DAVID SHEPHERD WILDLIFE FOUNDATION

Teacher Guidance

Biology of Rescuing Orphaned Elephants
Activity for A Level and Level 3 Animal Management Students



Image credit: Matt Armstrong-Ford

The Art of Survival: FIGHT • PROTECT • ENGAGE

Introduction

The students will learn about complex internal biological systems of a mammal as well as giving them a background in conservation. It will build on their independent learning skills as the information is given to the students through four information sheets but also builds on topics covered at A level Biology and Level 3 Animal Management courses. Using an orphaned elephant called Nkala, students will learn about the effects of dehydration, glucose, protein and stress on the body as well as linking the importance of saving endangered animals for conservation. This student activity brings many different aspects of biology, giving a holistic view of organism biology and health. This could be used as an end of term revision activity to bring together different aspects of the course.

At a glance summary

This is a synoptic activity bringing together different areas of learning and transferring this knowledge to a novel context. It can be used at any point in the year as a recap or revision activity, or to use alongside taught content from these courses, to supplement teaching parts of these subjects.

This can help students explain their understanding and apply their knowledge to a novel situation and answer exam-style questions.

1 - 1.5 hr **Time:** Depending on ability level of the group.

Activity: using the PowerPoint and Student booklet, complete the rescuing an orphan elephant activity. The powerPoint to give background and the activity booklet contains the information needed to complete the questions with some prior knowledge covered within A level Biology and Level 3 Animal Management courses. The activity book has questions throughout and tables to complete, with additional information provided at the back of the booklets.
You will need (for roughly one-hour lesson):

- Student activity book (one per student)
- A device for additional research
- Pens and paper
- The Teacher PowerPoint

Learning Outcomes

1. How hormones and stress effects an individual
2. The role of water and electrolytes in the body
3. Key Biochemical molecules and their role in the body
4. The importance of conservation of an endangered animal in the in-situ

Guide to the PowerPoint

Slides 1 - 2	Title page and learning outcomes
Slides 3 - 6	Where is Zambia and what is Kafue national Park like
Slide 7 - 8	The scenario from the booklet and to read and fill in the booklet
Slides 9 - 10	Further explanation on electrolytes
Slides 11 - 13	Discussing the blood tests carried out and what they are looking for and what next steps should be taken based off these findings
Slides 14 - 16	Research into conservation threats, questions and Nkala is on the way to the orphanage.

Prior learning from different courses.

Key specification points:

For A level

- Water and its properties
- Carbohydrate structure and function
- Endocrine system and stress
- Heart structure and how the heart beats
- Conservation and In-situ conservation projects
- Ethics of conservation

For Level 3 Animal Management

- Wild animal behaviour - Behaviour and Communication
- Hormones that effect behaviour- Behaviour and Communication
- Properties of different food types (carbohydrates, water, proteins and potassium)- Feeding and Nutrition
- Hindgut fermenters- Feeding and Nutrition
- Endocrine System (hormones and glands)- Principles of Biology
- Circulatory system (Heart, heartbeat and blood)- Principles of Biology

Glossary

Glossary Term	Definition
Subsistence farms	A farmer and their family grow crops to meet the needs of their family on their farm.
Human wildlife conflict	Competition between people and the wildlife that share a space, the encounters turn negative for both animals and humans such as loss of property, crops and even life.
Dehydration	Losing more fluids/water than is being taken in to the body
Electrolytes	Positive or negative ions dissolved in the body fluids including the blood.
Hindgut fermenters	Herbivores with a single stomach and much larger caecum and colon for digesting plant materials.
Enema	Liquid being inserted into the anus to introduce medicine or fluids for hydration.
Pneumonia	Infection on the lungs that causes inflammation causing, a cough and shortness of breath.
Illegal Wildlife Trade	Gathering products from animals through illegal means and trafficking them around the world. Over exploitation of animal populations. It can be a part of an animal such as tiger's penis or a whole animal.
Matriarch	A female that is the head of the tribe or herd.
Cardiac Arrest	The heart stops beating, causing a lack of blood flow to the heart and other organs.
Albumin	A protein that once in the bloodstream aids in keeping the fluid in the blood from leaking out of the blood vessels into surrounding tissues. It also aids in carrying hormones, enzymes and vitamins in the blood.

Questions for the students

This can be used for direct questions as a stretch and challenge or used more as a discussion point for the students.

Question: What is in-situ conservation?

Answer: Any conservation that is done within the natural habitat or country of origin, whether all or part of it. Different from moving animals into zoos for conservation. This can include genetic variation by aiding the transport of selected animals to vary the gene pool, providing protected areas such as reserves and national parks that provide a safe habitat from hunters and land encroachment. In this case providing medical care for an endangered species to keep individuals healthy, helping increase population numbers with the goal to re-release back into the wild.

Question: What is the link between the nervous system working effectively with muscle movement and electrolytes?

Answer: The nervous system is made up of neurons which pass electrical messages around the body including signalling muscles to fire. This is especially important in the heart where the electrical impulse synchronises the heart to beat at the right time. The electrical message is a nerve impulse that travels down the axon of the nerve changing the electrical charge. Two of the substances that pass in and out of the cell are potassium and sodium, which are two of the substances that are electrolytes. If sodium and potassium are low, the axon cannot depolarise and repolarise and the electrical message cannot move along the length of the axon. If this is occurring in the heart the heart, beat may not be regulated correctly and can lead to fibrillation of the heart or cardiac arrest.

Question: Why are antibiotics not routinely given in elephant rescues anymore?

Answer: Antibiotic resistance is a big problem in animal and human health and the over use of antibiotics, when there is no medical need, is increasing the resistance of different bacteria strains. So, only providing antibiotics when there is a proven bacterial infection that is causing harm will reduce the amount of unnecessary antibiotics.

Antibiotics negatively effect all bacteria in the elephant not just the ones causing harm, meaning the gut microbiome will be negatively affect the breakdown and absorbance of food in an already malnourished animal.

Question: If stress and stress hormones such as cortisol and adrenaline are bad for the body, why do we have them and what is their purpose?

Answer: Adrenaline has a role in the autonomic nervous system with fight or flight response. When danger is detected the hypothalamus and pituitary gland in the brain, they trigger the release of adrenaline by the adrenal glands. This works quickly to divert blood away from the excretory and digestive systems to the muscles, in preparation for running or fighting the way out of danger. The heart and respiratory rate increases, so this blood is oxygen and nutrient rich. The liver releases stored glucose to fuel this activity so that the individual can evade the danger.

Image credit: Matt Armstrong-Ford

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