



# AP<sup>®</sup> Biology 2021 Edition

BIOZONE's new title for AP<sup>®</sup> Biology is the third edition of this popular resource. Now in **full color** and **one comprehensive volume**, it has been completely revised to address the **2020 AP<sup>®</sup> Biology CED**. This title expertly balances breadth of content with depth of understanding, employing a wide variety of activities to develop the student's skills in key science practices. In keeping with the approach of the new **CE**D, AP<sup>®</sup> Biology deemphasizes the traditional approach of content coverage to focus on inquiry, critical thinking, and enduring understanding of key concepts. Clear presentation, a highly visual approach, and integration of relevant and engaging illustrative examples readies students for college level courses, developing the essential inquiry and reasoning skills they will need as 21st century scientists.

## Activity Page

### Activity number

Activities are numbered to make navigation through the book easier.

### Key question

Each activity has a key question summarizing its primary focus. It helps students to understand where the activity's emphasis lies.

### Write-on answers

Students write their answers directly onto the page. This becomes their record of work and helps them when it is time to review for tests and exams.

### Critical thinking questions

A direct questioning style helps students to easily identify what is being asked. A wide range of tasks, including free response, data analysis and presentation, and interpretation and evaluation of evidence, scaffold student learning to build confidence and competence.

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## Comparing Fibrous and Globular Proteins

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**Key Question:** How do the structure and properties of globular and fibrous proteins reflect their contrasting roles? Proteins can be classified according to structure or function. Globular and fibrous proteins form two of the main broad structural groups of proteins (the others being membrane proteins and disordered proteins such as casein). Globular proteins are spherical and somewhat soluble forming colloids in water (e.g. enzymes). Fibrous proteins have an elongated structure and are not water soluble. They provide stiffness and rigidity to the more fluid components of cells and tissues.

**Globular proteins**  
The shape of globular proteins is a function of their tertiary structure. Some proteins (e.g. actin and tubulin) are globular and soluble as monomers, but polymerize to form long, stiff fibers.

**IgG2** is a common immunoglobulin (antibody) in human serum. The red and blue regions are the constant regions of the molecule, whereas the yellow and green regions are variable and determine antibody binding specificity.

**Insulin** is a peptide hormone involved in the regulation of blood glucose. Insulin is composed of two peptide chains linked together by two disulfide bonds.

**RuBisCO** is a large multi-unit enzyme. It catalyzes the first step of carbon fixation in photosynthesis. It consists of 8 large and 8 small subunits and is the most abundant protein on Earth.

**Hemoglobin** is a multi-unit oxygen-transporting protein found in vertebrate red blood cells. One hemoglobin molecule consists of four polypeptide subunits (red and blue). Each subunit holds an oxygen-binding heme group (green).

**Properties of globular proteins**

- ▶ Easily water soluble
- ▶ Tertiary structure critical to function
- ▶ Polypeptide chains folded into a spherical shape

**Functions of globular proteins**

- ▶ Catalytic, e.g. enzymes
- ▶ Regulatory, e.g. hormones (insulin)
- ▶ Transport, e.g. hemoglobin
- ▶ Protective, e.g. immunoglobulins (antibodies)
- ▶ Structural (rarely), e.g. actin and tubulin monomers (cytoskeletal elements)

1. How are globular proteins involved in the functioning of organisms? Use examples to help illustrate your answer:

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\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

2. (a) Explain how the shape and properties of a globular protein relate to its functional role: \_\_\_\_\_

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\_\_\_\_\_

(b) How would its function be affected by a change in tertiary structure? \_\_\_\_\_

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ISBN: 978-1-98-856656-6  
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SYI-1  
6.E.b

SYI-1  
1.A

SYI-1  
6.E.b

SYI-1  
1.A

### Comprehensive diagrams

Provide an engaging, highly visual delivery of the important information.

### Content organization

Logically organized content makes it easier for students to access and engage with the information.

### Data driven activities

Answering questions based on the analysis and interpretation of real world data develops core skills in evidence-based reasoning and logical thinking. Communicating these analyses effectively builds skills in literacy.

### Activity coding system

Tab codes indicate online support via BIOZONE's Resource Hub and identify the key science practices and big ideas that spiral across topics and units. Purple connect tabs point forward or back to related content in the book