

STRUCTURAL BIOLOGY WITH DR CHARLES STEWART JR.

TALKING POINTS

KNOWLEDGE

1. What is a protein?
2. How many protein molecules can fit across the width of a human hair?
3. Do you know of any other types of proteins found in humans, other animals, or plants, in addition to those mentioned in the article?

COMPREHENSION

4. Can you explain how X-ray crystallography works?
5. Why is it important to know the structure of a protein?

ANALYSIS

6. What specific examples in other fields of science can you think of where you would need knowledge from structural biology?

EVALUATION

7. Which aspect of structural biology would you most like to study? Why?

CREATIVITY

8. Charles describes the moment that he made a breakthrough in his research. Imagine how he felt that night. How do you think you would feel if you made an important scientific discovery?

ACTIVITIES YOU CAN DO AT HOME OR IN THE CLASSROOM

- Write a list of 10 questions that you would like to ask Charles about his journey to becoming manager of the Macromolecular X-ray Crystallography Facility.
- As Charles discusses, medicinal plants can be hugely beneficial to humans. Research and find other examples of useful medicinal plants. Which proteins do they contain that we can use to our advantage?
- Charles describes his research as a mix of science and art. Many forms of science produce visually appealing results, and art can often be used as an effective way to communicate science. Find examples of science that you consider to be 'beautiful' or pleasing to look at. Why do you admire them? How could you use these images to engage others in the science behind them?

MORE RESOURCES

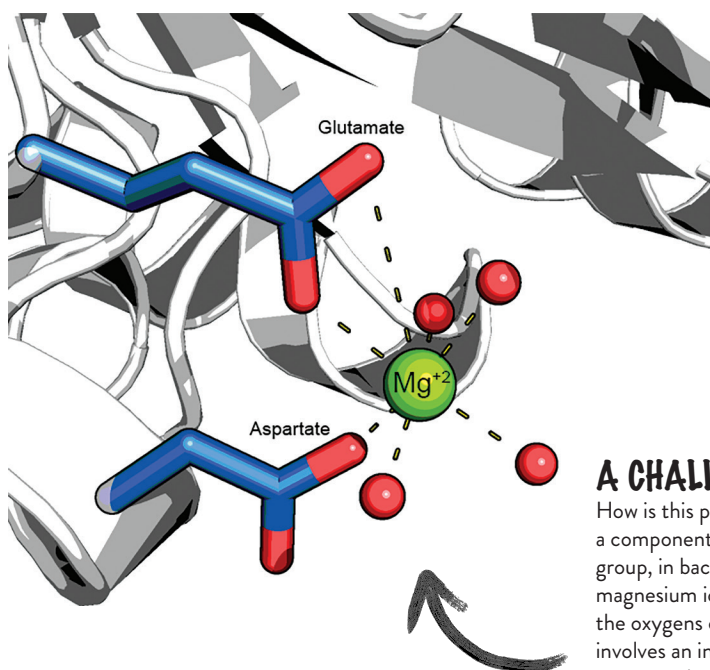
VISIT CHARLES' LAB PAGE:

<https://xray.biotech.iastate.edu>

<https://www.biotech.iastate.edu/biotechnology-outreach-education-center-boec/>

Learn more about proteins at the educational portal of the RCSB's Protein Data Bank:

<http://pdb101.rcsb.org>



A CHALLENGE FROM CHARLES

How is this protein able to bind magnesium? Some proteins bind metals. The image is of a component of a system of enzymes that transports phosphates, a chemistry functional group, in bacteria (pdb code 6v9k). The side chains of the amino acids that bind the magnesium ion are shown as sticks with their oxygen atoms coloured red. Additionally, the oxygens of nearby waters are also shown as red spheres. Hint: Metal-binding involves an interaction between the positively charged metal and negatively charged amino acids. Water is special – it has both positively and negatively charged areas.