**Pakistan School, Kingdom of Bahrain**

**E- Support and Learning Material / Session 2020-2021**

**Subject: Biology Grade: 9**

**Book: Biology 9(PLD), FIRST TERM**

***NOTE: FOR SSC CLASSES PRESCRIBED TEXTBOOKS ARE THE MAIN SOURCE OF INFORMATION. FOLLOW THE TEXTBOOK ACCORDING TO ONLINE LECTURES. SAMPLE NOTES ARE PROVIDED FOR YOUR ASSISSTANCE.***

**Ch.;2. Solving A Biological Problem**

**TOPIC: Study of Malaria**

**Q.7. Let’s consider a hypothesis. “ALL PLANT CELLS HAVE A NUCLEUS”. Write the deduction make by the biologists about this hypothesis?**

Ans: Biologists can’t usually check every situation where a hypothesis might apply.

Let’s consider a hypothesis: “ALL PLANT CELLS HAVE A NUCLEUS. Biologist cannot examine every living plant and every plant that has ever lived to see if this hypothesis is false. instead, biologist generate deduction using reasoning. From the above hypothesis, a biologist can make the following deduction: If I examine cells from a blade of grass, then each one will have a nucleus”.

**Q.8 Which one is the effective remedy for malaria?**

Ans: In fact, quinine was the only effective remedy for malaria from 17th to the 20th century.

Q.9 Why female mosquitoes need the blood of mammals or birds?

Ans: Female mosquitoes need the blood of mammals or birds for the maturation of their eggs.

Q.10 Describe the function of saliva of female mosquito? Ans: When a female mosquito pierces the skin with her mouth parts, she injects a small amount of saliva into the wound before drawing blood. The saliva prevents the blood from clotting in her food canal.

 **Q. 9 How welts appear after the mosquito leaves?**

Ans: The welts that appear after the mosquito leaves is not a reaction to the wound but an allergic reaction to the saliva .in most cases, the itching sensation and swelling subside within several hours.

 **Q.10 Describe the steps involved in biological method taking Malaria as an example?**

**Ans:** Malaria has killed more people than any other disease. The account of malaria is example of a biological problem ana of how such problem solved.

Malaria is a common disease in many countries including Pakistan.

**Observations about Malaria:**

In the last part of 19th century many different causes of malaria were being suggested. That time there were four major observation about malaria.

* Malaria and marshy areas have relation,
* Quinine is an effective drug for treating malaria.
* Drinking water from marches does not cause malaria.
* “Plasmodium” is seen in the blood of malarial patients**.**

 **Hypothesis Formulation:**

A scientist uses whatever information and observation he has and make or more hypothesis. The hypothesis made in this case was:

 **“Plasmodium is the cause of malaria”**

 **Deduction:**

A scientist does not know whether this hypothesis is true or not, but he accepts it may be true and makes deductions.one of the deduction from the above hypothesis was:

 **“If plasmodium is the cause of malaria, then all persons ill with**

 **should have plasmodium in their blood.”**

 **Experimentation:** The next step was to test the deduction through experiments which were designed as follows:

**Experimental Group:**

 Blood of 100 malarial patients was examined under microscope.

 **Control group:**

 Blood of 100 healthy persons was examined under microscope.

**Results:**

 The experimental results showed that almost all malarial patients had

 Plasmodium in their blood while 7 out of 100 healthy persons also had plasmodium in their **blood.**

Plasmodium in the blood of healthy individuals was in its incubation period i.e. the period between the entry of parasite in the host and appearance of symptoms.

Hypothesis confirmation:

The results were quite convincing and provide the hypothesis

 “Plasmodium is the cause of Malaria “was true.

 The next biological problem was to learn about “How plasmodium gets into the blood of a man.

**Topic: Theory, Law and Principle.**

**Q-11. How are theory, law and principles formulated?**

Ans. **Theory.**

The hypothesis that stands the test of time (often tested and never rejected), are called theories. A Theory is supported by a great deal of evidence.

Productive theory keeps on suggesting new hypothesis and so testing goes on.

Many Biologists take it as a challenge and exert greater effort to disprove the theory.



 **Law and Principle:**

If theory survives such doubtful approach and continues to be supported by constant fact of nature, it is refutable theory. The hypotheses that stand the test of time (often tested and never rejected) are called theory. Many Biologists take it as a challenge and exert greater efforts to disprove the theory. If the theory survives such doubt ful approach and continues to be supported by experimental evidence, It becomes a law or Principle. Examples of Biological laws are hardy-Weinberg’s law and Mendel’s law of inheritance.

**Q-12. Define Data**?

ns. Data can be defined as a single piece of information such as names, dates, or values made from observations and experimentation.

**Q13. How the Principles of ratio and proportion are used in Biological method.**

Ans. Application of statically methods.

Depending on the types of Data and the biological problems this might include application of statistical methods i.e.

1. Ratio (ii) Proportion

**Ratio**

**Definition**. When a relation between two numbers e.g. ‘’a’ and ‘’ b’’ is expressed in terms of quotient(a/b) is called the ratio of one no two others. Representation of Ratio.

A ratio may be expressed by putting a division (÷) or colon (;) mark between two numbers

**Example**. The ratio between 50 malarial patients and **150** normal person is1:3

**Proportion**

**Definition:** Proportion means to join two equal ratios by the sign of equality (=).

Representation of proportion:

**a: b=cod or a: b:C: d**

**Example:** A biologist can calculate how many Birds would get Malaria, when he allowed infected mosquitoes to bite 100 healthy sparrows. In one experiment he noted that when he allowed mosquitoes to bite 20 sparrows, 14 of them got malaria.

using proportion rule:

 $\frac{X}{100 }= \frac{14}{20} \rightarrow X x 20=14 x 100$

 $\rightarrow X= \frac{100}{20} x 14 \rightarrow X=70.$

It means 70 out of the 100 sparrows would get malaria.

 **Statistics:**

Statistics are thus a means of summarizing data through the calculation of a mean value. This step is very important as it transforms raw data into information which can be used to summarize and report the result.

 **TOPIC: Data organization and Data Analysis**

**Q.14. Describe Data Organization and Data Analysis**

Ans: **Data organization:**

1. In order to formulate and then to test the hypothesis scientists collect and organize data. Through the use of variables and controls, results can be determined. Variables are those factors being tested in a experiment and are usually compared to a control. A control is a known measure to which scientists can compare their results.
2. Prior to conducting an experiment, it is very important for a scientist to describe the data collection method. It ensures the quality of the experiment. Attention must be paid to ensure that data collection method is kept balanced.
3. Data is organized in different formats like graphics, tables, flow charts, maps and diagram.
4. **Data analysis:**

Data analysis is necessary to prove or disprove a hypothesis by experimentation. The methods involved in testing/analyzing the data are also important since an experiment should be repeated by others to ensure the quality of the results. Depending on the type of data and biological problem, this might include application of statistical method i.e. Ratio and propotion.when a relation between two numbers e.g. “ a “And “b” is expressed in terms of quotient (a/b), such a relation is the ratio of one number to the other. A ratio may be expressed by putting a division (+) or colon (:) mark between the two numbers. For example, the ratio between 50 malarial patients and 150 normal is 1:3.

**WORKSHEET**

  **Assessment Worksheet s(Chapter-2 Solving a biological problem)**

**Q1. Encircle the correct option i.e. A/B/C/D all parts carry equal marks.**

1. Rose allowed a female ----------------mosquito to bite on sparrows suffering from Malaria
2. Plasmodium.
3. Culex
4. Anopheles
5. Aedes- albopictus.
6. ------------------ -is the effective medicine is used for the treatment of Malaria is

a. Panadol

b. Antibiotics.

c. Quinine.

d. Cinchona.

iii. The Theory of Evolution was proposed by

 a. Archimedes

b. AL lbaruni.

c. Darwin.

d. Einstein.

iv. While testing the Hypothesis that Plasmodium is the cause of Malaria what would be the control group of Malaria

a. Blood of Malarial Patient.

b. Blood of healthy patient

c. Saliva of the mosquito.

d. all of them.

v. ---------------------------refers to the computational and statistical techniques for the analysis of biological data;

1. Data organization.
2. Data analysis
3. Bioinformatics.
4. Applied mathematics.

 **Q.2. Tick the following statement either True or False;**

1. Quantitative observations are better in biological Method
2. Data analysis is necessary to prove or disprove Hypotheses
3. The hypothesis that does not stand the test of time are called theory.
4. Deductions are drawn from Hypothesis.
5. The untreated specimen is called as control Group.