

HOW CAN SCIENTIFIC PHENOMENA BE TRANSPOSED FOR A YOUNG AUDIENCE?
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Welcome to



Chimiscope

UNIGE

Your speaker for today, July 1, 2023:

Didier PERRET

The Chimiscope is a proud member of the **Scien**SCOPE of the University of Geneva

(TENTATIVE) 2-HOUR WORKSHOP PLAN

1) WHAT AND WHY IS CHIMISCOPE?

(and why is it useful before point 2?)

2) HOW TO TRANSPOSE?

(this is my mere personal “how to”!)

3) YOUR TURN!

(be prepared for the show!)

FOR THE VERY YOUNGEST



PIPETTES & Co.

 4-7 y.o.  1h  every day

FOR THOSE WHO ARE JUST A LITTLE OLDER



CHIMISCOPE ? CHIMISCOOL !



7-10 y.o.



1h



every day; extension above 10 y.o. on request

FOR ALL AGES



MEMBRANES DE VIE



≥7 y.o.



1h



every day; also for biology classes

FOR (ALMOST) ALL AGES





CHIMIE = COULEURS !

 ≥10 y.o.  1h  every day

FOR (ALMOST) ALL AGES

ÉNERGIE ⇌ CHIMIE

 ≥10 y.o.  1h  every day

FOR THOSE ENTERING THEIR TEENS

ELEMENT-DETECTIVE

 H Hydrogene 1																	 He Helium 2						
 Li Lithium 3	 Be Beryllium 4																	 B Bore 5	 C Carbone 6	 N Azote 7	 O Oxygene 8	 F Fluor 9	 Ne Neon 10
 Na Sodium 11	 Mg Magnesium 12																	 Al Aluminium 13	 Si Silicium 14	 P Phosphore 15	 S Soufre 16	 Cl Chlore 17	 Ar Argon 18
 K Potassium 19	 Ca Calcium 20	 Sc Scandium 21	 Ti Titane 22	 V Vanadium 23	 Cr Chrome 24	 Mn Manganèse 25	 Fe Fer 26	 Co Cobalt 27	 Ni Nickel 28	 Cu Cuivre 29	 Zn Zinc 30	 Ga Gallium 31	 Ge Germanium 32	 As Arsenic 33	 Se Sélénium 34	 Br Brome 35	 Kr Krypton 36						
 Rb 37	 Sr 38	 Y 39	 Zr 40	 Nb 41	 Mo 42	 Tc 43	 Ru 44	 Rh 45	 Pd 46	 Ag 47	 Cd 48	 In 49	 Sn 50	 Sb 51	 Te 52	 I 53	 Xe 54						



12-15 y.o.



1h






every day; also in July (Passeport-Vacances; 3-4h)

FOR THOSE ENTERING THEIR TEENS



ALCHIMIE
DÉMYSTIFIÉE

 12-15 y.o.  3-4h  on certain dates; also in July (Passeport-Vacances)

FOR THE TEENS AND ABOVE



BIOMOLÉCULES EN MOUVEMENT

 ≥12 y.o.  1h  every day; also for biology classes

FOR THE TEENS AND ABOVE

ENVIRONNEMENT | CHIMIE

 ≥12 y.o.  1h  every day

FOR PRE-ADULTS



CHIRALITÉ
ET SYMÉTRIE



≥15 y.o.



1h



every day (useful: basic notions of organic chemistry)



DRUG DESIGN



≥15 y.o.



1h



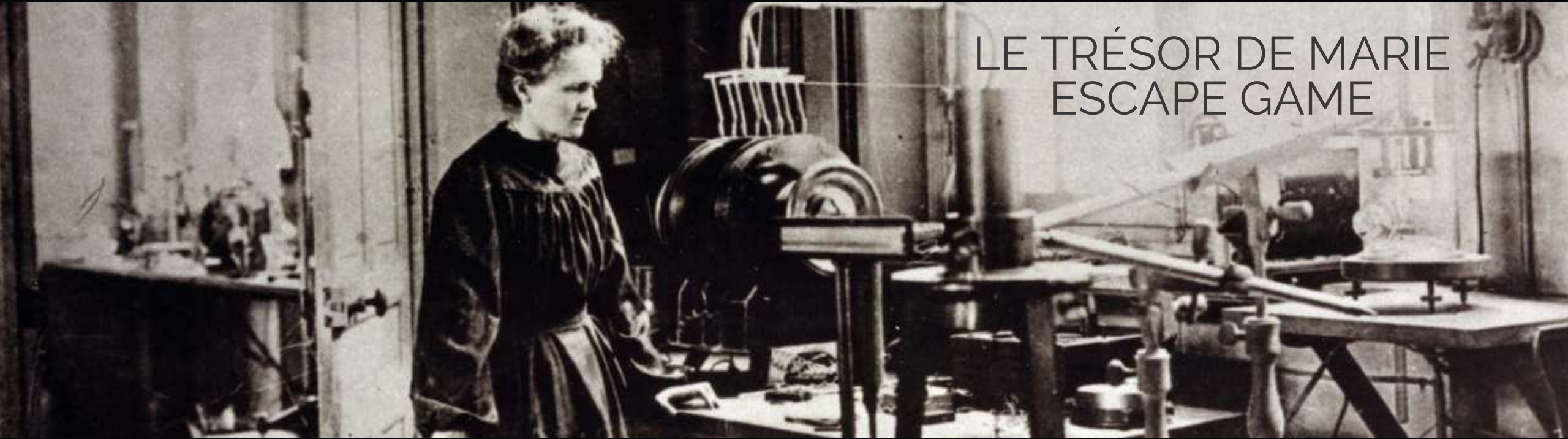
every day subject to availability (useful: basic notions of molecular structure)

FOR PRE-ADULTS




SIGNÉ P. Signac

 ≥15 y.o.  1h  every day; also for visual arts classes

FOR PRE-ADULTS



LE TRÉSOR DE MARIE ESCAPE GAME

 ≥15 y.o.  1h  every day

AND EVEN FOR BIRTHDAY PARTIES



ANNIVERSAIRE
CHIMIQUE



5-12 y.o.



1-1.5h

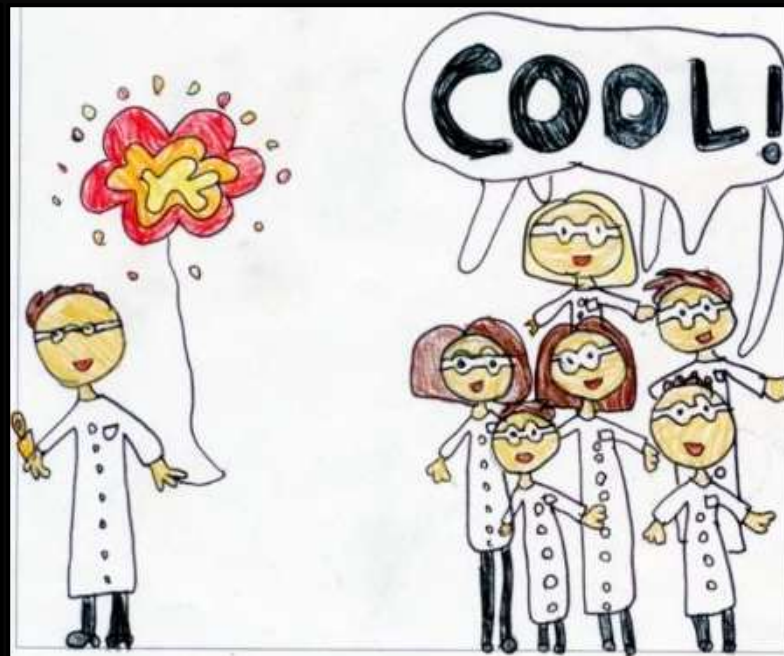


every Wednesday afternoon (200.-; ideally for 10-15 children 7-10 y.o.; reception room available)

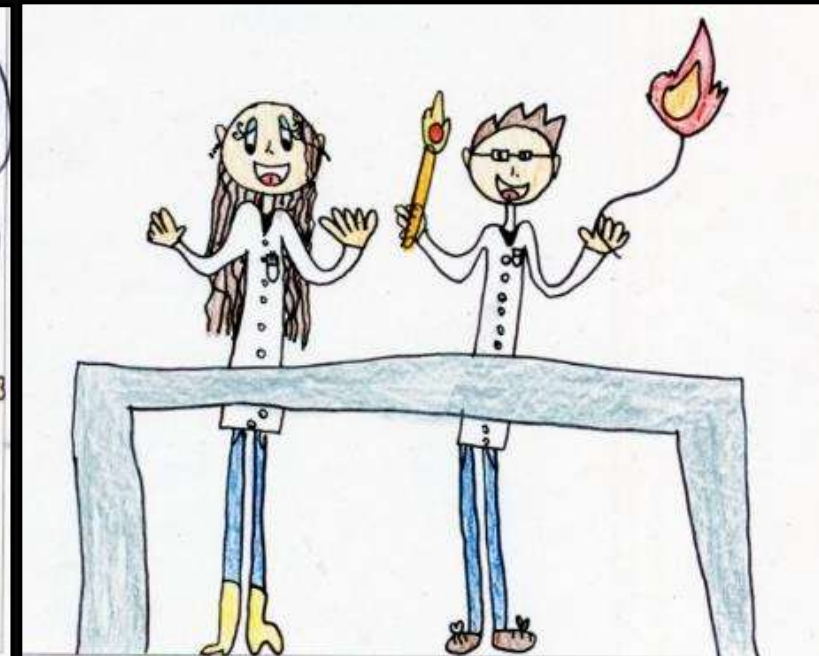
CHALLENGING PRE- AND MISCONCEPTIONS ABOUT CHEMISTS



1979 – inauguration of our building



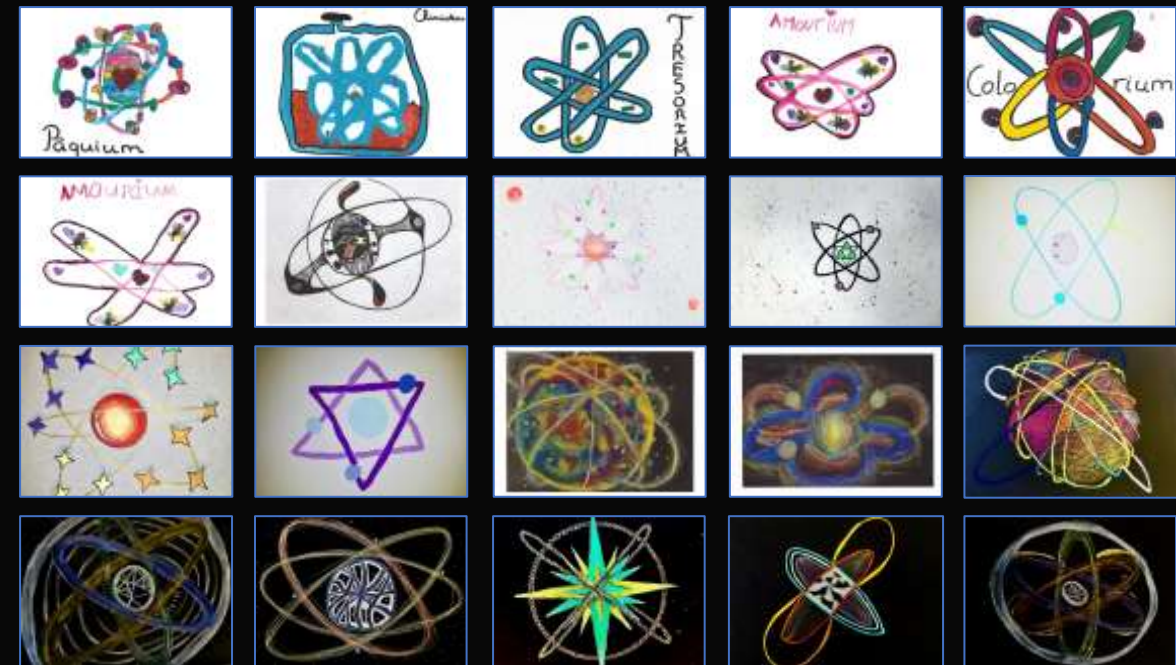
today – Chimiscope – paradigm shift



CHALLENGING PRE- AND MISCONCEPTIONS ABOUT CHEMISTRY



competition for classes (4-19 y.o.; 2019)



mistaken view of the atom and the education gap

CHALLENGING PRE- AND MISCONCEPTIONS ABOUT CHEMICAL INDUSTRY

“Don’t eat/drink/touch/smell that! It’s chemical!”



Minamata 1932-1968
3'000 victims
of mercury



Seveso 1976
ecological disaster
caused by dioxin



Bhopal 1984
2'000 deaths
from methyl isocyanate



Toulouse 2001, Beirut 2020
30+150 deaths, 5'000 injured
from ammonium nitrate

“Where would we be without these discoveries/inventions?”

pasteurisation 1865
(food)



ammonia 1909-1913
(fertilisers)



vitamins 1913-1957
(health)



Penicillin 1928
(antibiotics)



Taxol 1983, Glivec 1998
(anti-cancer)



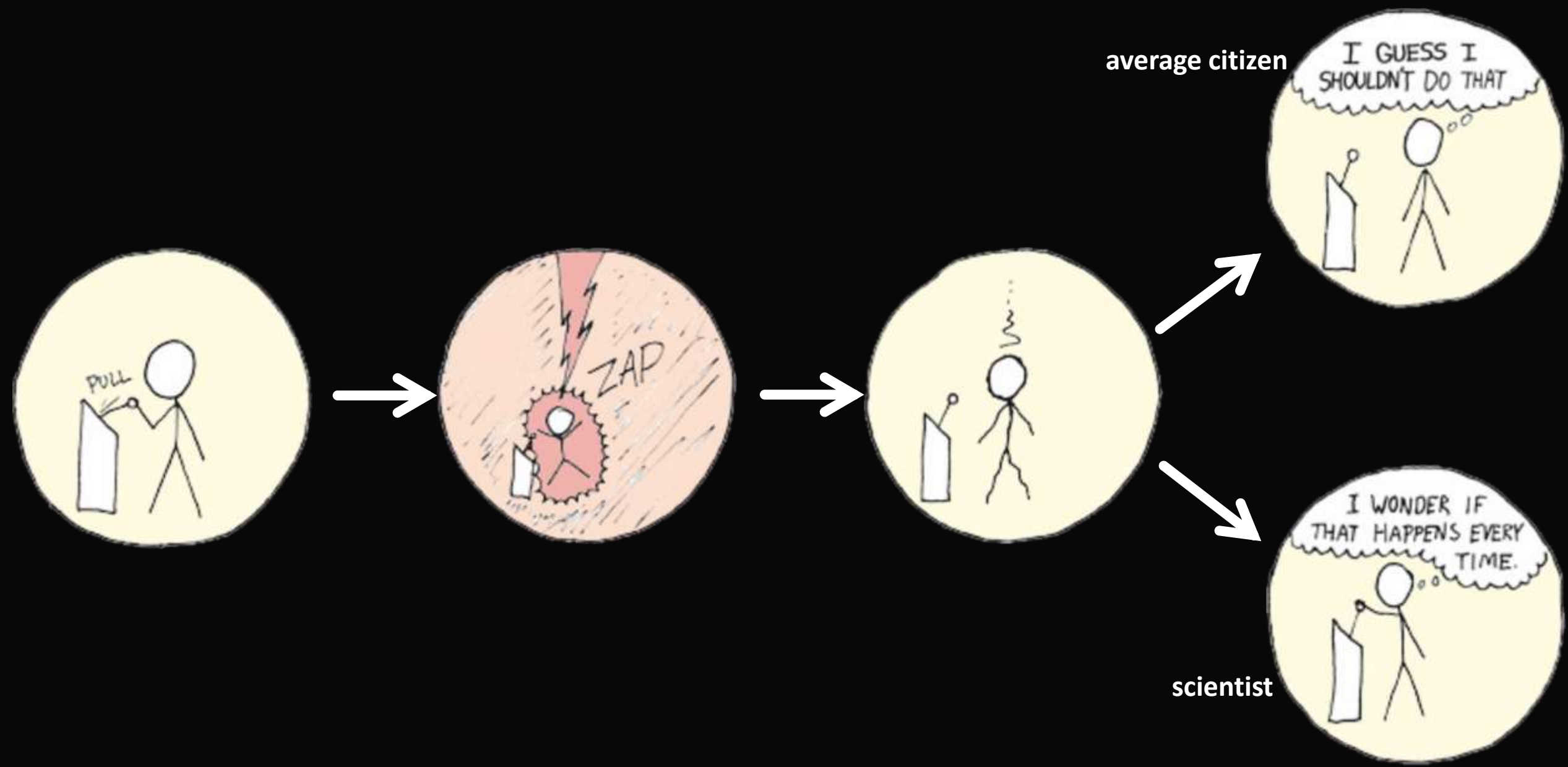
CONSEQUENCES AND ACTIONS

Think about intuitive **ROLE MODELS** when dealing with younger audiences

DECONSTRUCT PRECONCEIVED IDEAS and be prepared to argue against popular conspiracy theories, but without arrogance

Present **POSITIVE MESSAGES** in a balanced way, in opposition to negative feelings

IMPORTANCE OF THE SCIENTIFIC/EXPERIMENTAL APPROACH



APETIZER TO THE TOPIC

HEY CHILDREN!

PLEASE REPREPARE A **SOLUTION** WITH A **CONCENTRATION** OF ONE **MOLAR**

Please prepare an **ANSWER** with a **CLOSE ATTENTION** of one **FLAT TOOTH**
AT THE REAR OF YOUR MOUTH

Even **THE MOST TRIVIAL WORDS** in your specialized domain may have
OTHER MEANINGS for young audiences, novice adults or other specialists

CONSEQUENCES AND ACTIONS

Always **THINK TWICE** before formulating arguments and explanations; put yourself in the shoes and age of those you are talking to

Presenting/asking trivial things (for you) is usually **NOT TRIVIAL** (for your audience, but for you too)

How to fill the gap and be understood? **TRANSPOSE** (*i.e.*, transfer to a different context) **WITHOUT DISTORTING** the scientific facts!

WHAT IS LIGHT? AND WHAT IS **WHITE** LIGHT?

SUN

LAMPS

LASERS

(tungsten, halogen, fluorescent, LED)

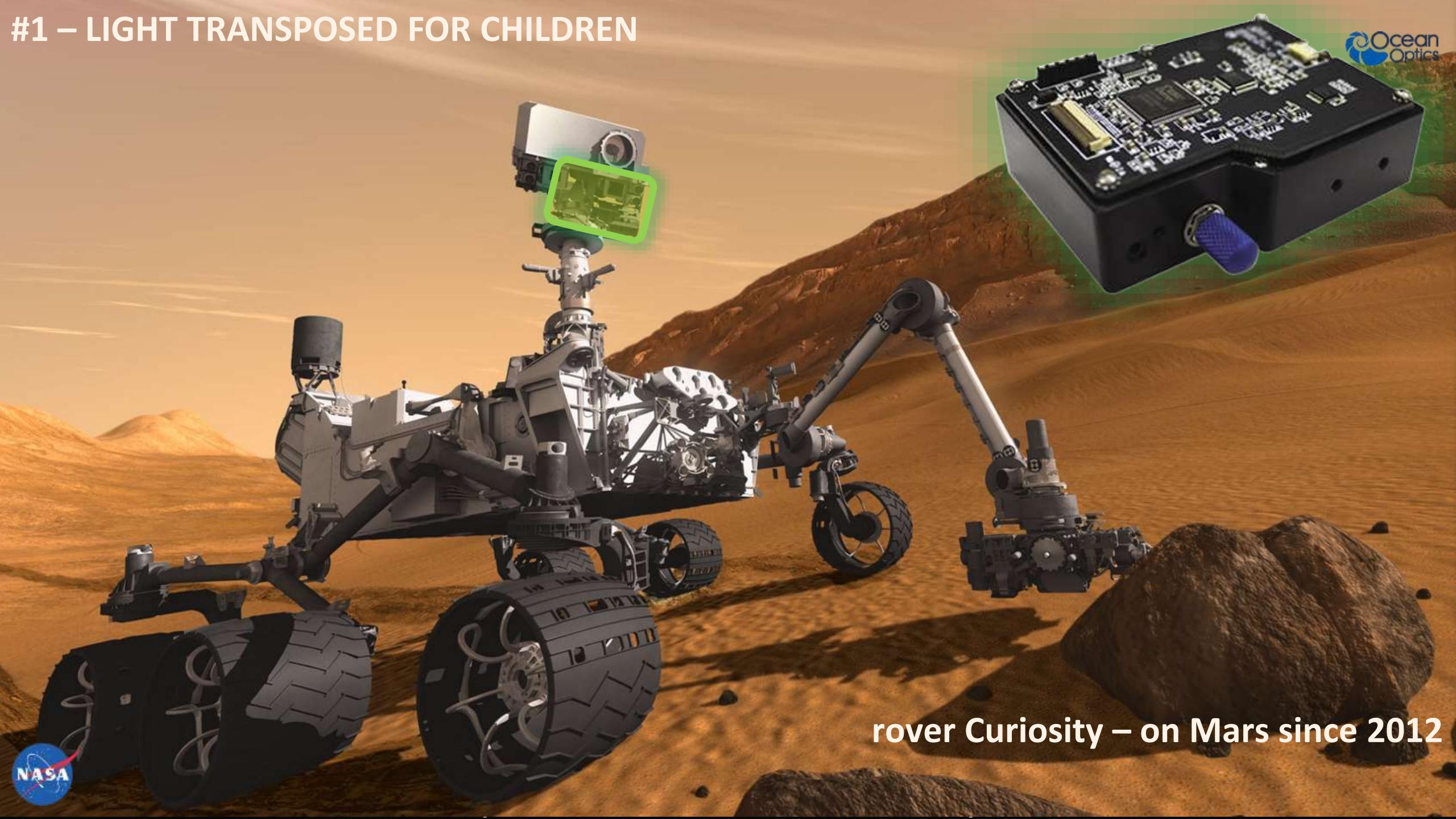


Natural white light source

Artificial source
of \pm white light

Artificial source of coherent
and monochromatic light

#1 – LIGHT TRANSDUCER FOR CHILDREN



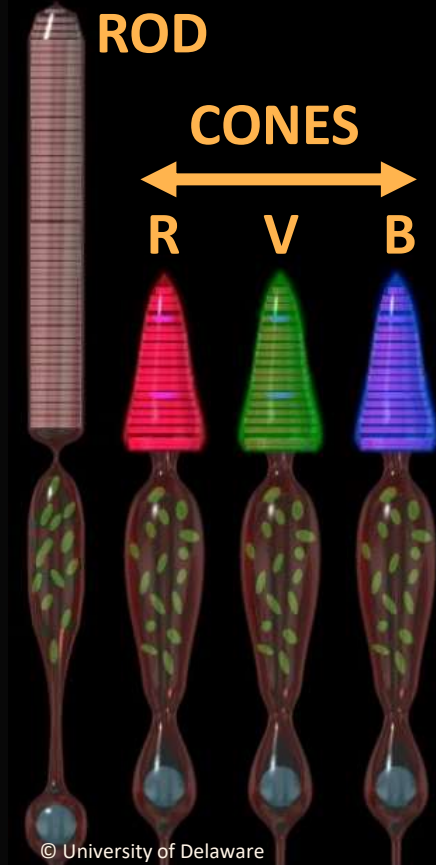
rover Curiosity – on Mars since 2012

HOW TO TRANSPOSE? – EXAMPLE #2 – COLOUR, VISION AND MOLECULES

The eye transforms light into **nerve impulses** that are transmitted to the brain

Cones : Sensitive to **RED (R)**
GREEN (V)
and **BLUE (B)**
Active in full light

Rods : Detect white, gray (and black by default)
Active in dim light



#2 – COLOUR, VISION AND MOLECULES TRANPOSED FOR CHILDREN

The LASER: **L**ight **A**mplification by **S**timulated **E**mission of **R**adiation



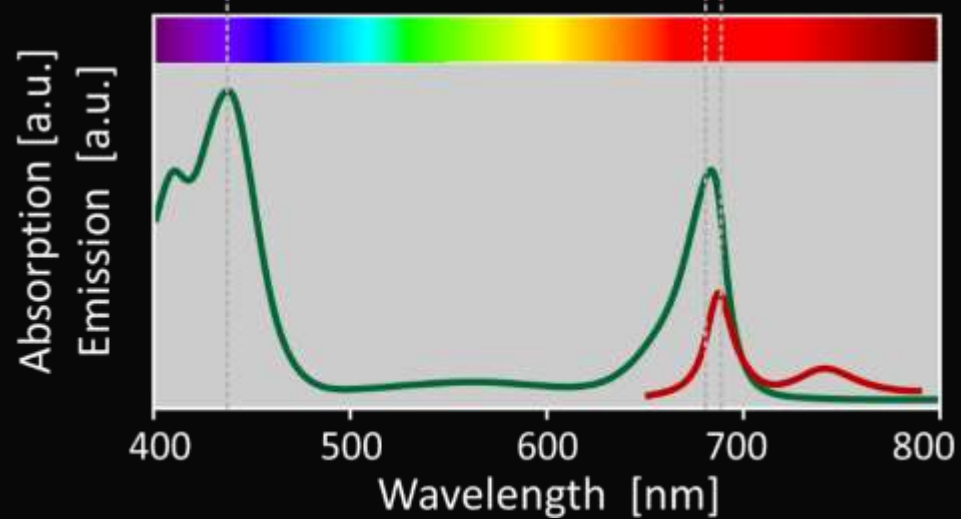
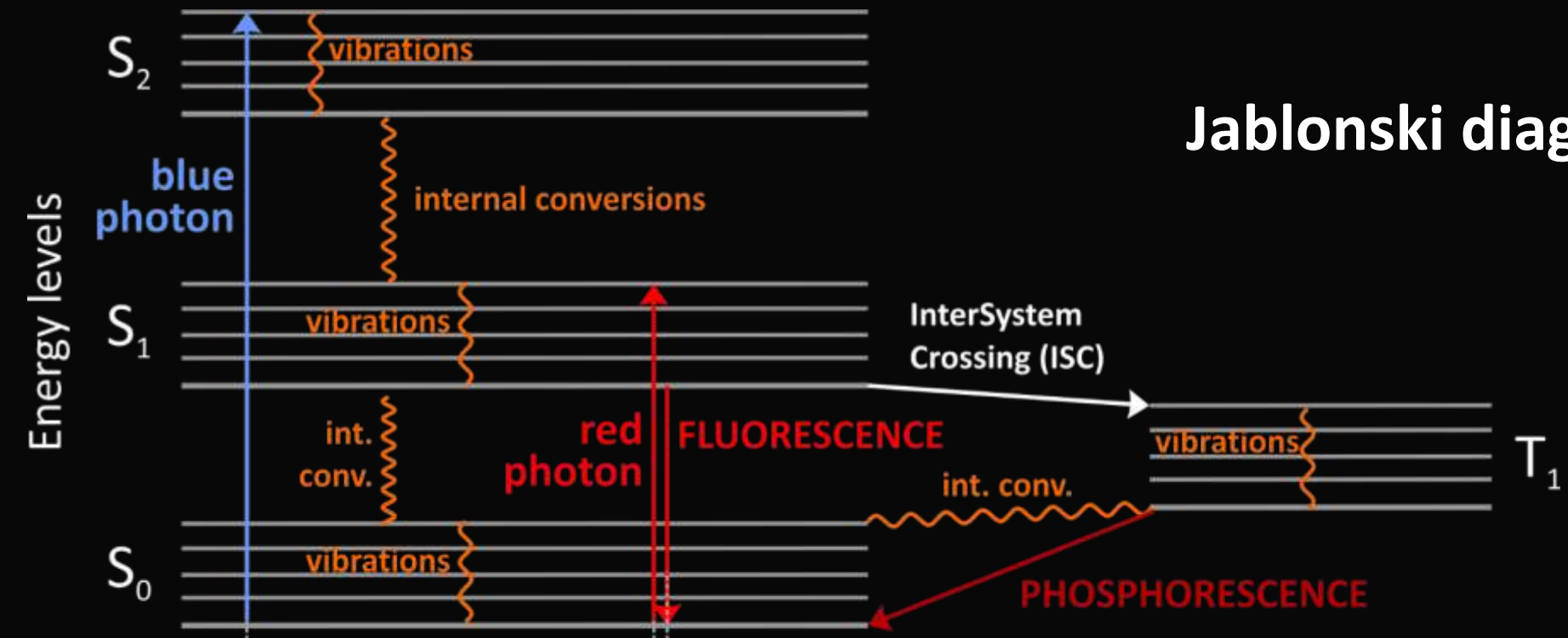
© 2002 James Bond 007 – Daniel Craig



© 2002 Star Wars – L'attaque des clones

HOW TO TRANSPOSE? – EXAMPLE #3 – FLUORESCENCE

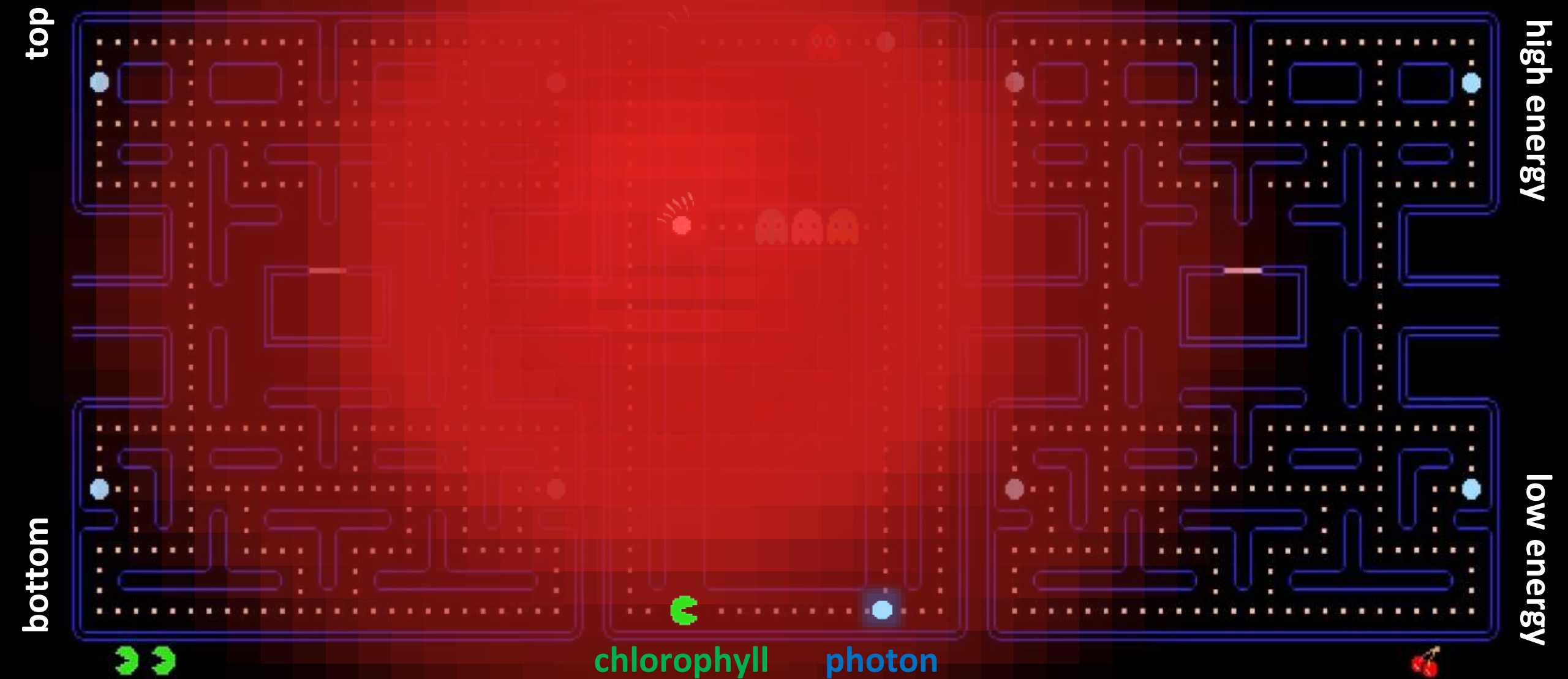
Jablonski diagram of chlorophyll



How can the novice calmly/easily apprehend the phenomenon?

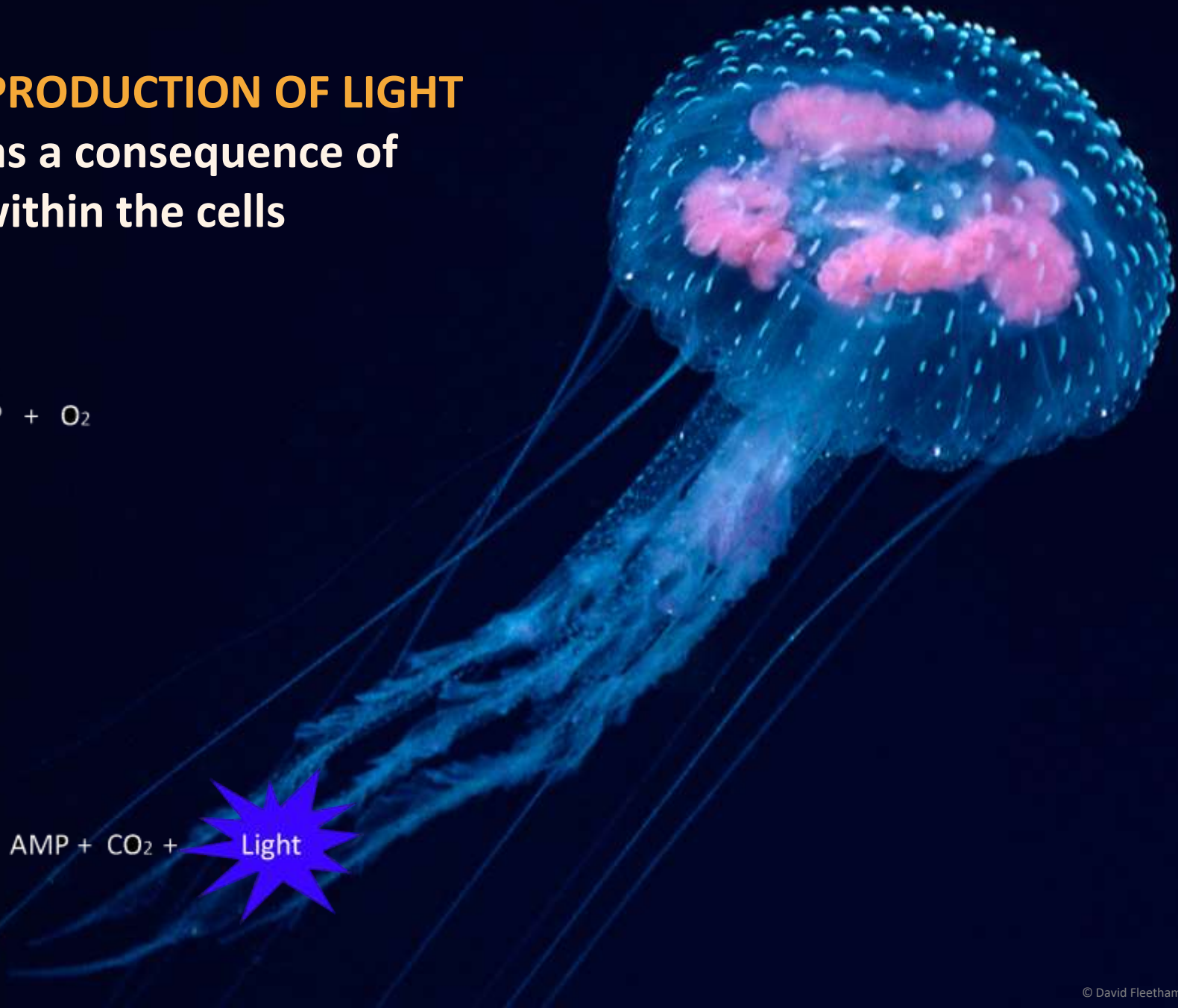
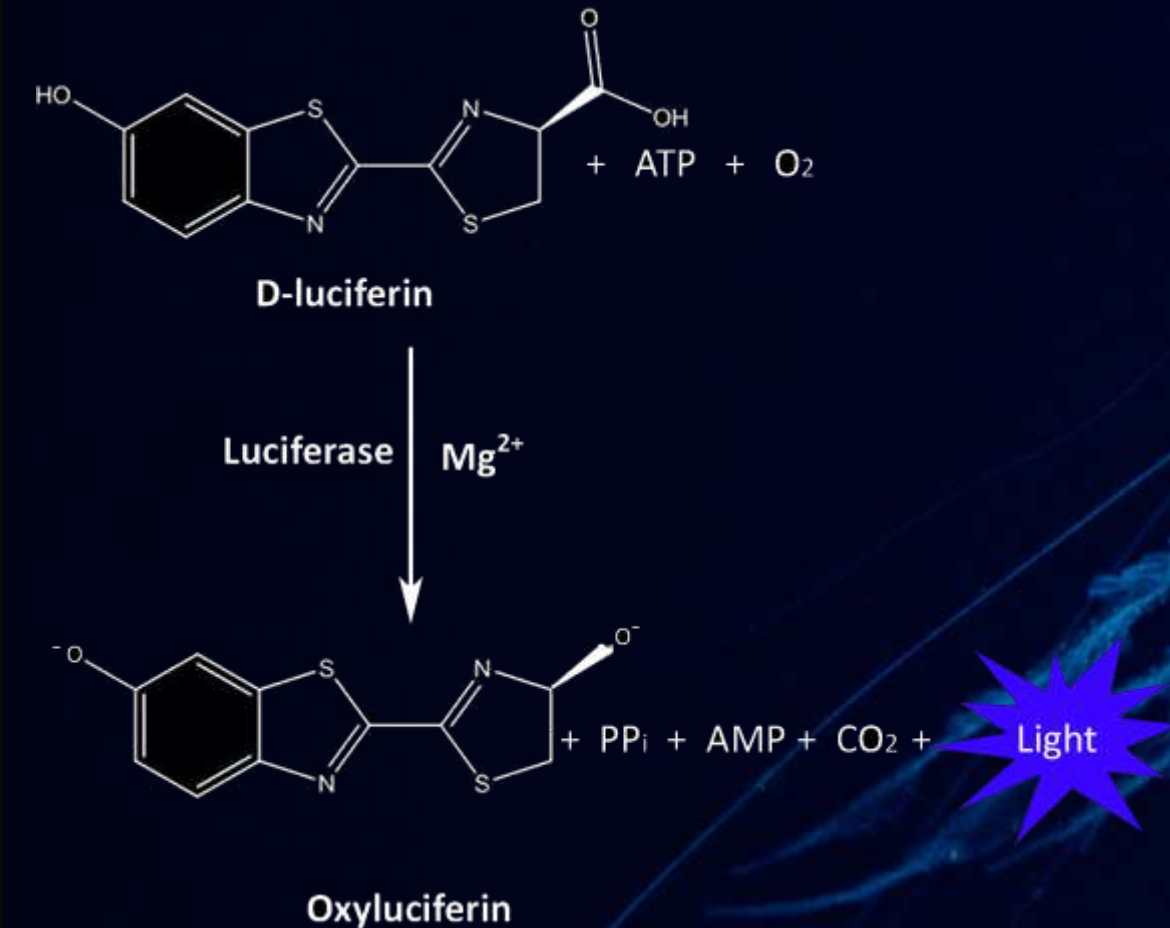
#3 – FLUORESCENCE TRANSPOSED FOR CHILDREN

energy of emitted red light \ll energy of absorbed blue light



HOW TO TRANSPOSE? – EXAMPLE #4 – BIOLUMINESCENCE

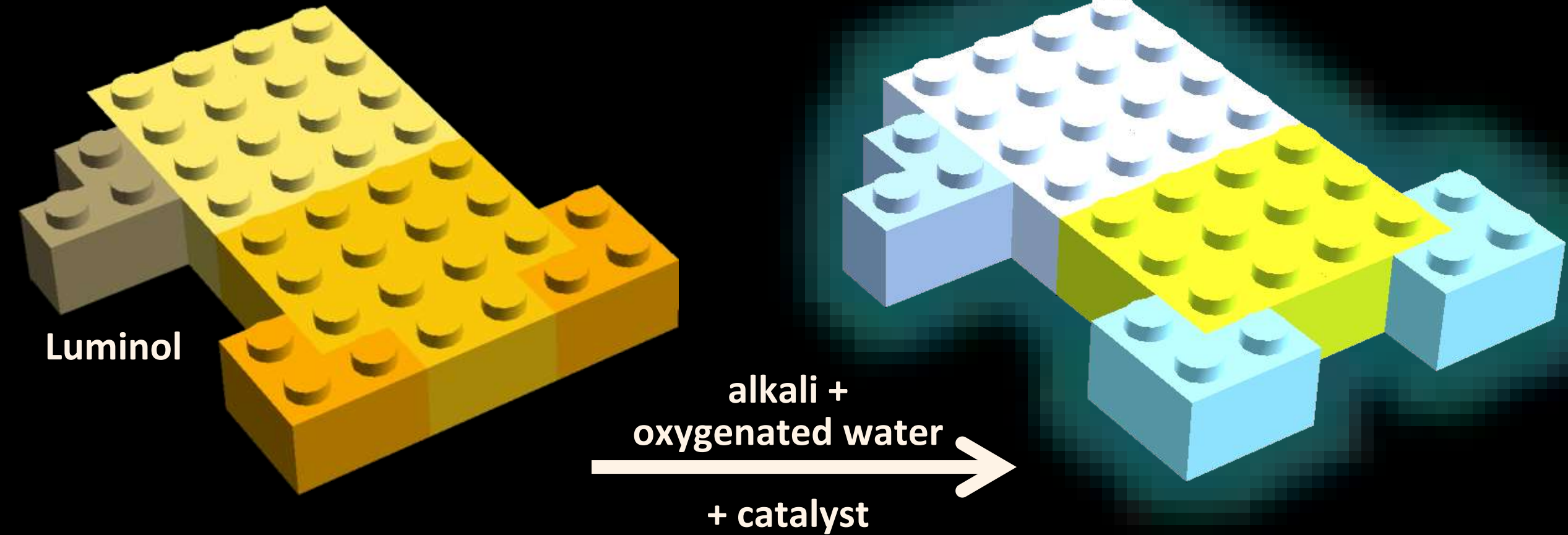
Bioluminescence is the **PRODUCTION OF LIGHT** by **LIVING ORGANISMS** as a consequence of **CHEMICAL REACTIONS** within the cells



#4 – BIOLUMINESCENCE TRANSPOSED FOR CHILDREN



#4 – BIOLUMINESCENCE TRANSPOSED FOR CHILDREN



AND NOW, IT'S YOUR TURN!

ONE CHEMICAL EXPERIMENT TO CREATE (OUT OF THREE AVAILABLE)

#1

HEAVY OR LIGHT?

Play with the elements
and the periodic table,
avoid traps/preconceptions,
and let us gain knowledge.

Be imaginative!

#2

SEE/FEEL THE INVISIBLE

Let us understand
basic thermodynamics
applied to chemical reactions
and surprise us.

Be curious and sensitive!

#3

BREAK UP THE MIX

Back to kindergarten,
create an Art & Science
activity around syrup and
markers.

Be creative and artistic!

FOR THE ONES WITH AN **ASSIGNMENT** WHO WILL TARGET THIS WORKSHOP...

YOUR ASSIGNMENT:

In your own field of expertise, identify/create a sentence (< 4-5 lines) containing **numerous specialised terms** that have no a priori meaning for an audience of **average schoolchildren** aged around **10** or **15** respectively.

Transpose this sentence using words that obviously **speak to each of these two audiences** (and to me!).

See you soon at



ChimisciSCOPE UNIGE