vitae species rationesque discimus

GRUPPO DIDATTICA

SOCIETÀ ITALIANA DI BIOCHIMICA E BIOLOGIA MOLECOLARE - 1951 - SIB

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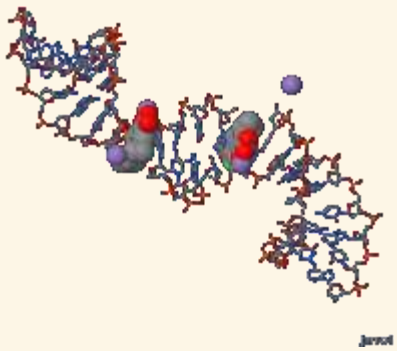
19 settembre 2022

Communicating biomolecular concepts in 3D: Proteopedia

How to use Proteopedia as **support** in teaching structure and function of biomolecules



Angel Herráez
University of Alcalá (Spain)
FEBS Education Committee

Poll: Where are you?

wooclap.com/ZHFXJR

How can we use the resources?

Support for content of the lecture (instructor)

Declare the utility

Recommended links (student)

Declare the aims

Homework for the student

Design activities

Guidance

What does Proteopedia offer?

- The resources are there: you don't need to write anything –yet, you may do it!
- Pick one protein, search for it on Proteopedia, and study the elements in the page
  - What unusual elements do you see?
  - What do they do for the protein structure and function?

e.g.:

lactalbumin	p53
acetylcholine	calcium channels
ribosome	Lac repressor
proton channels	CRISPR

http://proteopedia.org

Tell a story to your students

- Engage your students into protein structure by telling a story.
- (Study cases) Examples already available, in Proteopedia home page:
  - Why is carbon monoxide so dangerous to breathe?
  - How do *Tamiflu* and *Relenza* work as antiviral medication and why do they sometimes fail?
  - How do HIV drugs work to stop AIDS infection?
  - How to design a human protein that can be expressed in bacteria?
  - How does a repressor protein bind to a particular region of DNA?

Design of the case study

- Pick one interesting protein
- What does the protein do? (function)
- How does it happen? (structure)
- What happens when it fails? (disease)
- Are there any remedies? (drugs)

(to help you, any newly created page in Proteopedia will have a template including these points)

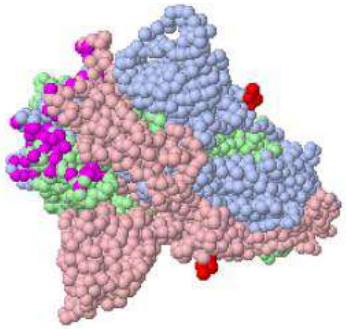
proteopedia.org

***As life is more than 2D**, Proteopedia helps to bridge the gap between 3D structure & function of biomacromolecules*

ISSN 2310-6301

Proteopedia** presents this information in a user-friendly way as a **collaborative & free 3D-encyclopedia of proteins & other biomolecules.

Selected Research Pages	In Journals	Education

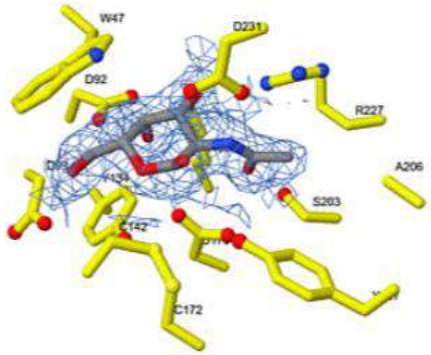


Jmol

Coronavirus Spike Protein Priming

by Eric Martz

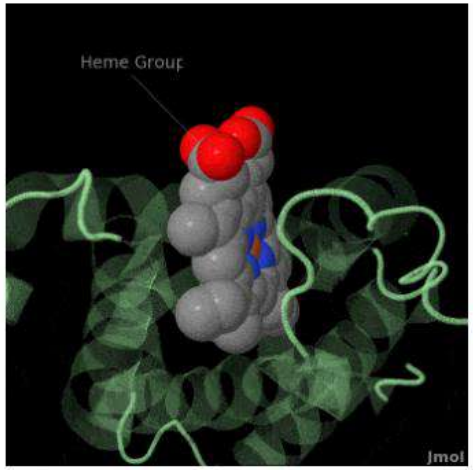
Coronavirus SARS-CoV-2 (responsible for COVID-19) has a spike protein on its surface, which enables it to infect host cells. Initially, proteases in the lungs clip



JSmol

Interconversion of the specificities of human lysosomal enzymes associated with Fabry and Schindler diseases.

IB Tomasic, MC Metcalf, AI Guce, NE Clark, SC Garman. J. Biol. Chem. 2010



Tutorial: How do we get the oxygen we breathe

J Prilusky, E Hodis doi: 10.14576/431679.1869588

This tutorial is designed for high school and beginning college students. When

How to add content to Proteopedia	About Interactive 3D Complements - **I3DCs**	Teaching strategies using Proteopedia
Video Guides	List of I3DCs	Examples of pages for teaching

What is there in Proteopedia?

- One page for every structure in the PDB (*seeded pages*, automatic)
- Pages written by users (*authored pages*)
- Wiki: collaborative space, easy to edit
- Attribution of authorship (automatic)
- Text content + images + videos + 3D molecular models inserted in the page
- "Green links": click and the model changes, loading a "molecular scene"
- Scene authoring tool (SAT) to easily create scenes
- Really great pages: DOI

Proteopedia is based on…

- **Mediawiki**
- **Jmol**, a molecular structure viewer
- **JSmol**, the variant for web pages
- The **Jmol Extension for Mediawiki**
- The **SAT** (part of Proteopedia itself)
- …

- The time and effort of users ☺

Ways to use Proteopedia

Reader: as a resource for finding out about a molecular structure

Lecturer: using ready material to support your teaching

Lecturer: write about your topic to support your teaching

Student: write your project and present it

Researcher:

- Talk about your protein, your lab work
- Prepare figures for your manuscript
- Supplement your published paper with 3D models
- Collaborate with a group of colleagues on a common resource

Guide your students to create projects on Proteopedia:

Suggest scientific questions where protein structure is known to play a role. Let the students search for information, study the topic (possibly find a graduate student to help as a Mentor).

Ask your students to summarize the findings and conclusion by creating interactive Proteopedia page. Finally have your students present it to the whole class (instead of using Powerpoint).

Making your own *Proteopedia* pages

- Proteopedia is based on Mediawiki, the same software as Wikipedia
- That means that ***registered*** users can edit content, create new pages, etc.
- Among the unique features of Proteopedia is the ability to easily insert
  - "**molecular scenes**" with 3D models displayed using JSmol
  - "**green links**" that will load the scenes

Teaching using special areas

- Studio domain
  - Able to create private areas, like Workbench, shared by a small group of students and a tutor.
  - Split the class into small working groups. They may share the same topic, but members from one group have no access to pages created by the others.
  - Selected users have read and write access
  - e.g.: proteopedia.org/w/Studio:G1SecL01

proteopedia.org/w/Proteopedia:Studio

Other special areas in Proteopedia

- Group domain
  - Open read and write access
  - proteopedia.org/w/Group:MUZIC:Interactome
  - proteopedia.org/w/Group:SMART:Teams
- Journal domain
  - Before paper publication:
    restricted read and write access
  - After publication:
    open read access, restricted write access
  - proteopedia.org/w/Journal:PLoS_ONE:2

Other features

Non-English pages

- Translation of English articles in Proteopedia to non-English languages is welcome.
- There is a convention for naming such pages.
- Help: proteopedia.org/w/Proteopedia:Languages

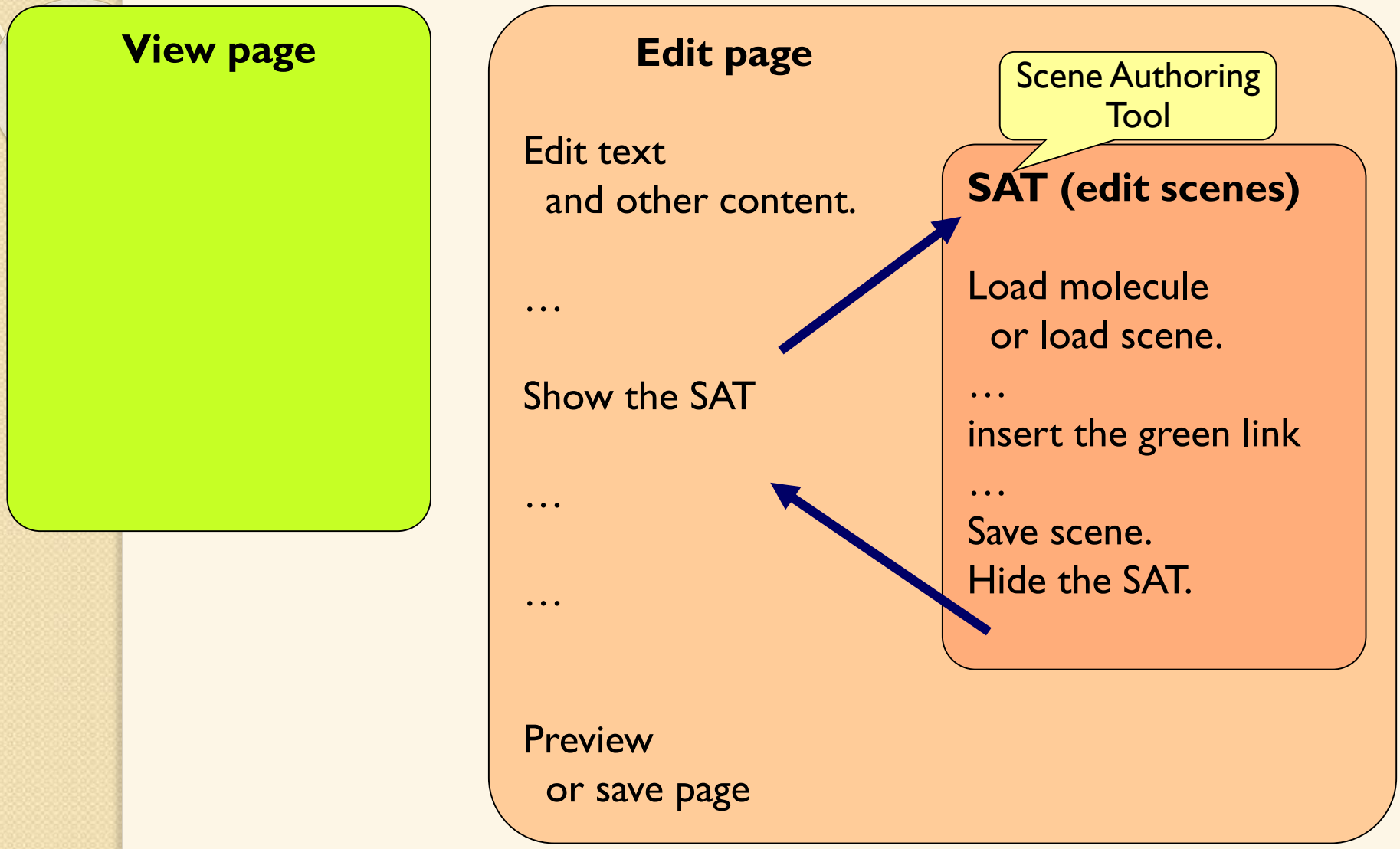
Sandboxes

- For testing, learning to edit…
- As temporary space (e.g. in workshops)
- e.g.: proteopedia.org/w/Sandbox_izmir18_01

Quizzes

- proteopedia.org/w/Proteopedia:Cookbook#Quiz

Flow of page editing



E questo è tutto ... per ora

Grazie!

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Proteopedialist-for-users mailing list
https://bit.ly/ProteopediaList