

PLANEAMENTO DAS AULAS

AULA 1 – INTRODUÇÃO AOS TESTES DE ECOTOXICOLOGIA. BIOMARCADORES E DELINEAMENTO EXPERIMENTAL

AULA 2 – EFEITOS DO GLIFOSATO NO CRESCIMENTO DOS ORGANISMOS TESTE (TAXAS DE INIBIÇÃO E CONSTANTES DE INIBIÇÃO IC50). MARCADORES BIOFÍSICOS DE TOXICIDADE I

AULA 3 – MARCADORES BIOFÍSICOS DE TOXICIDADE II

AULA 4 – MARCADORES BIOQUÍMICOS DE TOXICIDADE I – PIGMENTOS VEGETAIS

AULA 5 – MARCADORES BIOQUÍMICOS DE TOXICIDADE II – PIGMENTOS VEGETAIS II

AULA 6 - MARCADORES BIOQUÍMICOS DE TOXICIDADE III – DANO MEMBRANAR

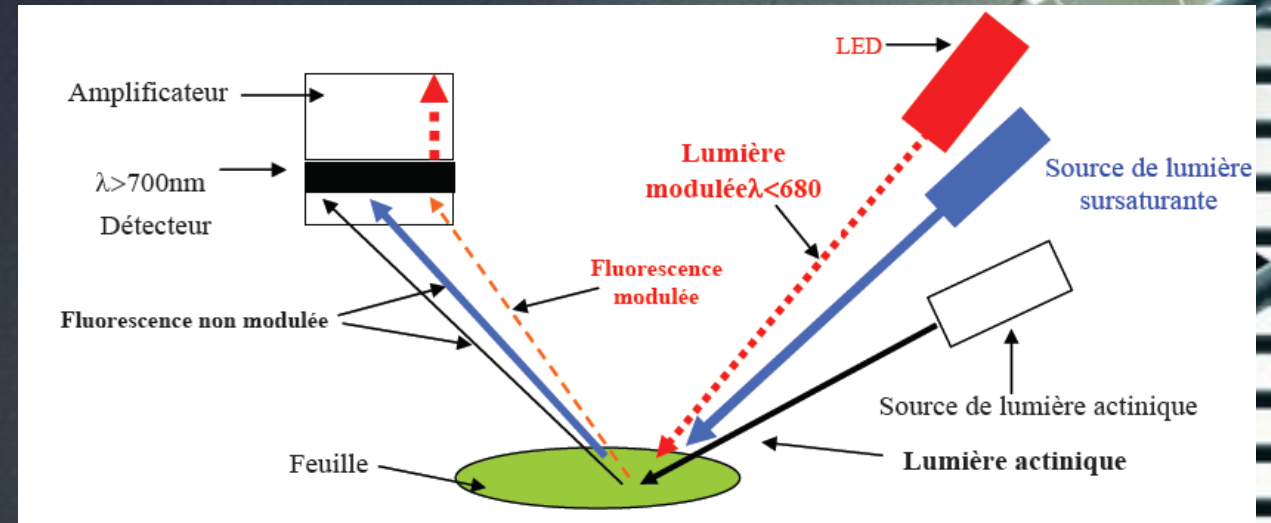
AULA 7 – MARCADORES BIOQUÍMICOS DE TOXICIDADE IV – DANO MEMBRANAR E ÁCIDOS GORDOS

AULA 8 - MARCADORES BIOQUÍMICOS DE TOXICIDADE III – SOD

AULA 9 – TÉCNICAS DE EXTRAÇÃO E ANÁLISE DE METAIS PESADOS

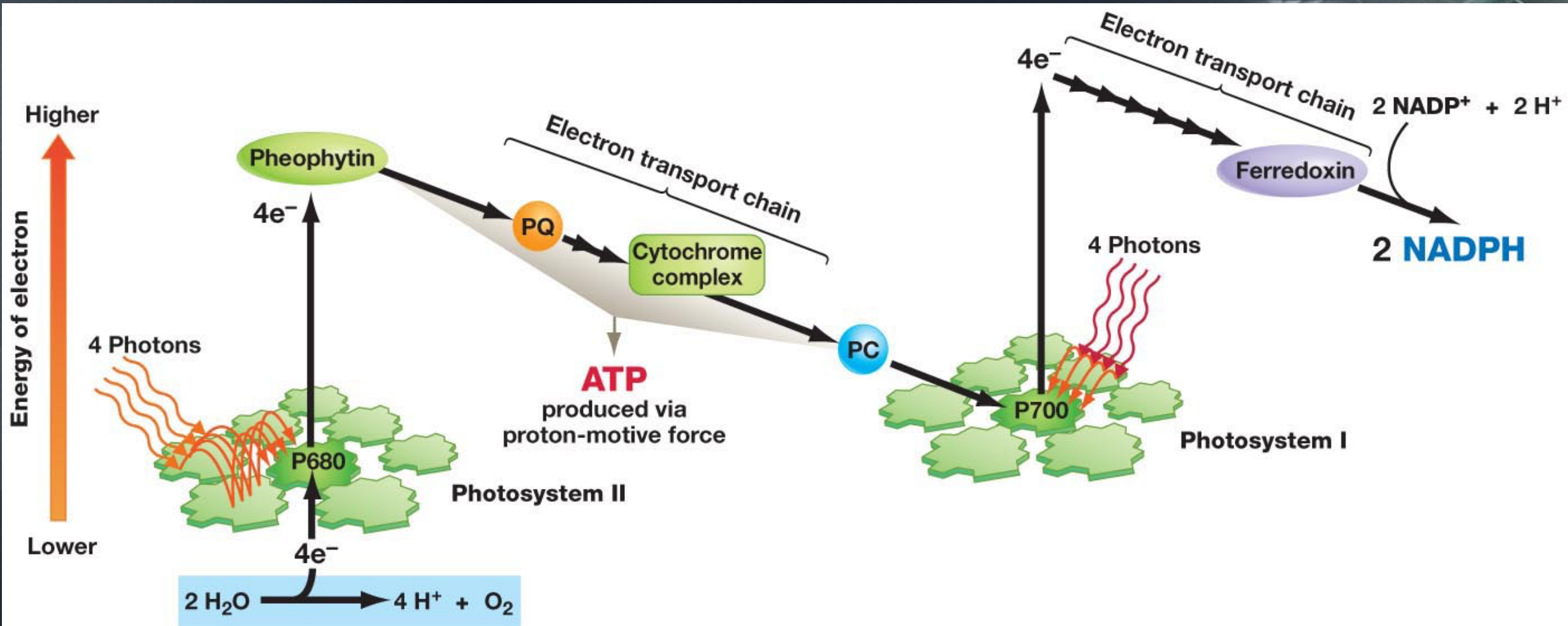
AULA 10 - NANOTOXICOLOGIA

PULSE AMPLITUDE MODULATED (PAM) FLUOROMETRY



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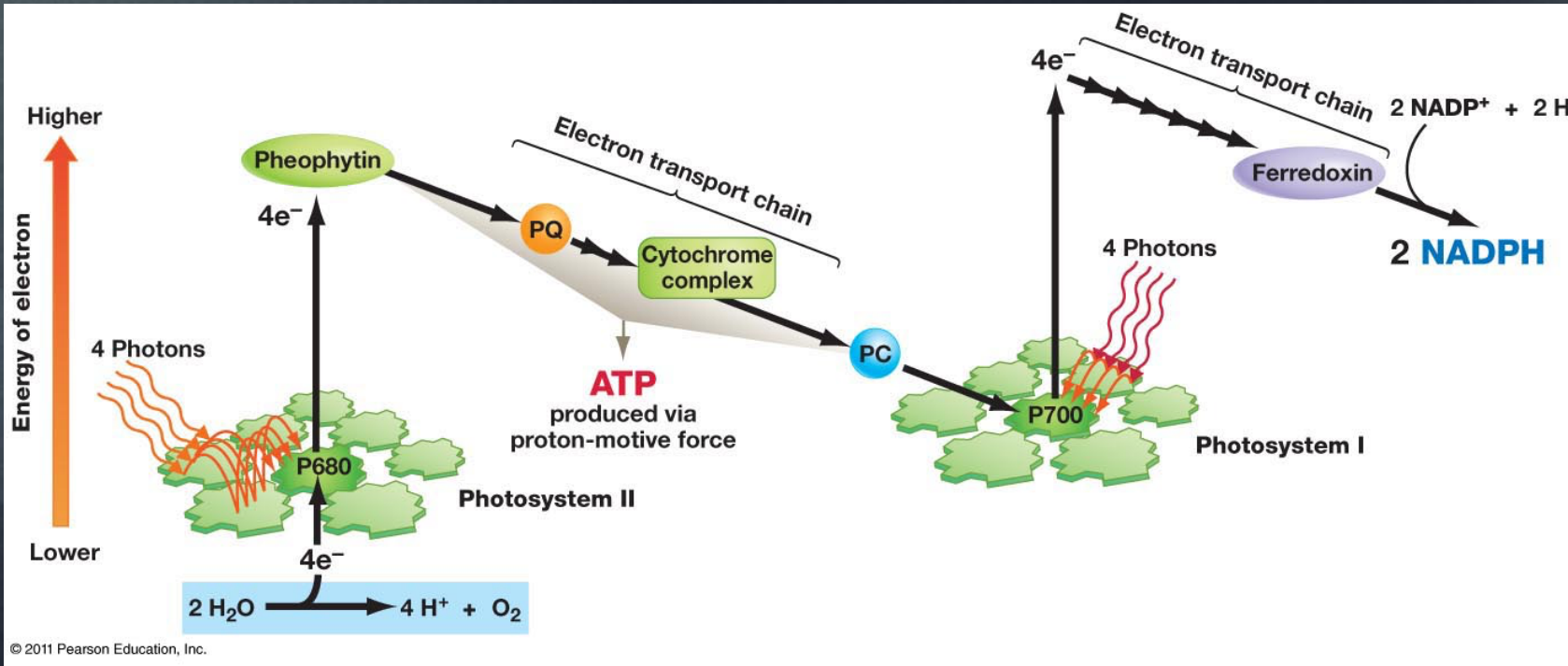


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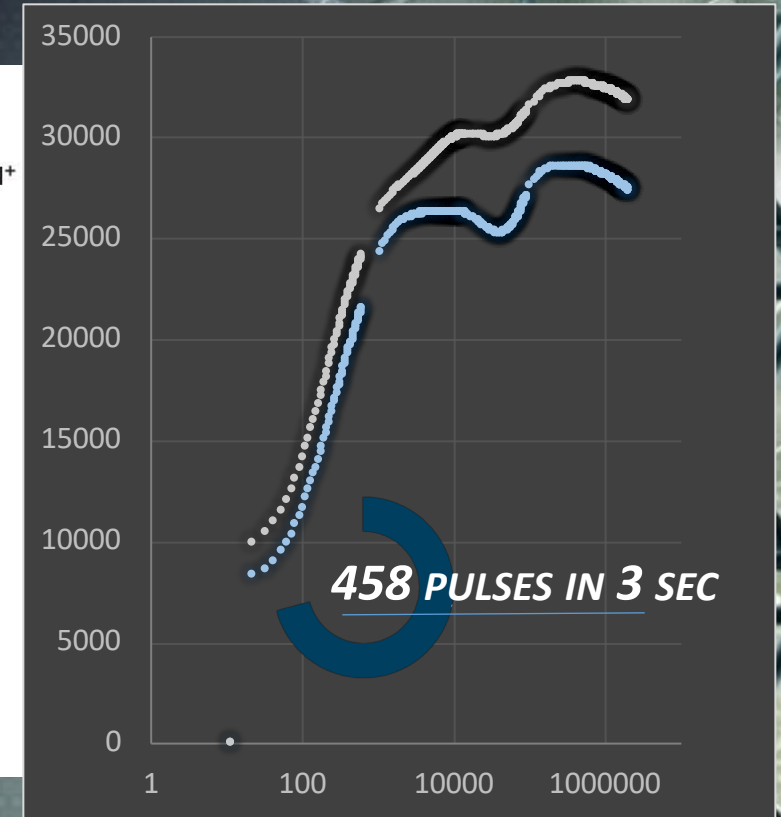
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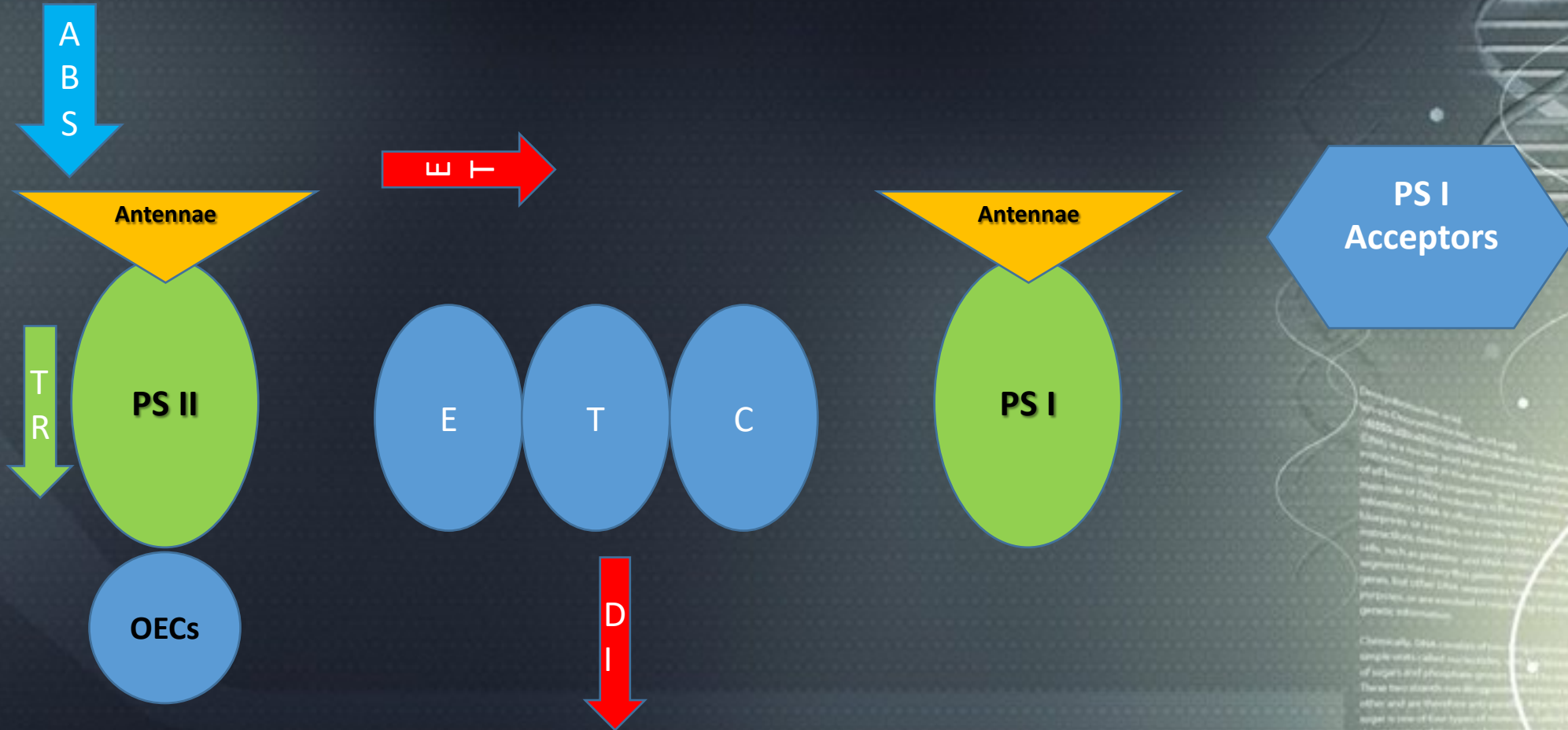


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the sequence of these two bases...
 that encodes information. This information is used
 using the genetic code to build a specific sequence of
 the protein as its amino sequence. The process of
 copying this flow of DNA into the messenger RNA
 step is a process called transcription.

Within cells, DNA is organized into very condensed
 called chromosomes. These chromosomes are
 duplicated before cells divide. In a process called
 replication, eukaryotic organisms undergo several
 rounds of DNA replication. In prokaryotes, the
 DNA is organized into a single circular chromosome.
 The DNA is organized into a single circular chromosome.
 The DNA is organized into a single circular chromosome.

PULSE AMPLITUDE MODULATED (PAM) FLUOROMETRY



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PULSE AMPLITUDE MODULATED (PAM) FLUOROMETRY



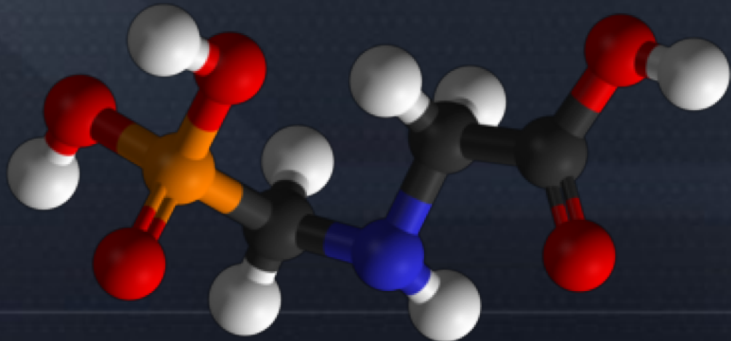
Chemically, DNA consists of two complementary strands of simple units called nucleotides. Each nucleotide is composed of a phosphate group, a five-carbon sugar, and a nitrogenous base. The two strands are held together by hydrogen bonds between the nitrogenous bases. The sequence of these bases determines the genetic information. This information is used to synthesize proteins, which are the building blocks of life.

When cells, DNA is organized into long molecules called chromosomes. These chromosomes are duplicated before cells divide. In a process called replication, eukaryotic organisms produce many copies of their DNA. In prokaryotes, such as bacteria, the DNA is organized into a single circular chromosome. In some organisms, such as plants, there are multiple chromosomes.

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CASO PRÁTICO DE ESTUDO: GLIFOSATO

GLYPHOSATE (IUPAC NAME: N-(PHOSPHONOMETHYL)GLYCINE) IS A BROAD-SPECTRUM SYSTEMIC HERBICIDE AND CROP DESICCANT. IT IS AN ORGANOPHOSPHORUS COMPOUND, SPECIFICALLY A PHOSPHONATE, WHICH ACTS BY INHIBITING THE PLANT ENZYME 5-ENOLPYRUVYLSHIKIMATE-3-PHOSPHATE SYNTHASE. IT IS USED TO KILL WEEDS, ESPECIALLY ANNUAL BROADLEAF WEEDS AND GRASSES THAT COMPETE WITH CROPS. IT WAS DISCOVERED TO BE AN HERBICIDE BY MONSANTO CHEMIST JOHN E. FRANZ IN 1970. MONSANTO BROUGHT IT TO MARKET FOR AGRICULTURAL USE IN 1974 UNDER THE TRADE NAME ROUNDUP. MONSANTO'S LAST COMMERCIALY RELEVANT UNITED STATES PATENT EXPIRED IN 2000.



EPSP SYNTHASE IS THE BIOLOGICAL TARGET FOR THE HERBICIDE GLYPHOSATE. GLYPHOSATE IS A COMPETITIVE INHIBITOR OF PEP, ACTING AS A TRANSITION STATE ANALOG THAT BINDS MORE TIGHTLY TO THE EPSPS-S3P COMPLEX THAN PEP AND INHIBITS THE SHIKIMATE PATHWAY. THIS BINDING LEADS TO INHIBITION OF THE ENZYME'S CATALYSIS AND SHUTS DOWN THE PATHWAY. EVENTUALLY THIS RESULTS IN ORGANISM DEATH FROM LACK OF AROMATIC AMINO ACIDS THE ORGANISM REQUIRES TO SURVIVE.

DELINEAMENTO EXPERIMENTAL



Control



Low GLYPH



Medium GLYPH



High GLYPH

EFEITOS NO CRESCIMENTO (EC50, IC50)

BIOMARCADORES BIOFÍSICOS

FLUORESCENCIA DE PULSO MODULADO DA CLOROFILA A

BIOMARCADORES BIOQUÍMICOS

PEROXIDAÇÃO LIPÍDICA (TBARS)

PREFIL PIGMENTAR

SUPERÓXIDO DISMUTASE

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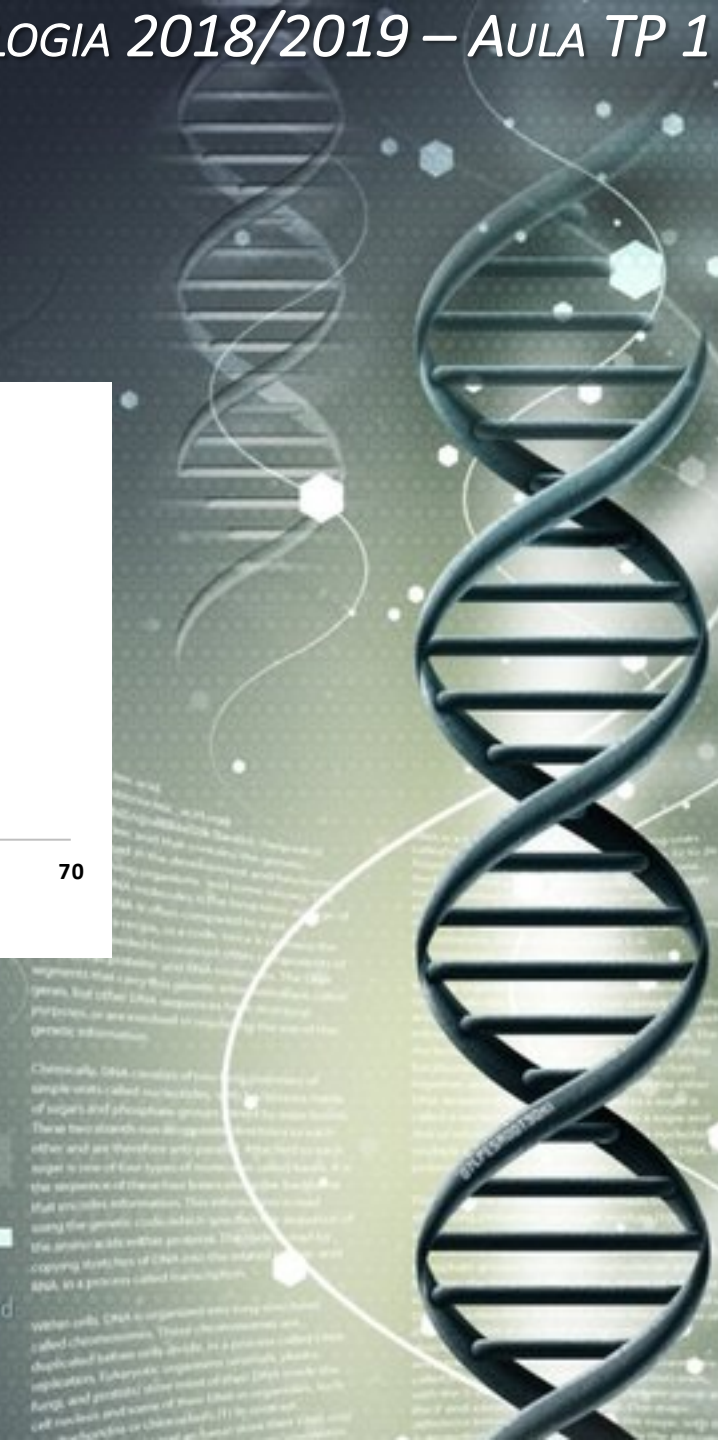
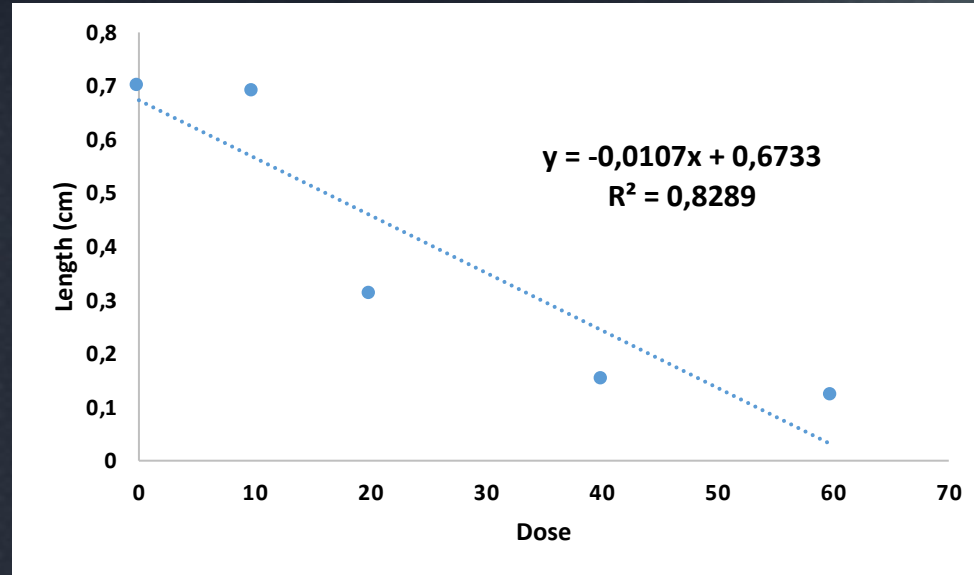
INHIBITORY CONCENTRATION (IC50)

THE HALF MAXIMAL INHIBITORY CONCENTRATION (IC50) VALUE DETERMINATION: THE HALF MAXIMAL INHIBITORY CONCENTRATION IS A MEASURE OF THE EFFECTIVENESS OF A COMPOUND IN INHIBITING BIOCHEMICAL PROCESSES AND BIOLOGICAL FUNCTIONS.

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INHIBITORY CONCENTRATION (IC50)

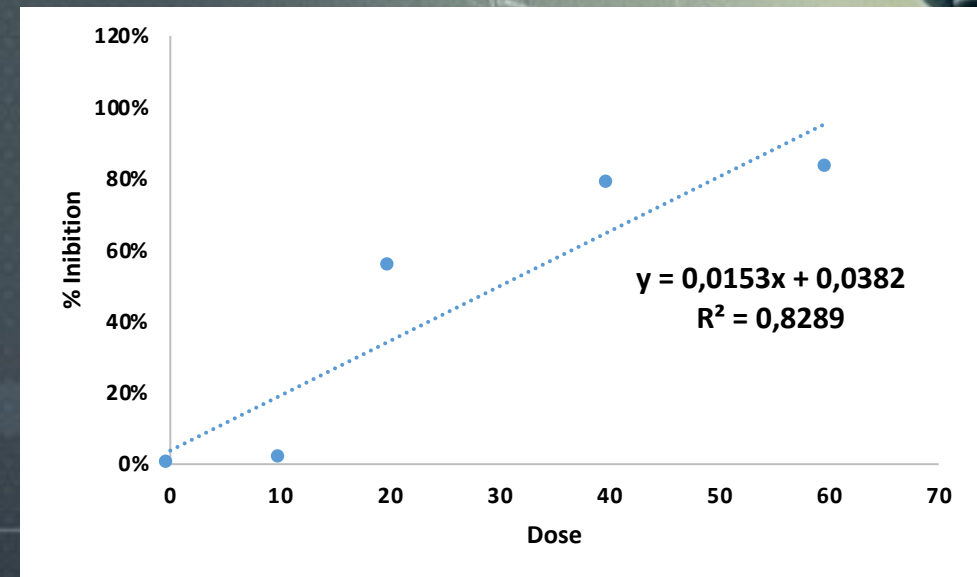
Dose	Length (cm)
0	0,7
10	0,69
20	0,31
40	0,15
60	0,12



INHIBITORY CONCENTRATION (IC50)

Dose	Length (cm)	% Inibition
0	0,7	0%
10	0,69	1%
20	0,31	56%
40	0,15	79%
60	0,12	83%

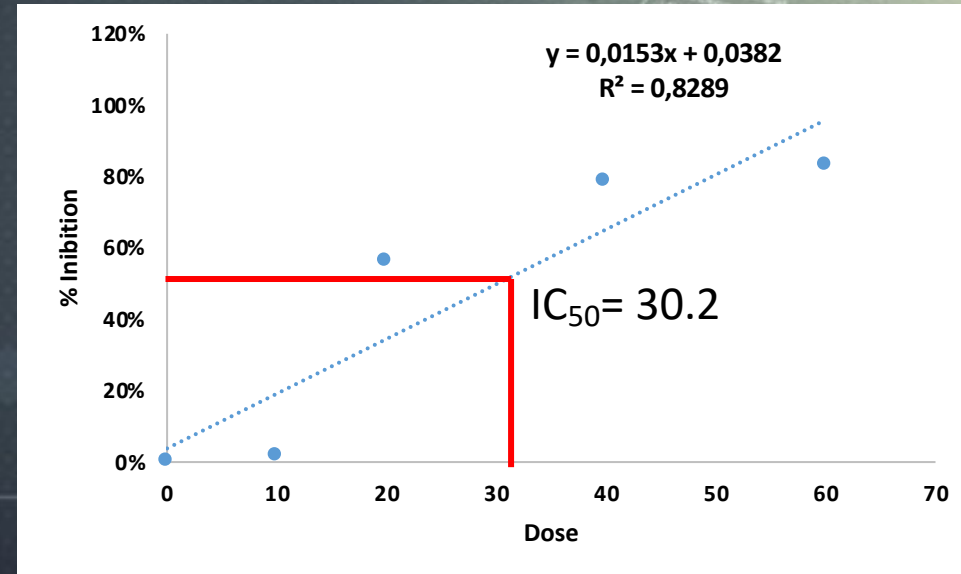
$\% \text{ Inibi\c{c}\tilde{a}o} = (\text{Controlo} - \text{Teste}) / \text{Controlo}$



INHIBITORY CONCENTRATION (IC50)

Dose	Length (cm)	% Inibition
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40	0,15	79%
60	0,12	83%

Construindo a recta de regressão linear % de inibição versus Dose e resolvendo a equação tendo $y=0,50$ obtém-se a dose que inibe em 50% da variável em causa (IC₅₀)



TRABALHOS EM CURSO E PERSPETIVAS DE MESTRADO

CLIMATE CHANGE IMPACTS IN MARINE ORGANISMS

NANOTOXICOLOGY

PHARMACO-TOXICOLOGY

MULTI-GENERATIONAL EVOLUTION

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PROTOCOLO

1. AVALIAR A CONCENTRAÇÃO DE CÉLULAS ATRAVÉS DO PARÂMETRO FT
2. AVALIAR O ESTADO FISIOLÓGICO DAS CÉLULAS ATRAVÉS DO PROTOCOLO OJIP
3. CALCULAR OS VALORES DE IC50 PARA O CRESCIMENTO CELULAR EM DIFERENTES DOSES DE GLIFOSATO.

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