



## **Proteins: Historians of Life on Earth**

**Studying the molecular fossils of the amino acid sequences in proteins of various organisms**

Data and Background Material provided by  
Microbes Count! Problem Posing, Problem Solving, and Peer Persuasion in Microbiology  
John R. Jungck, Marion Field Fass, and Ethel D. Stanley, Editors  
BioQUEST Curriculum Consortium

Read through the *Proteins: Historians of Life on Earth* section by Garry A. Duncan, Eric Martz, and Sam Donovan on pages 181-190 of the Microbes Count! text.

Enter into the site:

<http://workbench.sdsc.edu/>

Sign in or register

Save your password here: \_\_\_\_\_

Read through the SDSC tutorial and informational pages provided.

Do a search for the term “enolase.” Enter a description here.

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Enter Biology Workbench with your User ID and Password.

Click Session Tools

Start New Session

Run

Session Description (name it)

Start New Session

Run

Click Protein Tools

Ndjinn-Multiple Database Search Chosen

Run

Type Enolase

Choose PDBFINDER in colored list below

Search

Choose 7ENL (Different from text!!!!!!)

Import Sequence

Click box in front of protein (PDBFinder: 7ENL)

Select View Database Records of Imported Sequences

Run

Select Formatted

Show Record (s)

After viewing the information, click Return

Select your protein

Select BLASTP

Run

Choose SwissProt

Submit

Scroll down the BLASTP results page.

Select six records of your choice (try to recognize the organism)

Scroll to the top and click Import Sequences

Select (check mark) all of the sequences (including yeast record)

Select CLUSTALW

Run (we are accepting all of the defaults)

Submit

Study the CLUSTALW Multiple Sequence Alignments

Then click Import Alignments at the bottom of the page

Choose Alignment Tools

Click CLUSTALW-Protein file (with  $\checkmark$ )

Select DRAWTREE

Run

We will accept all defaults

Submit

Copy and paste your final CLUSTALW alignment choices (page 1) and the alignment tree to a word processing document. Print this document and write a complete sentence describing the results of your analysis.