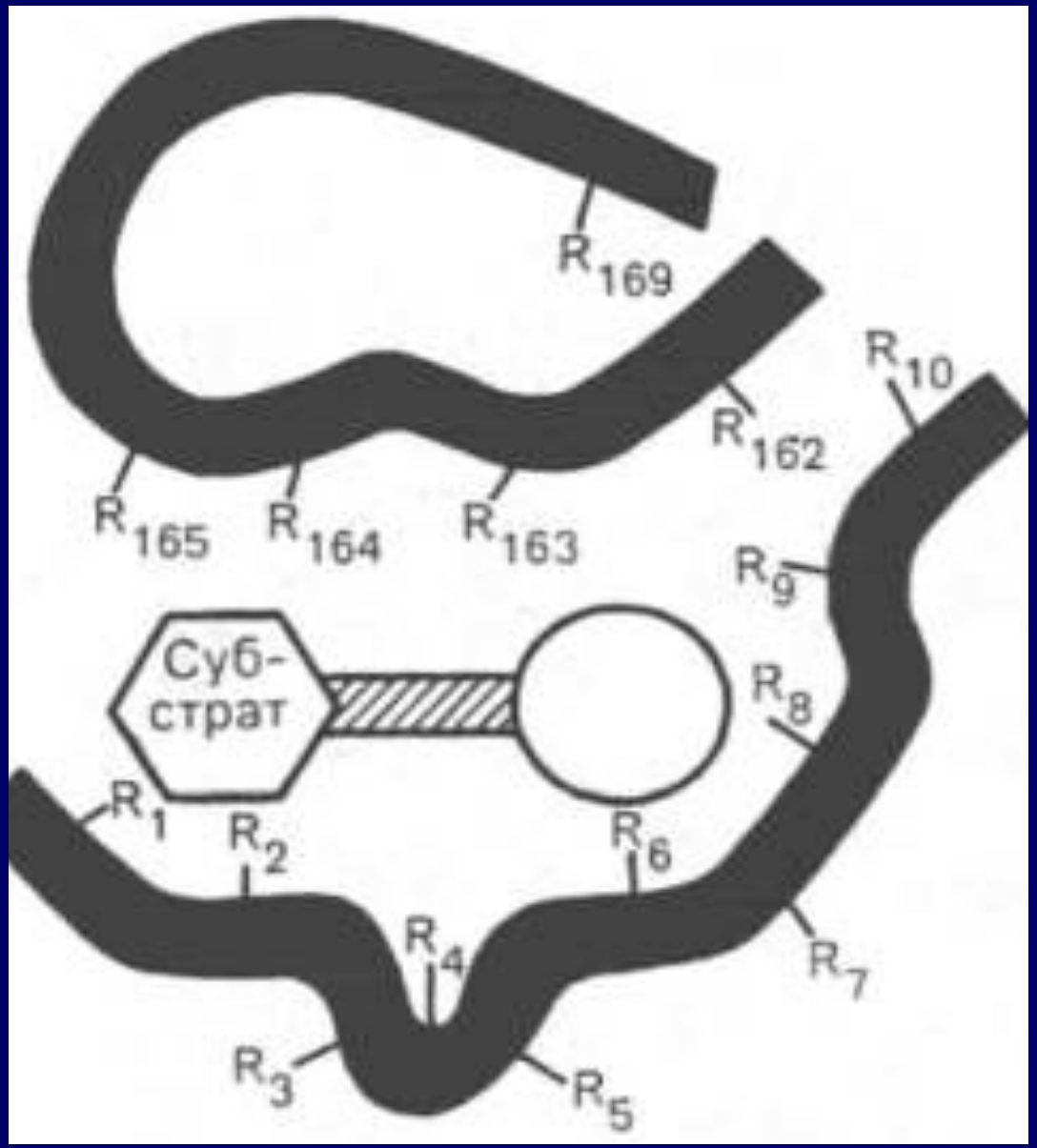
LA COENZYME LIANT LE DOMAINE

L'ENZYME INACTIVE

LA VITAMINE

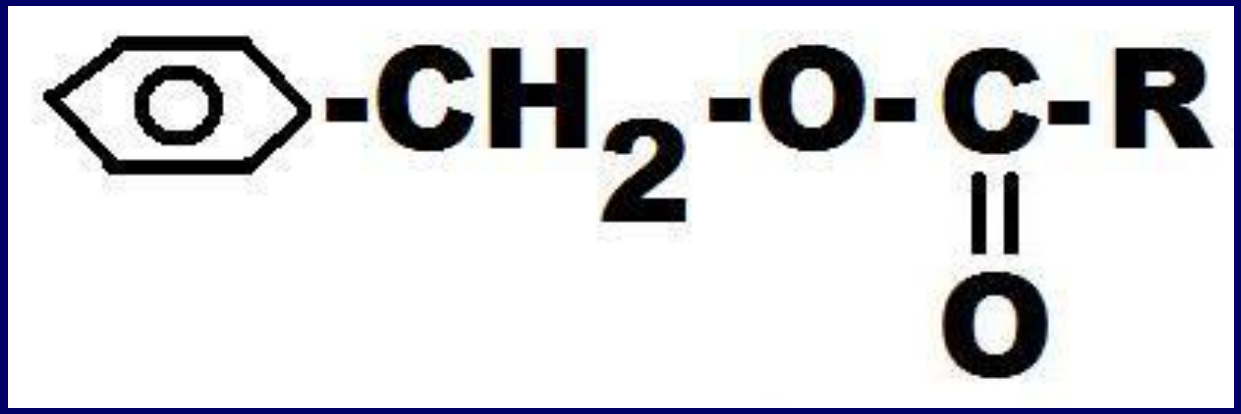
L'ENZYME ACTIVE





LE CENTRE ACTIF DES ENZYMES

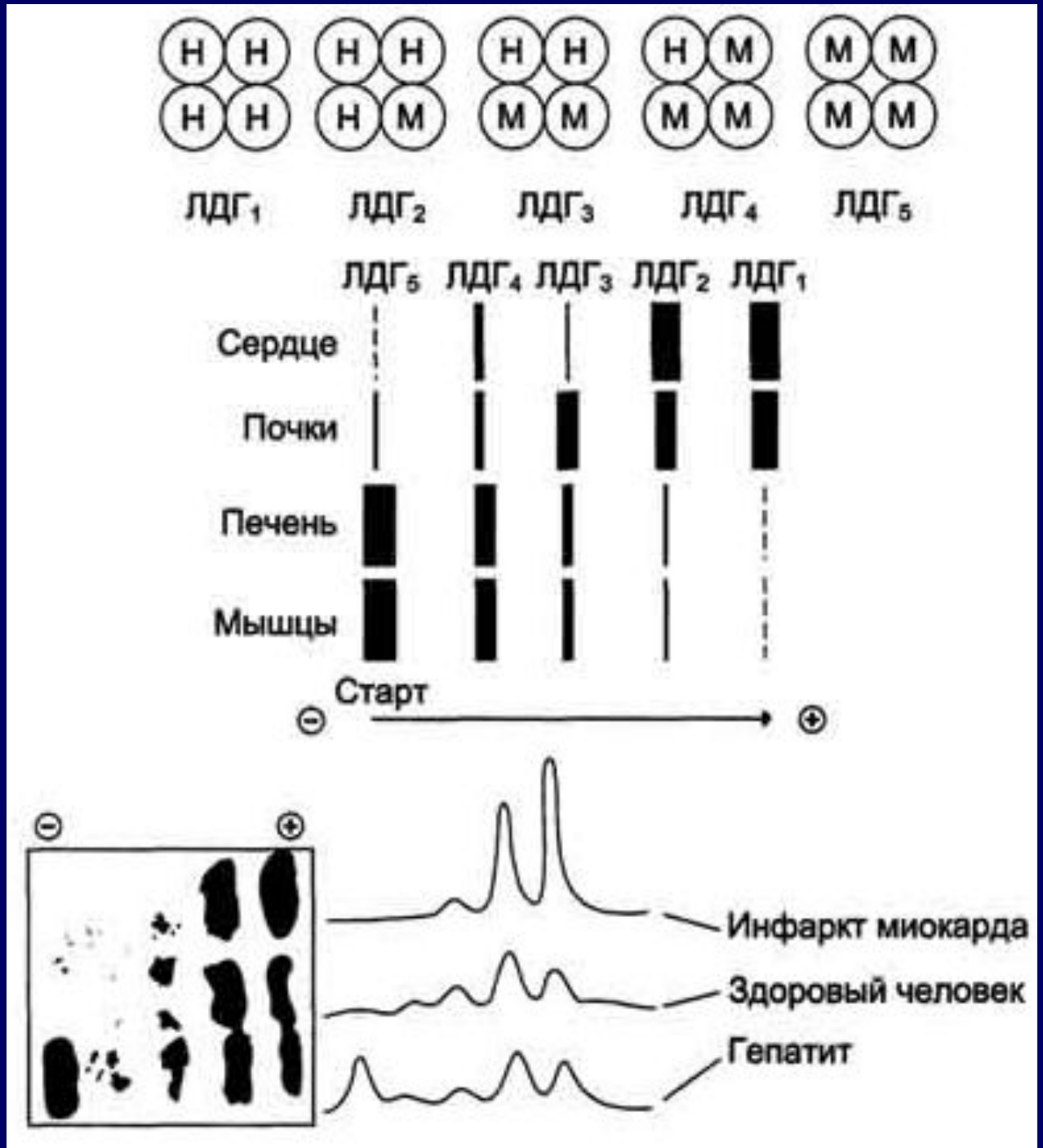
LA MOLECULE DE CHIMOTRYPSINOGENE



LE CENTRE LIANT

LE CENTRE CATALYTIQUE

LE CENTRE ACTIF


Н Н
Н Н
ЛДГ1
Н Н
Н М
ЛДГ2
Н Н
М М
ЛДГ3
Н М
М М
ЛДГ4
М М
М М
ЛДГ5
ЛДГ5 ЛДГ4 ЛДГ3 ЛДГ2 ЛДГ1
Сердце
Почки
Печень
Мышцы
Старт
Инфаркт миокарда
Здоровый человек
Гепатит

LA CLASSIFICATION DES ENZYMES

1. LES OXYDOREDUCTASES
2. LES TRANSFERASES
3. LES HYDROLASES
4. LES LYASES (SYNTHASES)
5. LES ISOMERASES
6. LES LIGASES (SYNTHETASES)

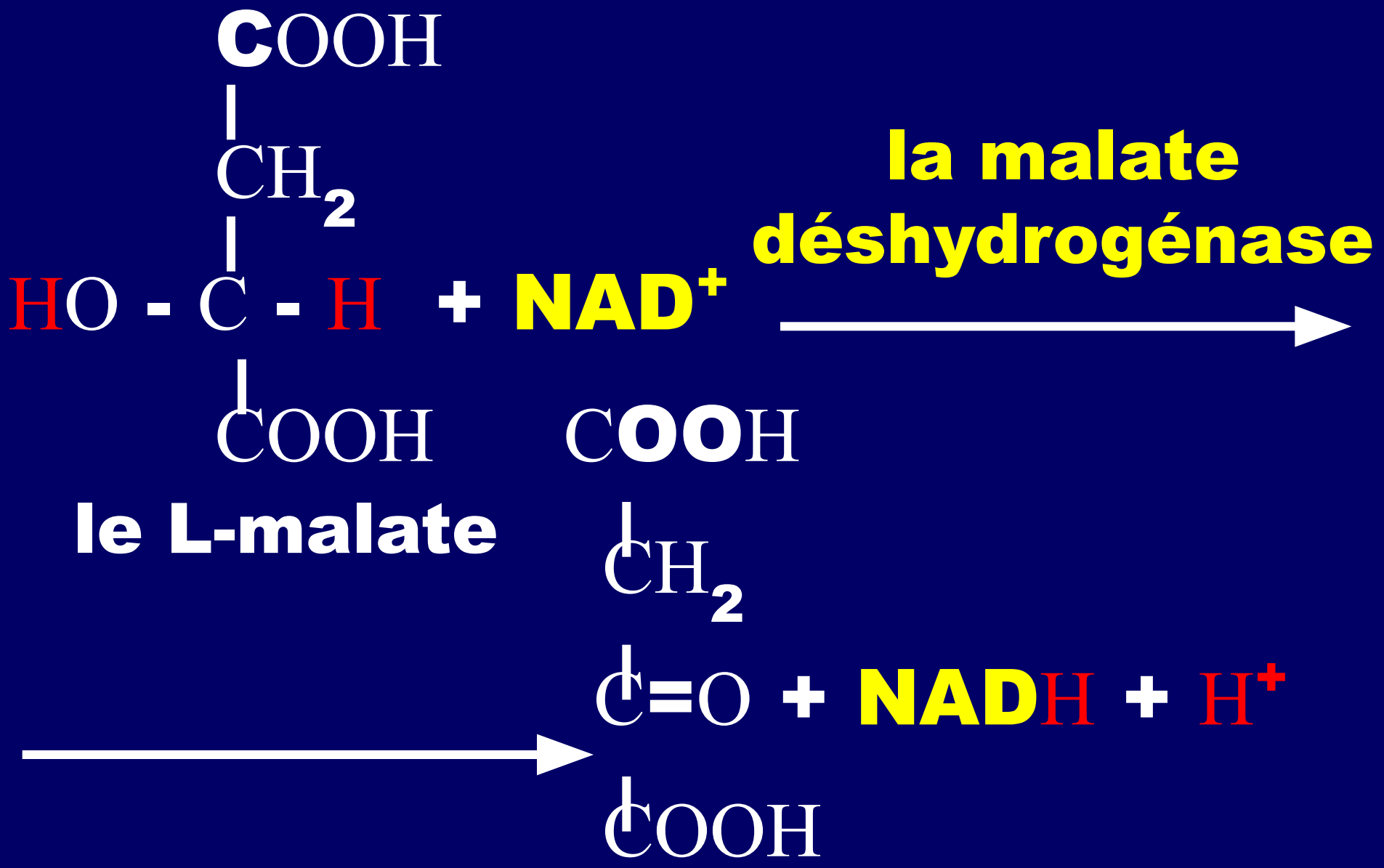
1. LES OXYDOREDUCTASES

LES DESHYDROGENAES AEROBIES (LES OXYDASES)

LES DESHYDROGENASES ANAEROBIES

LES COENZYMES DES OXYDOREDUCTASES

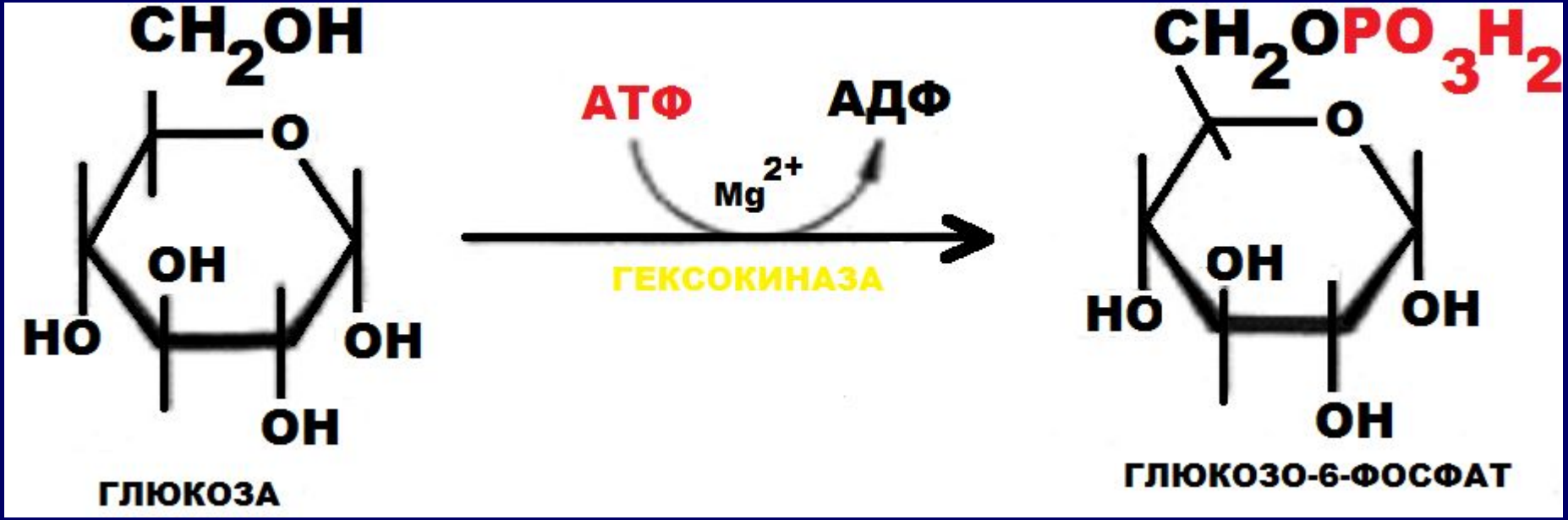
LA FORME OXYDEE	LA FORME REDUITE
NAD^+	$NADH + H^+$
FAD	$FADH_2$
$NADP^+$	$NADPH+H^+$
FMN	$FMNH_2$


COOH
CH2
HO - C - H + NAD+
COOH
la malate déshydrogénase
le L-malate
COOH
CH2
C=O + NADH + H+
COOH
l'oxaloacétate

2. LES TRANSFERASES

- PHOSPHOTRANSFERASES
- AMINOTRANSFERASES
- PROTEINES KINASES
- GLYCOSYLTRANSFERASES
- ACYLTRANSFERASES

LA PHOSPHOTRANSFERASE:

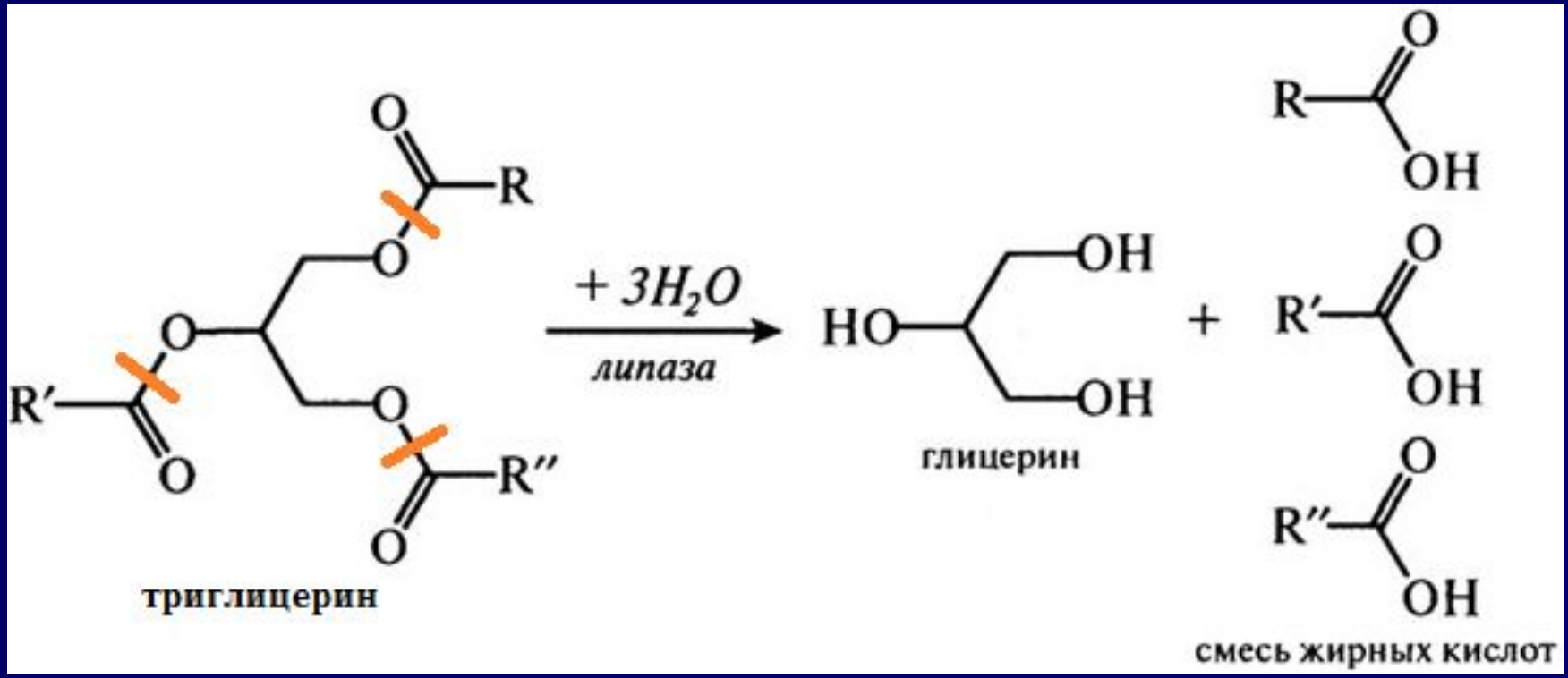


L’AMINOTRANSFERASE:

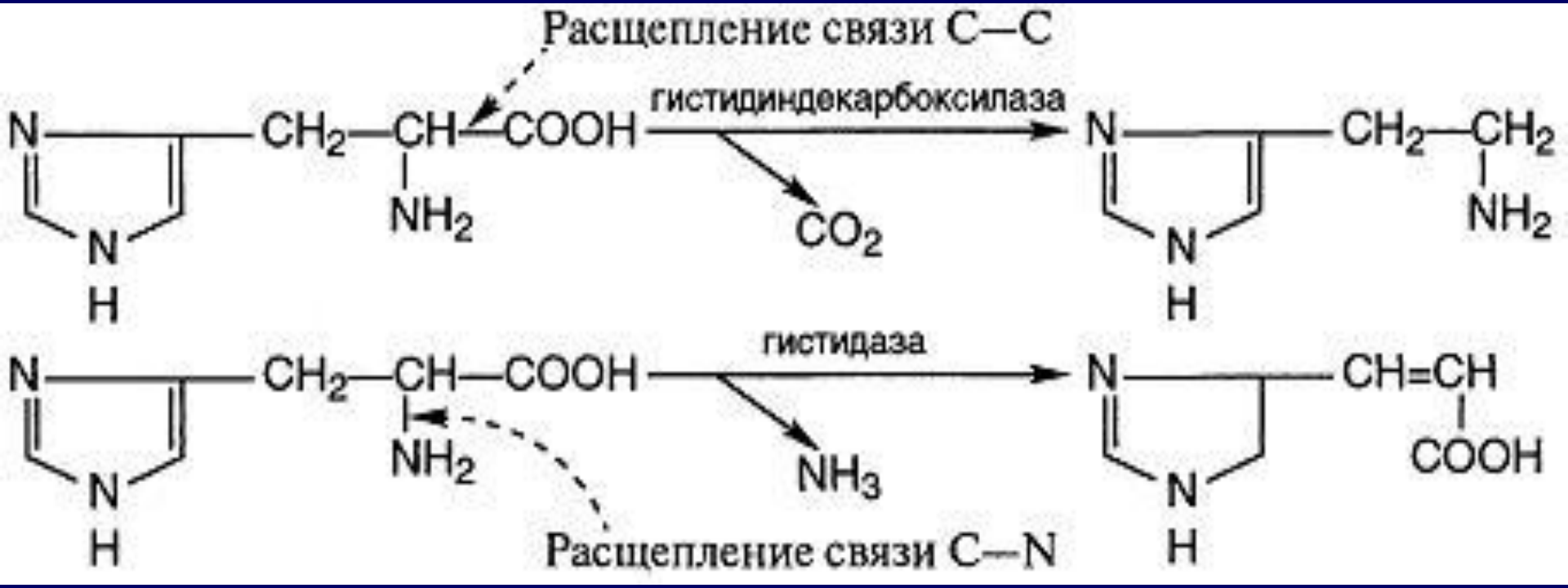
3. LES HYDROLASES

- ESTERASES
- PHOSPHATASES
- GLYCOSIDASES
- PEPTIDES HYDROLASES

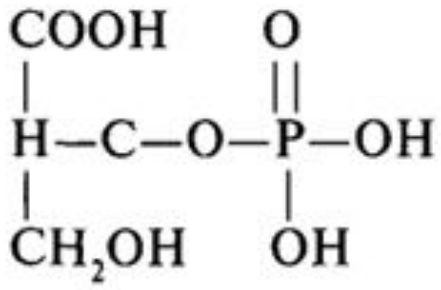
L'ESTERASE:


+ 3H2O
липаза
HO
OH
OH
+
R
OH
R′
OH
R″
OH
триглицерин
глицерин
смесь жирных кислот

4. LES LYASES (SYNTHASES)

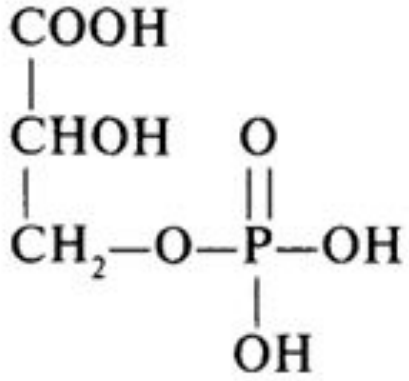


5. LES ISOMERASES

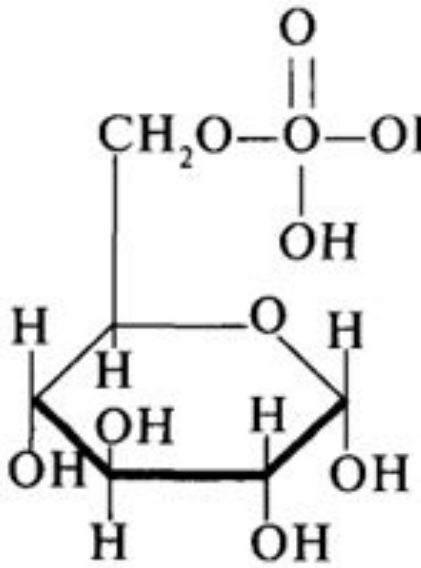


2-Фосфоглицериновая кислота

Фосфоглицерат-фосфомутаза

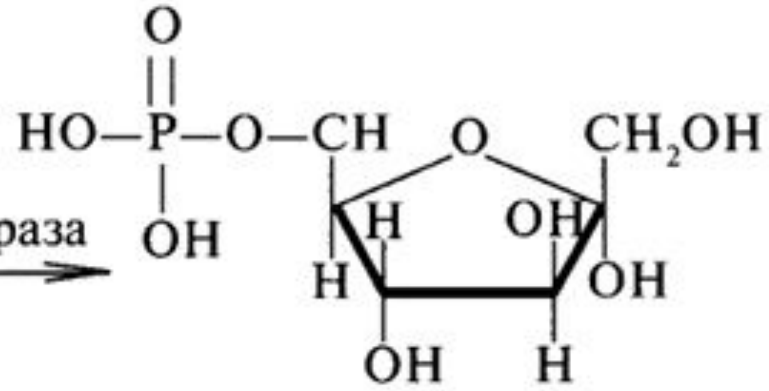


3-Фосфоглицериновая кислота



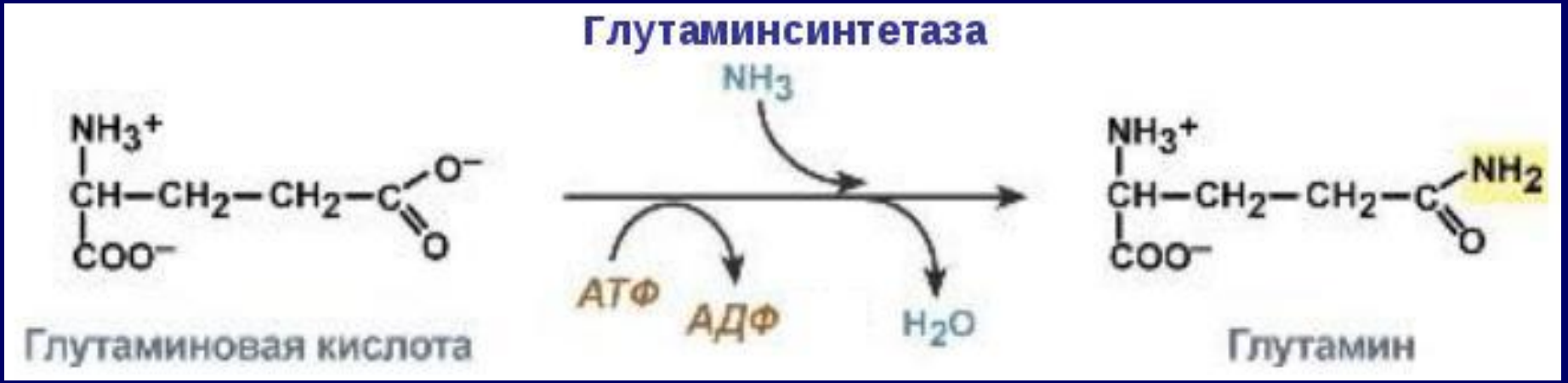
Глюкозо-6-фосфат

Глюкозофосфатизомераза

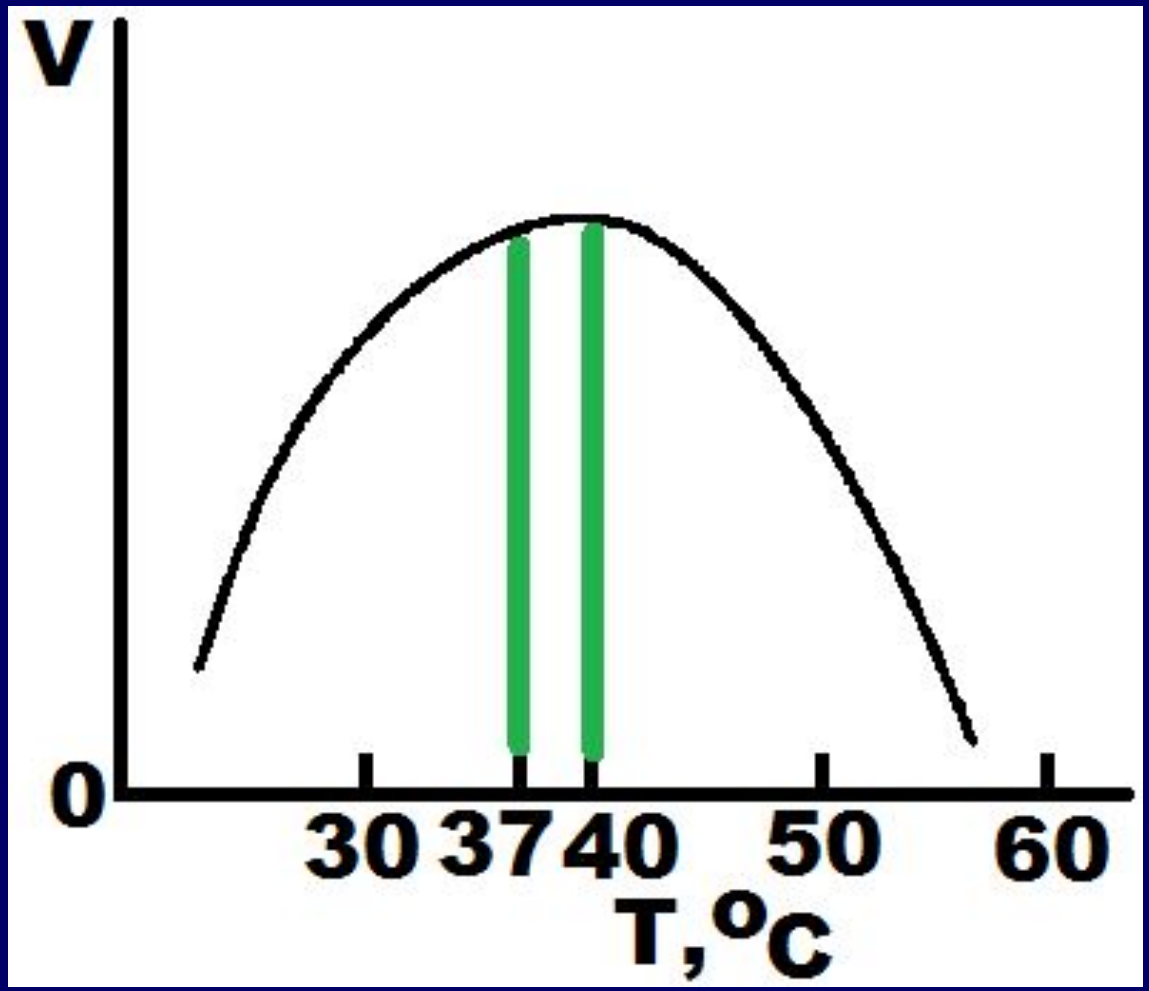


Фруктозо-6-фосфат

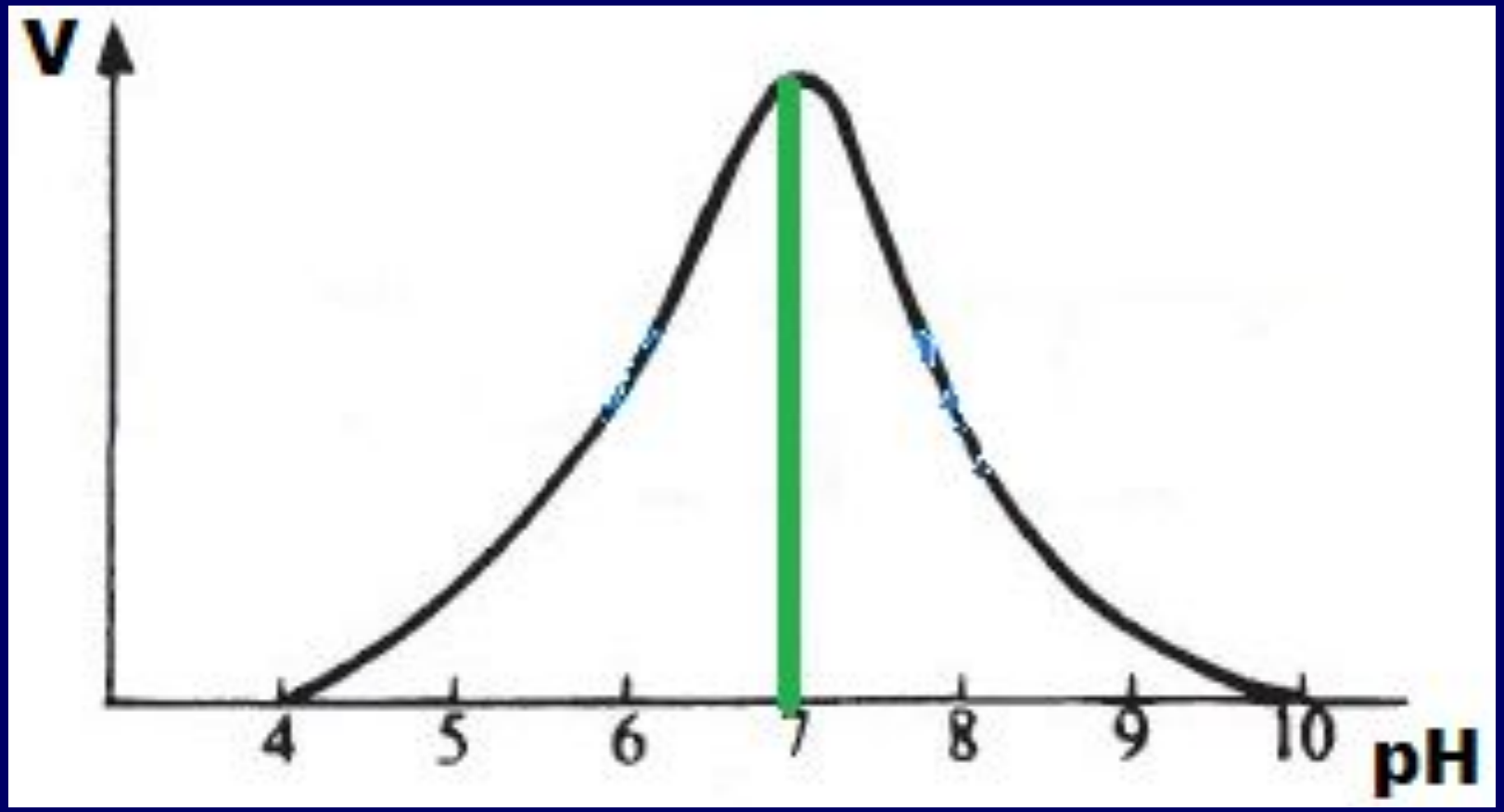
6. LES LIGASES (SYNTHETASES)



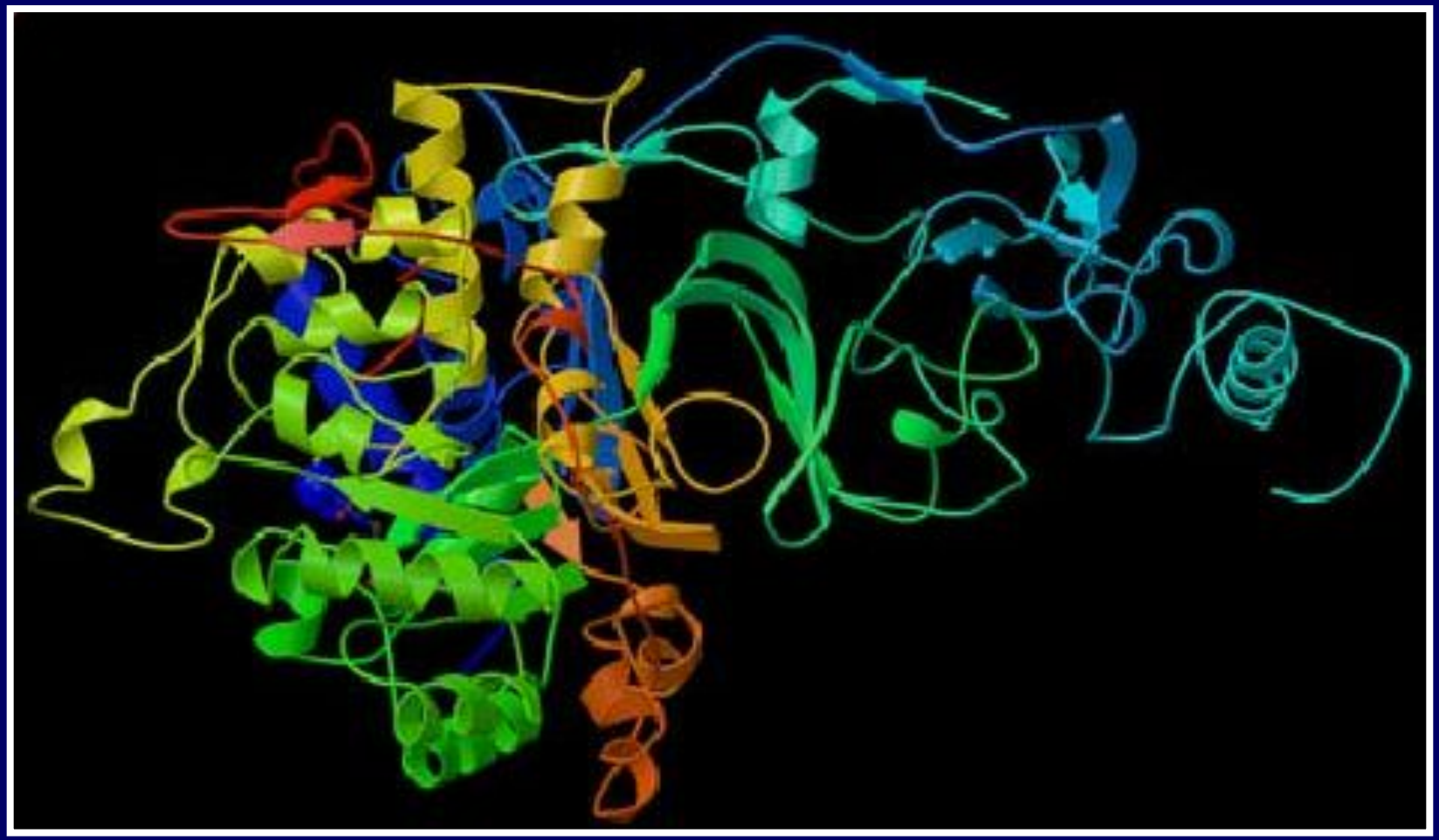
LA DEPENDANCE DE LA VITESSE DE LA REACTION ENZYMATIQUE (V) DE LA TEMPERATURE (T)

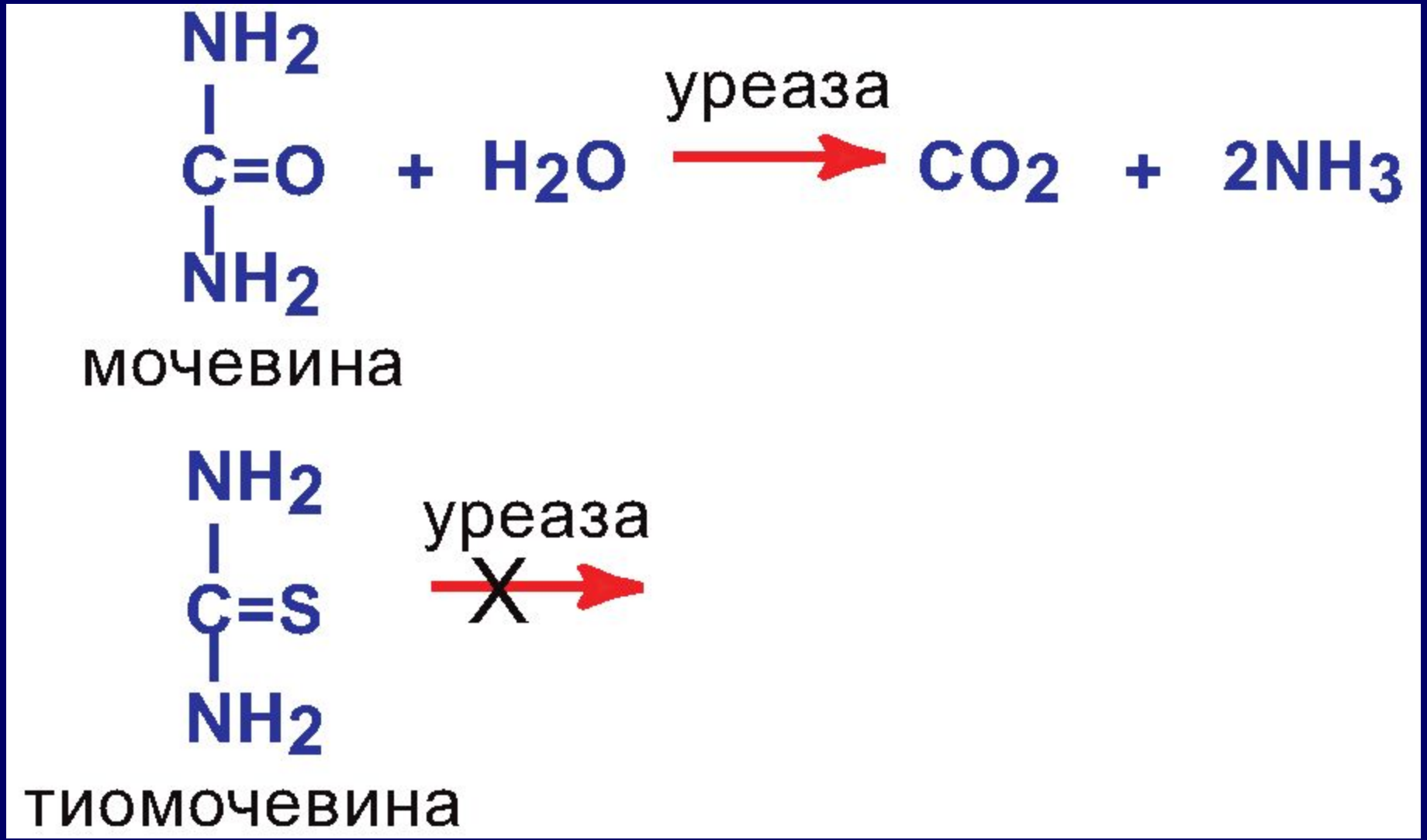


LA DEPENDANCE DE LA VITESSE DE LA REACTION ENZYMATIQUE (V) DU pH DU MILIEU

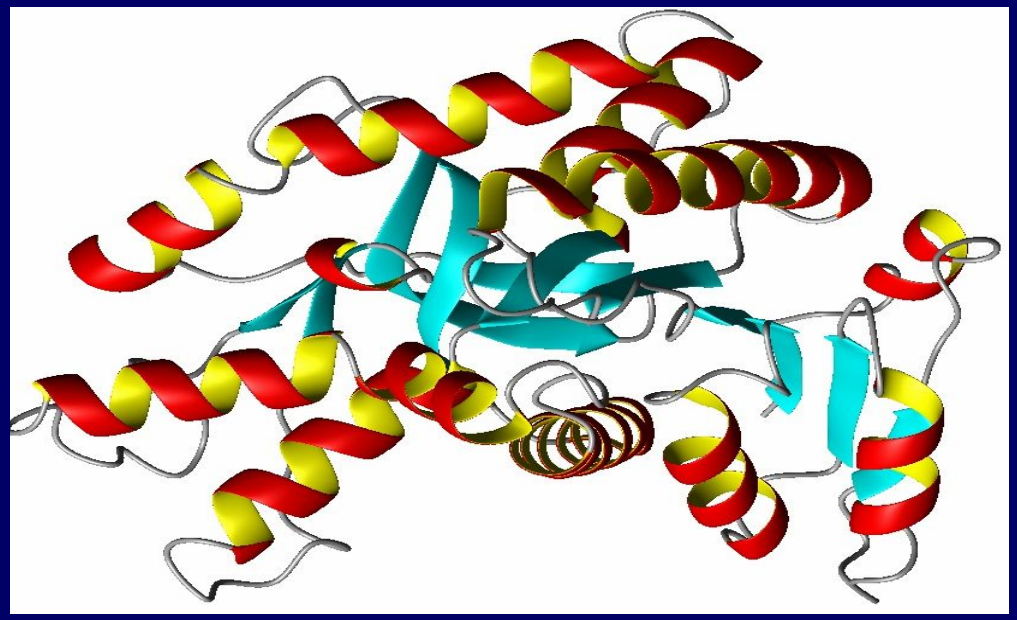


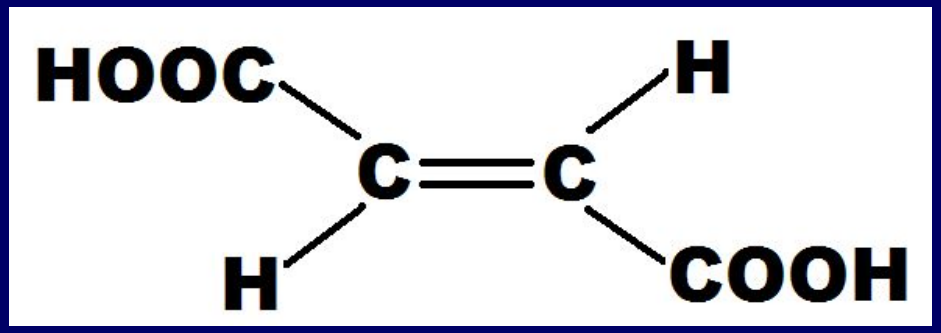
L’UREASE

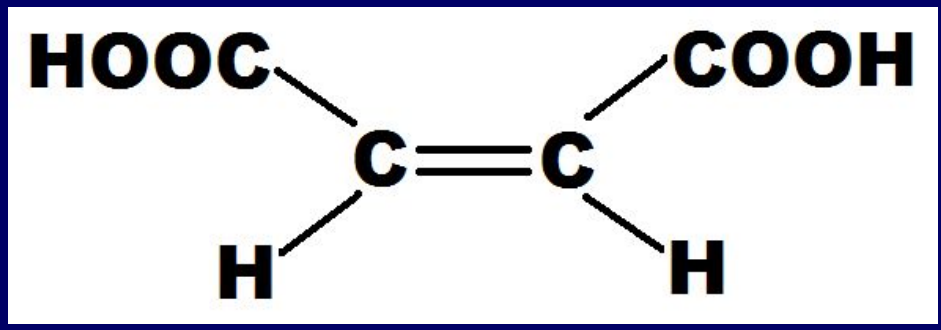



NH2
C=O
NH2
+ H2O
уреаза
CO2 + 2NH3
мочевина
NH2
C=S
NH2
уреаза
тиомочевина

LA FUMARASE





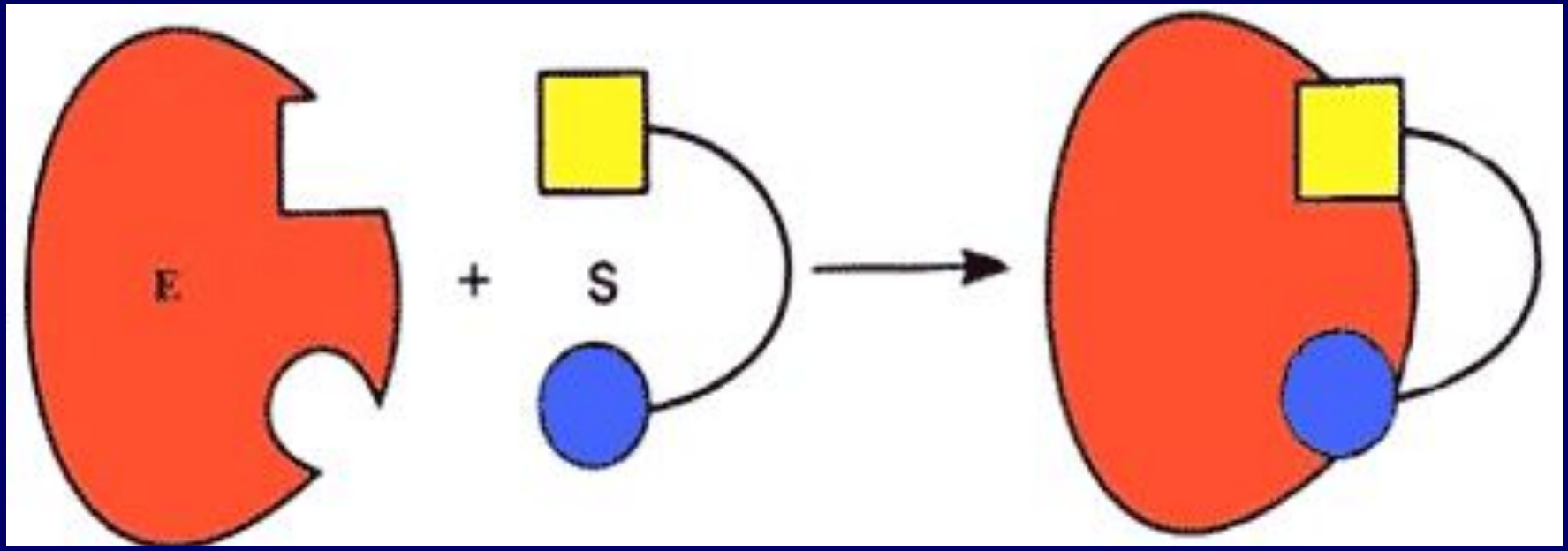


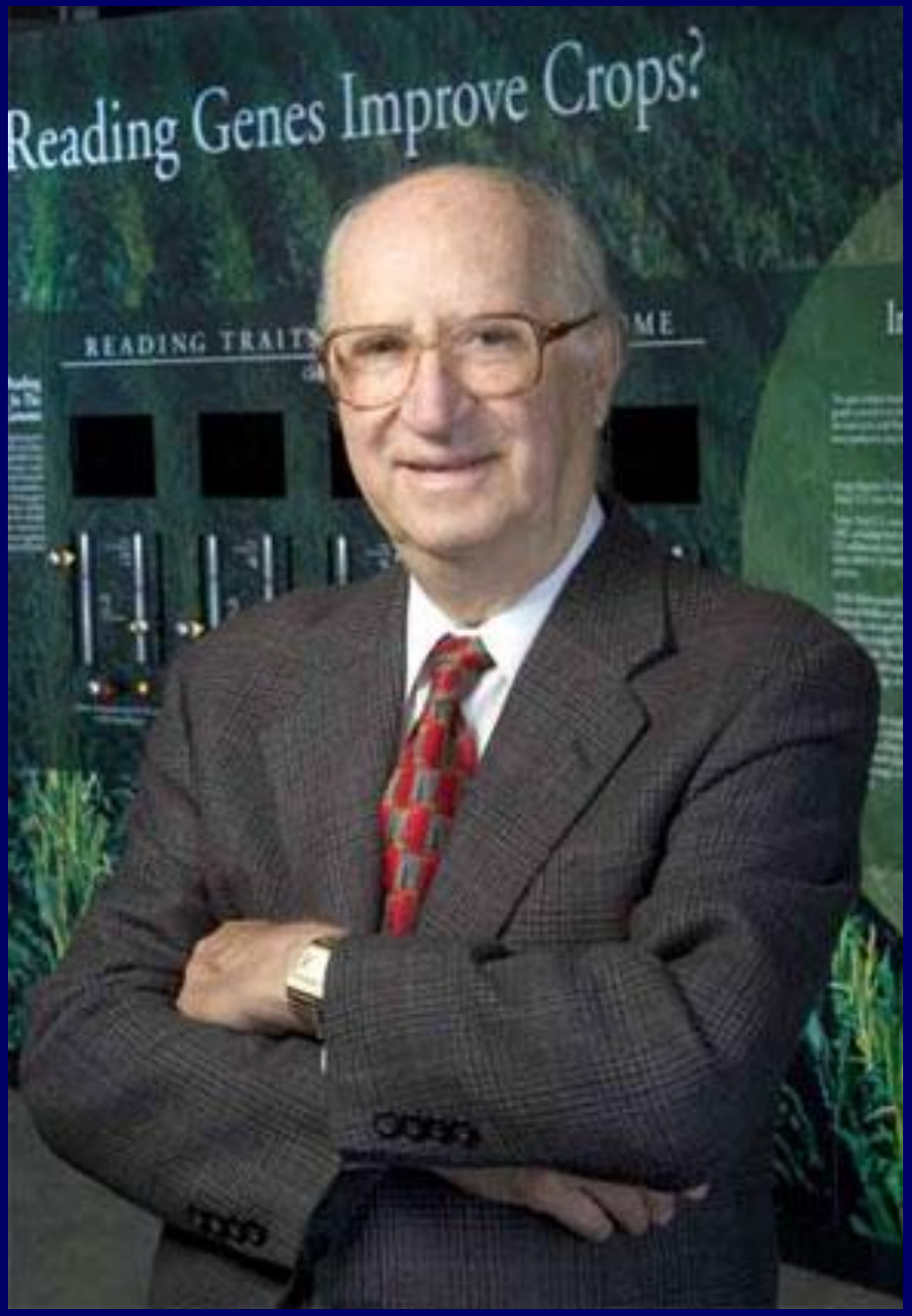
L'ACIDE FUMARIQUE

L'ACIDE MALEIQUE

HERMANN EMIL FISCHER (1852 - 1919)

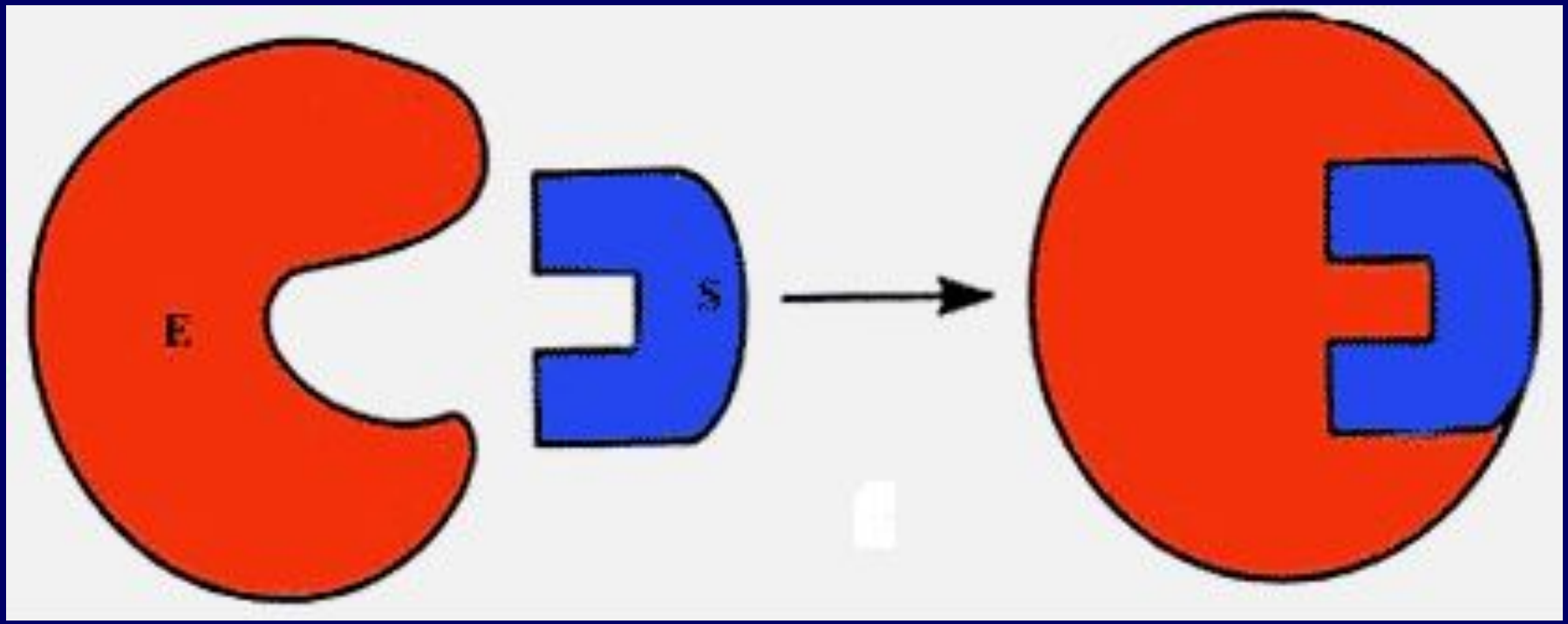
«CLEF – SERRURE»





DANIEL KOSHLAND (1920 - 2007)

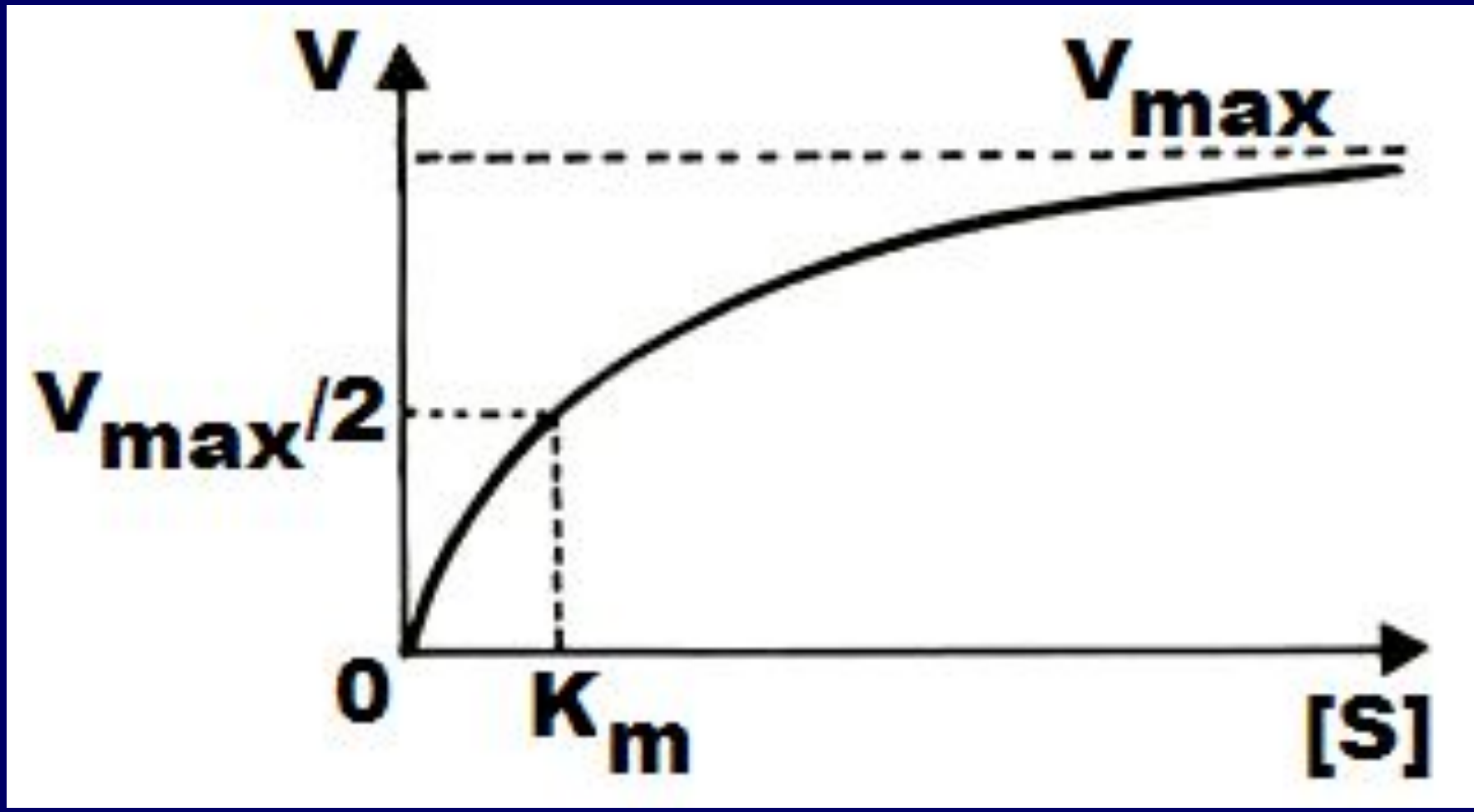
«GANT – MAIN»



$$E + S \leftrightarrow ES \rightarrow E + P$$

L'équation de Briggs – Haldane:

$$V = \frac{V_{max}[S]}{K_M + [S]}$$

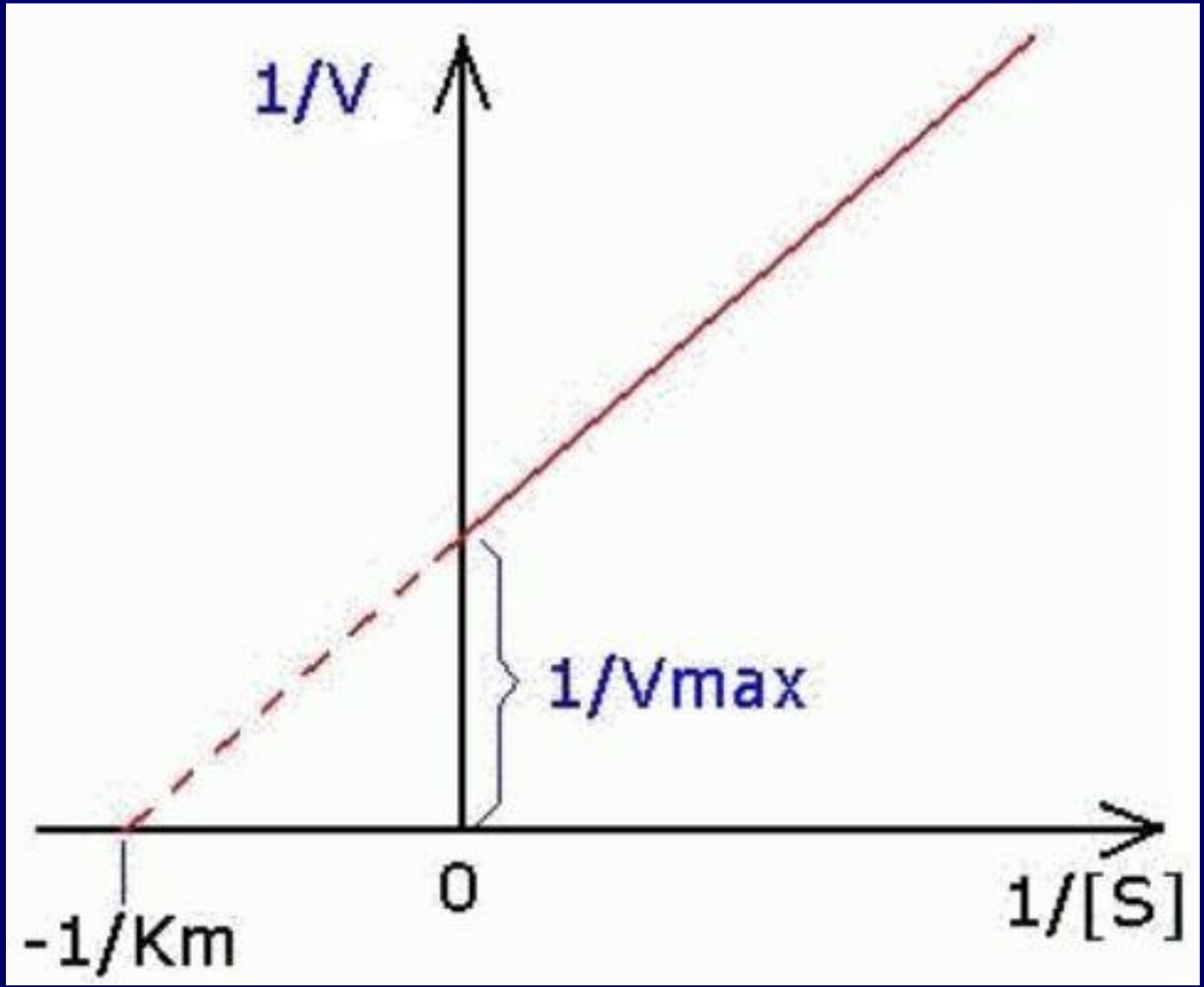

V
Vmax
Vmax/2
0
Km
[S]

LEONOR MICHAELIS (1875 - 1949)

MAUD LEONORA MENTEN (1879 - 1960)

L'équation de Lineweaver – Bark:

$$\frac{1}{V} = \frac{1}{V_{max}} + \frac{K_m \cdot 1}{V_{max}[S]}$$

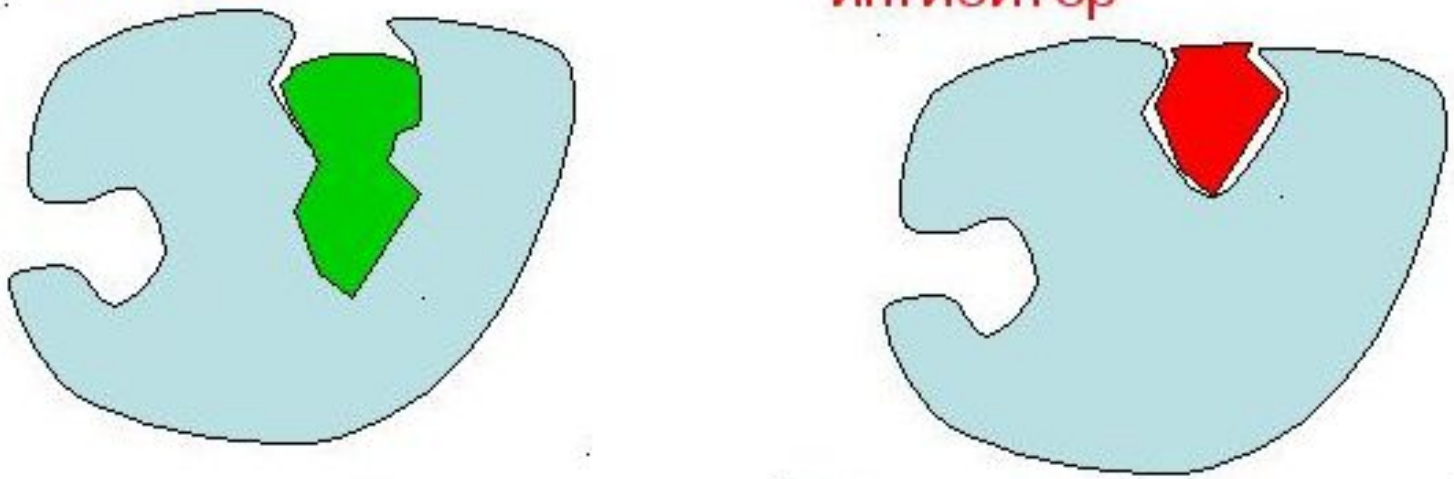

1/V
1/Vmax
0
1/[S]
-1/Km

DEAN BARK (1904 - 1988)

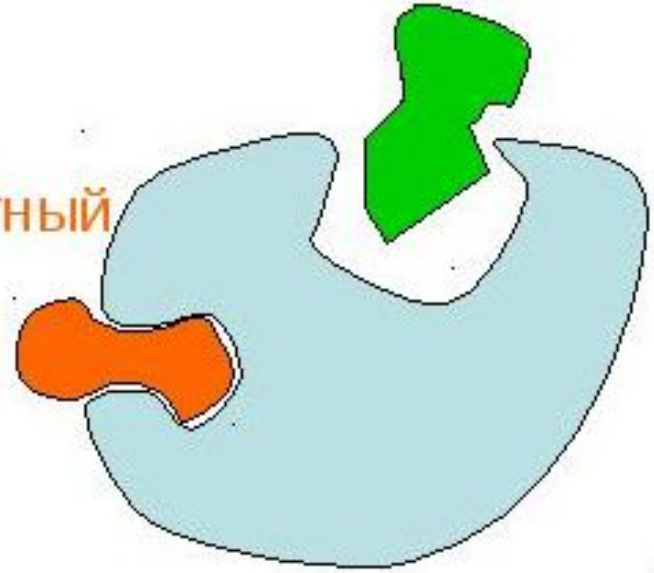
Обратимые ингибиторы

субстрат

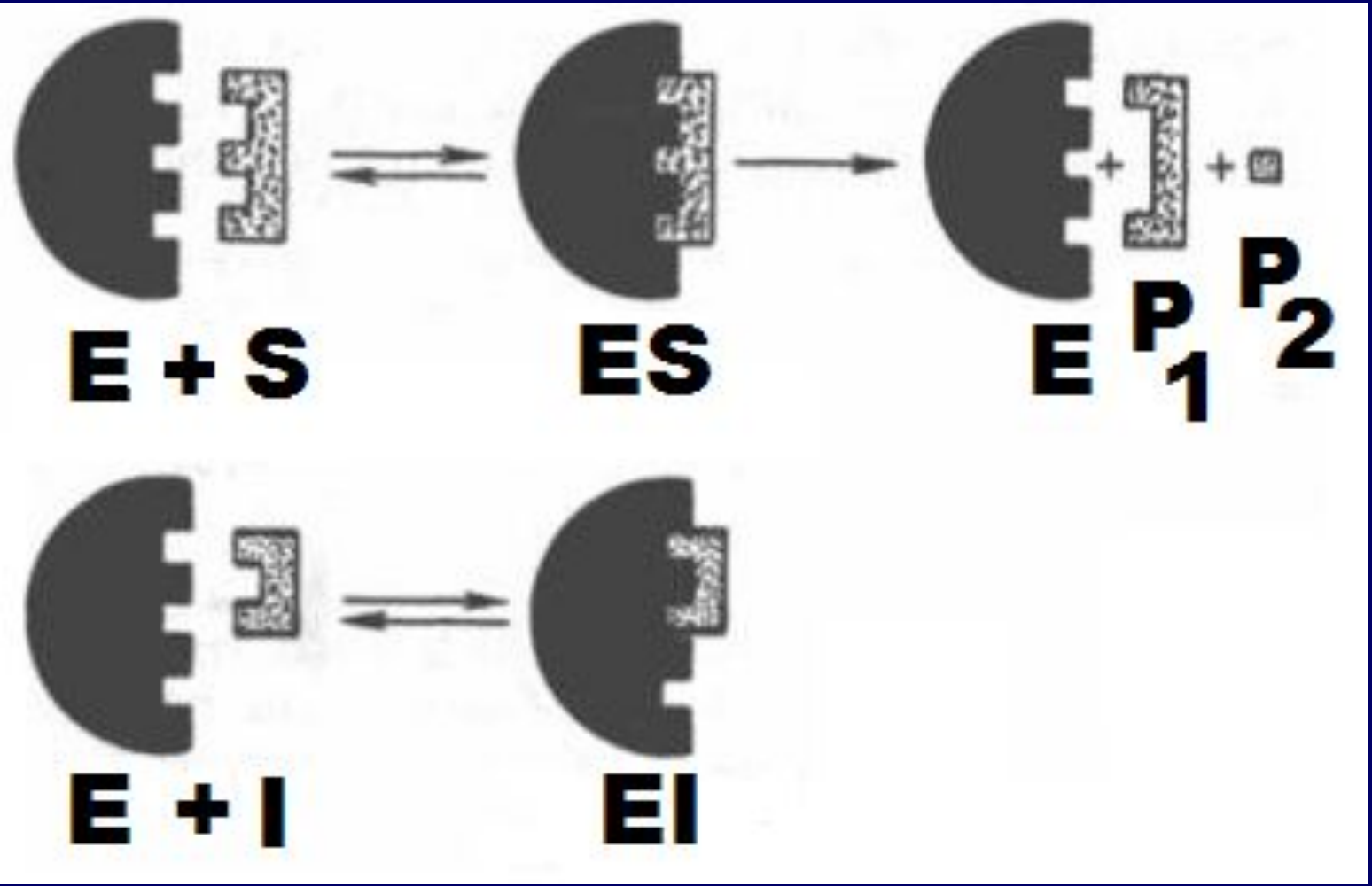
конкурентный ингибитор

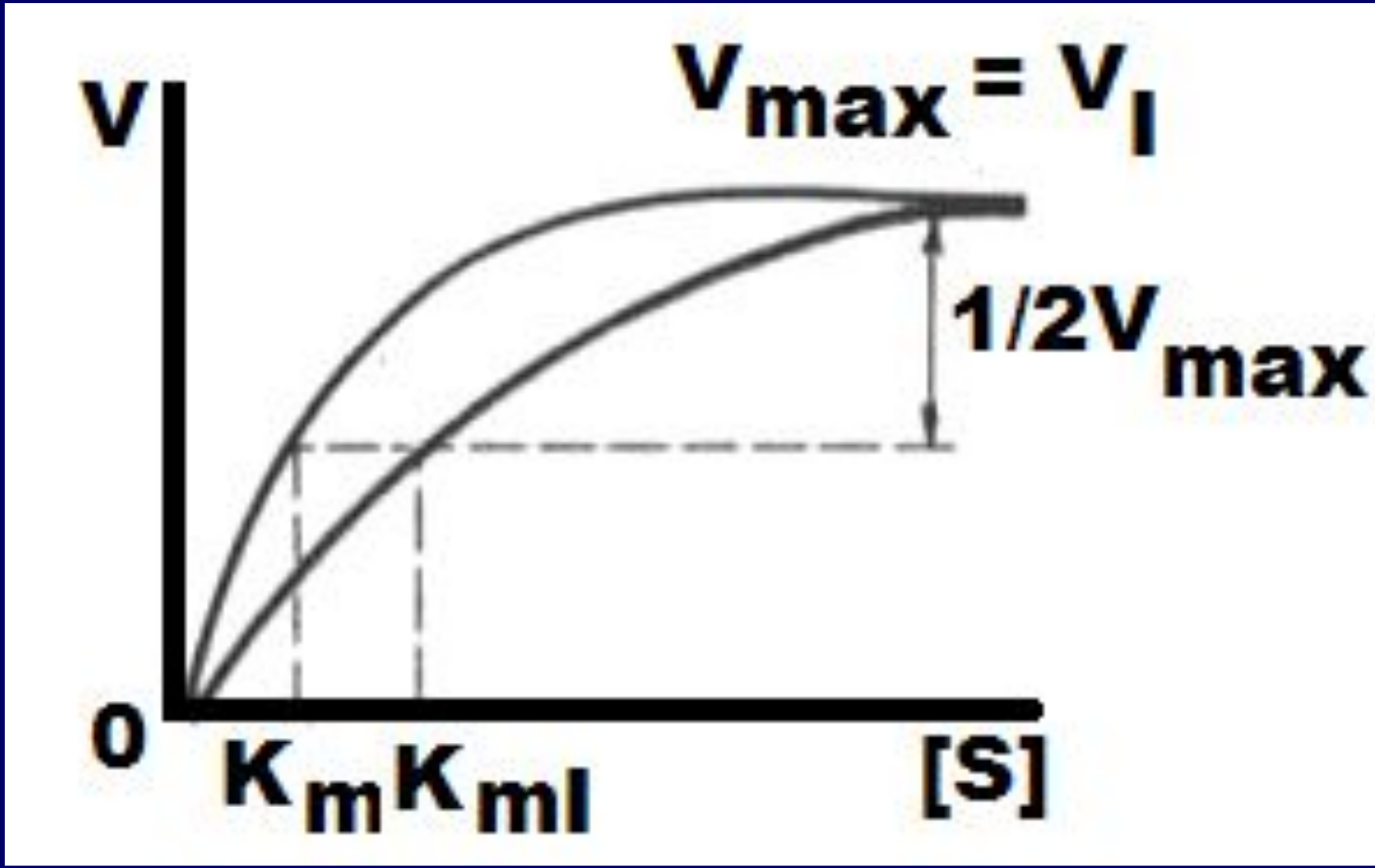


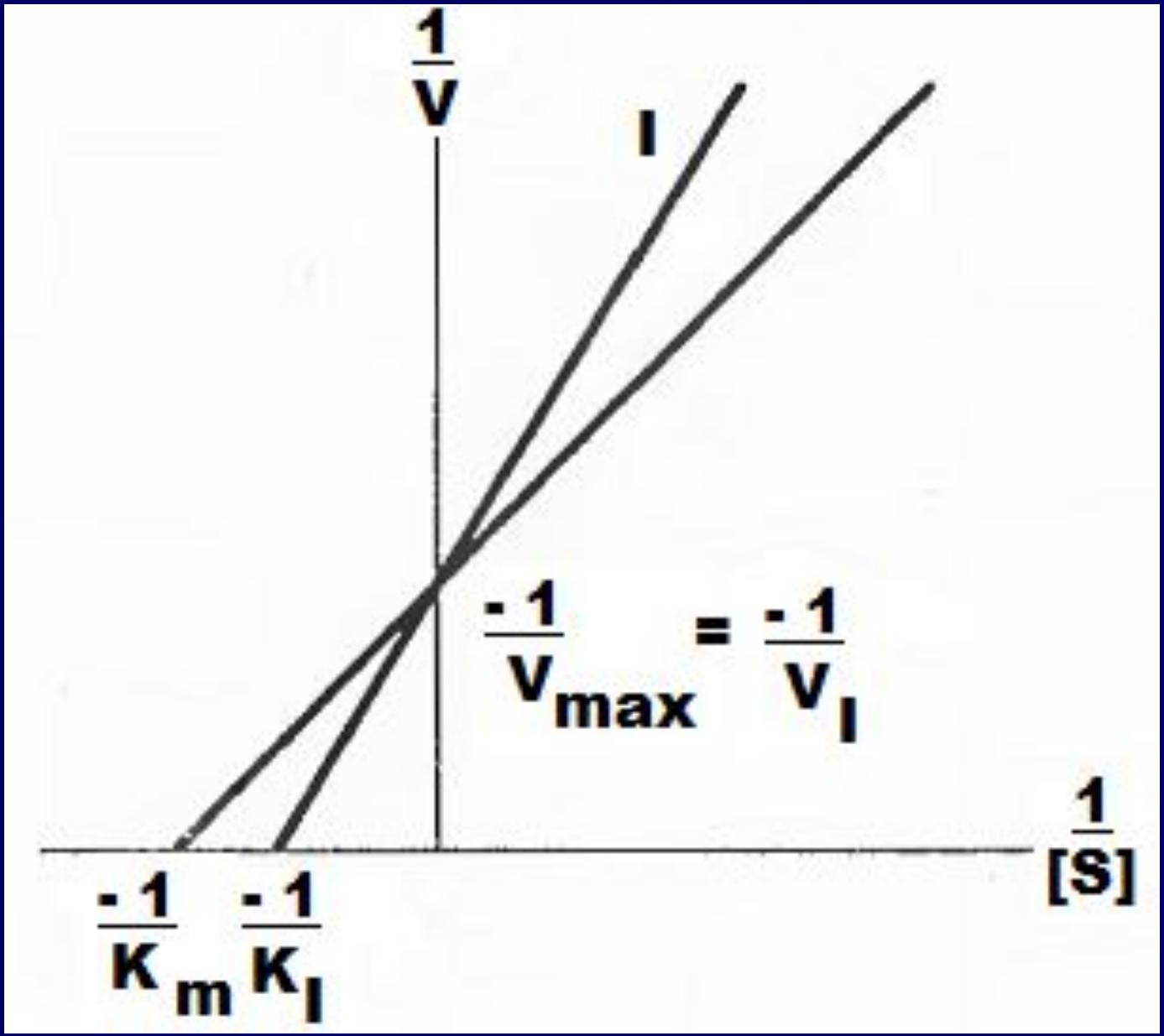
неконкурентный ингибитор



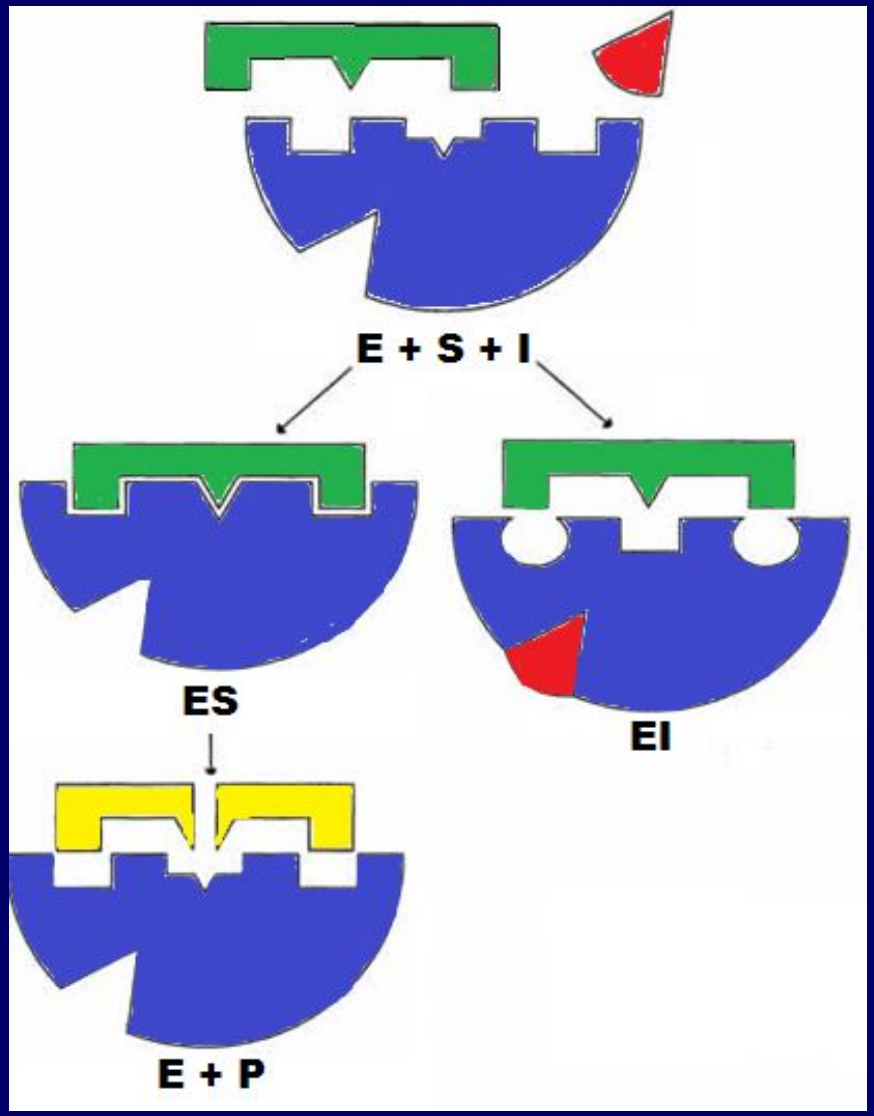
L'INHIBITION COMPETITIVE

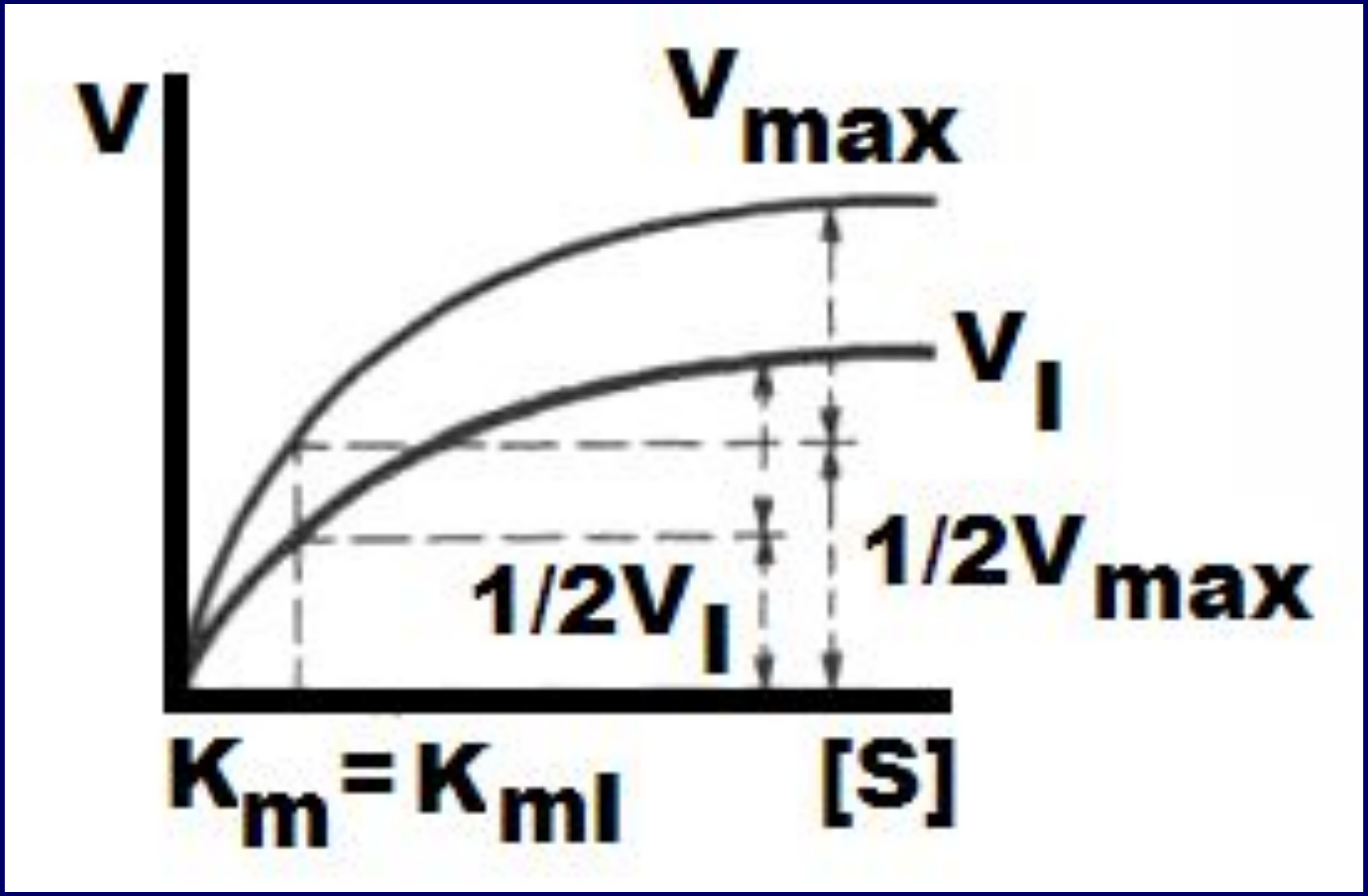


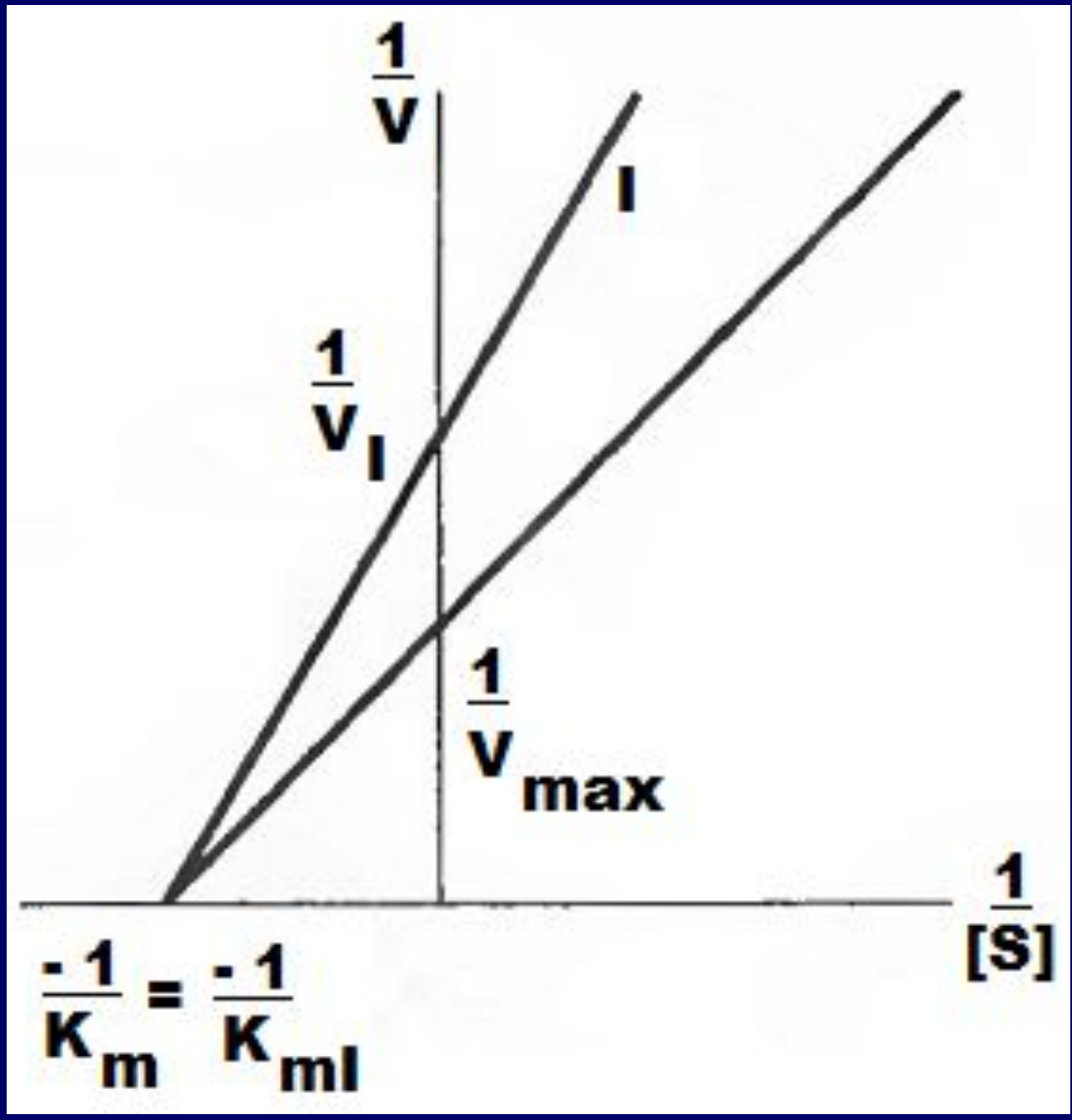

V
$V_{max} = V_I$
$1/2V_{max}$
0
K_m K_{mI}
[S]


1/V
I
-1/Vmax = -1/VI
1/[S]
-1/Km
-1/KI

L'INHIBITION INCOMPETITIVE



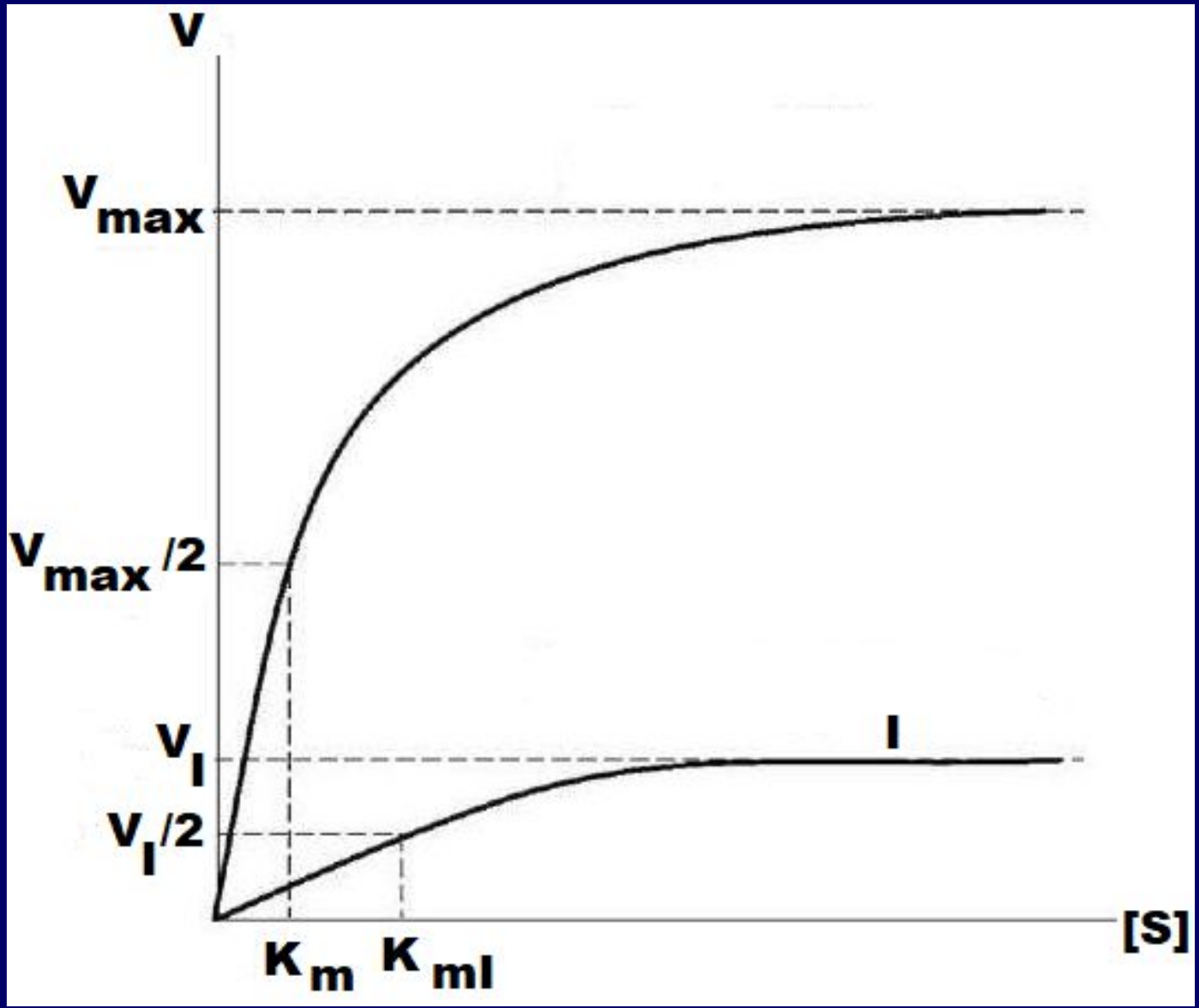

V
V_{max}
V_I
$1/2V_I$
$1/2V_{max}$
$K_m = K_{mI}$
[S]

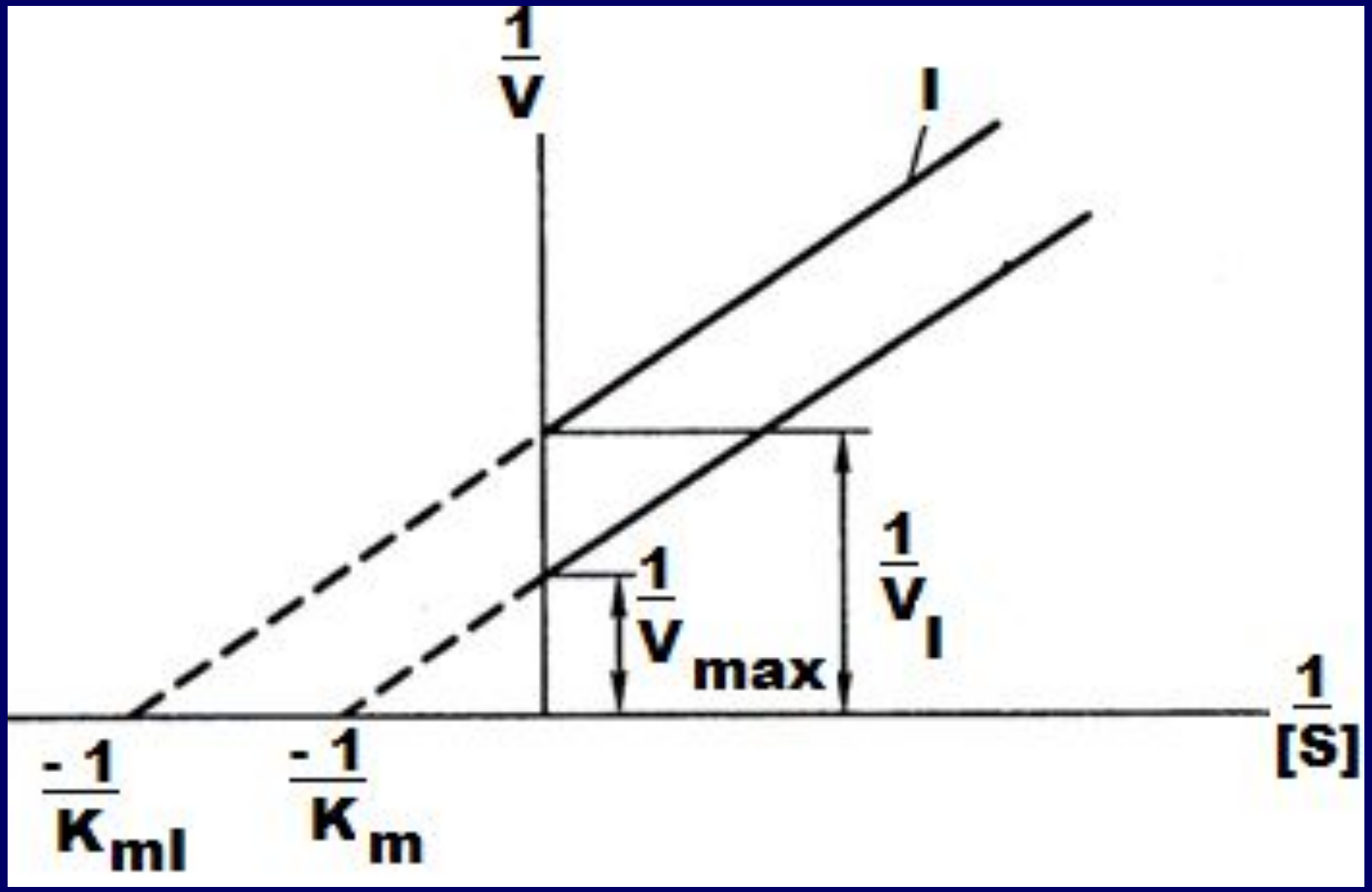

1/V
I
1/V_I
1/V_max
1/[S]
-1/K_m = -1/K_mI

L`INHIBITION NON COMPETITIVE

$$E + S \leftrightarrow ES \rightarrow E + P$$

$$ES + I \rightarrow ESI \rightarrow$$


V
V_{max}
$V_{max}/2$
V_I
$V_I/2$
I
[S]
K_m
K_{mI}


1/V
I
1/V_I
1/V_max
1/[S]
-1/K_mI
-1/K_m

L'ACTIVATION DE L'ENZYME PAR LA PHOSPHORYLATION

LA LIPASE INACTIVE

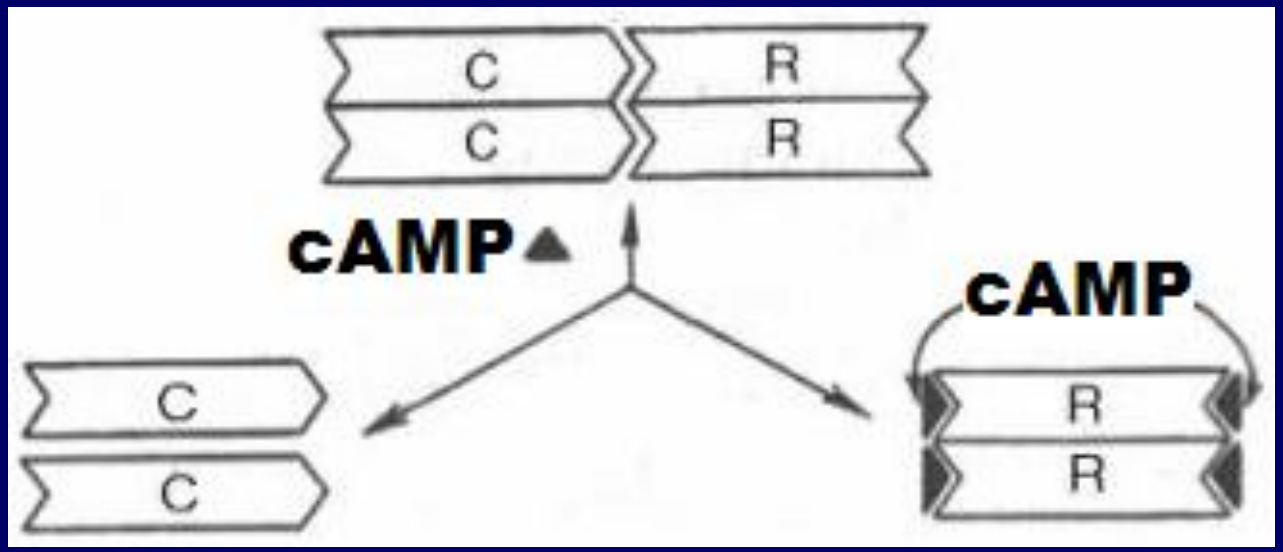
LA LIPASE ACTIVE

L'ENZYME NON PHOSPHORYLEE

L'ENZYME PHOSPHORYLEE

LA REGULATION DE L'ACTIVITE PAR VOIE DE LA DISSOCIATION DES SOUS-UNITES DE L'ENZYME

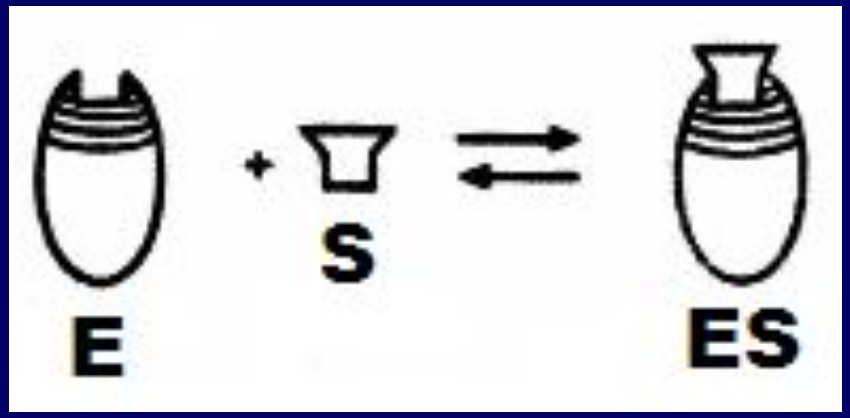
LA PROTEINE KINASE INACTIVE

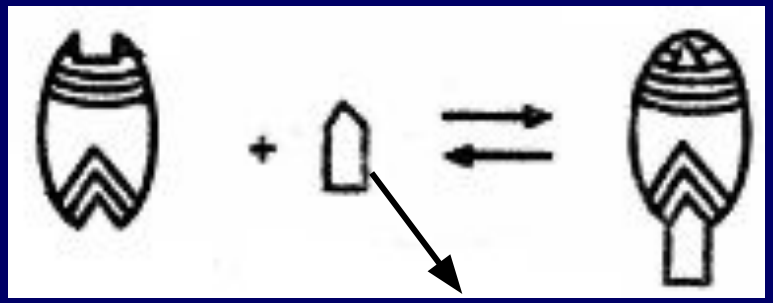


LES SOUS-UNITES CATALYTIQUES ACTIVES

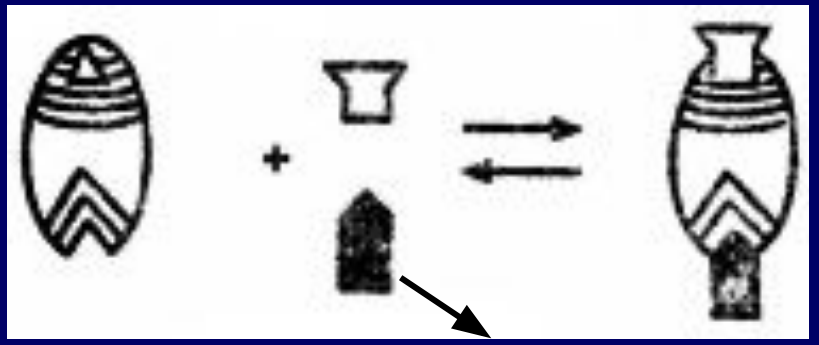
LES SOUS-UNITES REGULATRICES INACTIVES

LA REGULATION ALLOSTERIQUE





L'EFFECTEUR (NEGATIF)



L'EFFECTEUR (POSITIF)

LES ENZYMES EN MEDECINE

1. LES MEDICAMENTS:

2. LES REACTIFS ANALYTIQUES:

Enzyme	Utilisation
Glucose oxydase	Détermination de la concentration de glucose dans le sang
Cholestérol oxydase	Détermination du cholestérol dans le sang

3. LES ENZYMES INDICATRICES:

Maladie	Enzyme
Infarctus du myocarde	Créatine kinase, ASAT, LDH-1
Hépatite virale	ALAT, ASAT, glutamate déshydrogénase
Maladies du pancréas	α-amylase
Maladies du foie	ALAT, γ-glutamyltransférase