

Major Concept

- 27.1 Vaccination and Integrated Disease Management
- 27.2 Animal Husbandry
- 27.3 Latest Techniques Applied to Enhance Crop and Fruit Yield
- 27.4 Home Gardening
- 27.5 Role of Microbes in Human Welfare

Learning Outcomes

Students will be able to:

- Explain what is meant by integrated disease management.
- Describe vaccination and its importance.
- List some common viral diseases against which vaccination are required *e.g.* polio, measles, influenza and hepatitis.
- Describe the role of vaccines in preventing polio, measles, hepatitis and tetanus.
- State the schedule of the vaccination against polio, measles, hepatitis and tetanus.
- Describe animal husbandry and the role of life stock in national economy (milk, meat, eggs, wool and other miscellaneous products).
- List the outstanding milk producing breeds of cows and buffaloes.
- Describe different methods adopted for plant improvements (acclimatization, selection, hybridization and back crosses, *etc.*).
- Explain home gardening and its importance.
- Identify some seasonal vegetable and fruit plants suitable for home gardening.
- Explain the role of microbes in household food processing, industrial production, sewage treatment and energy generation.

Introduction

The aim of this unit is to establish proper importance of learning of biology for human benefits. Biology has a strong influence in health and diseases. **Health** is defined as a state when an individual is free from illness and injury. Biology has an impact in diagnosing, treating and preventing diseases. Biology gives awareness about causative agents (pathogens) for diseases and symptoms caused by them. Biology has contributed in enhancement of food production. Mechanisms have been developed to improve quantity and quality of food production. It has been made possible to preserve food for long duration. Knowledge of biology is helpful in using microbes for human welfare. Biological-control against **pests** and insects has greatly contributed in saving crops.

Animal and plant breeds have been improved by techniques of genetics and biotechnology.

27.1 Integrated Disease Management and Vaccination

There are several methods of disease control that have been developed and being used.

27.1.1 Integrated Disease Management

Integrated disease management is a struggle of combating fatal and other common diseases by using a range of measures to prevent and manage diseases by involving the whole society. All the effective measures necessary to get rid a particular disease are taken.

Objective

Integrated disease management aims to improve and maintain quality of life. It is concerned with improving health in populations and reduction of future complications associated with those diseases. By integrated disease management we can make our society healthy and progressive. (Fig.27.1)

Procedure

The initial step in integrated disease management is to involve community by creating awareness among them about a particular disease. This awareness can be created through **social and electronic media, magazines or newspapers**. Discussion programs among various colleges can be arranged in order to share information regarding disease. Certain causes of disease spread, effective remedies and precautions should be communicated to whole community. Every possible method is used to prevent and cure disease such as: vaccination, drug treatment and other therapies. Paramedics, Doctors, Basic Health Unit, District and Provincial Level Hospitals, Provincial and Federal Health Authorities are all part of integrated disease management. World Health Organization (WHO) is a global body to assist the governments and societies in promoting health and imparting health education.

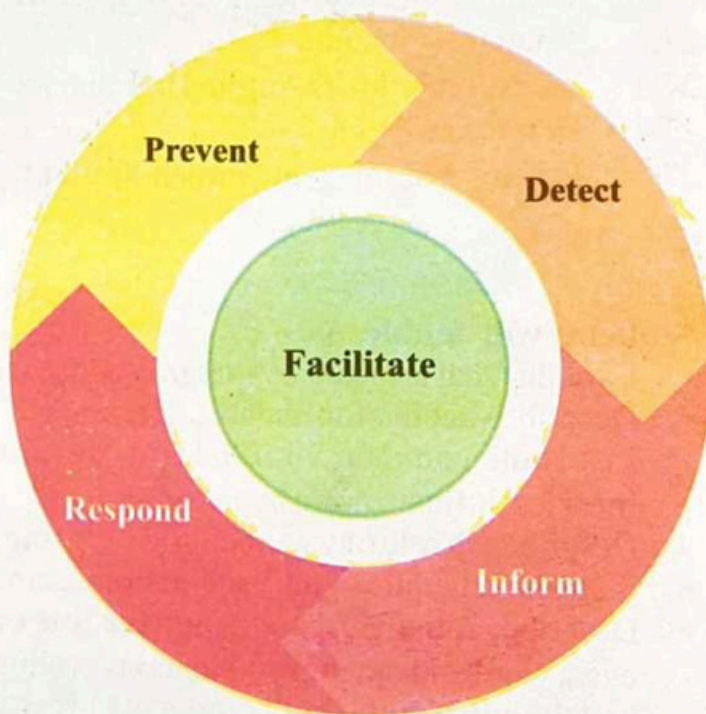


Fig.27.1: Integrated Disease Management

27.1.2 Vaccination

The introduction of an **antigenic substance** (vaccine) in the body to produce active immunity against a specific disease is called vaccination.

Vaccine is a biological preparation; it contains pathogen in killed or attenuated (weakened) form which can develop immunity but is not able to cause disease. A vaccine may also contain components of pathogen such as its proteins or toxins. Vaccines artificially activate the immune system to produce **antibodies** against the antigen present in vaccine. So that in future if one gets infected by such **pathogen**, the body has the potential to form accurate antibodies to destroy that particular **antigen**. Vaccination provides a lasting effect; it usually takes several weeks to develop immunity.

Importance of Vaccination

Vaccination is the most effective way used to **boost** immune system and prevent serious life threatening diseases that were once common worldwide *i.e.* polio, mumps, measles and tetanus. Vaccination is largely responsible for eradication of small pox worldwide. There can be mild side effects after vaccination such as low grade fever, nausea, fatigue, pain or redness on that area and chills. (Fig.27.2)

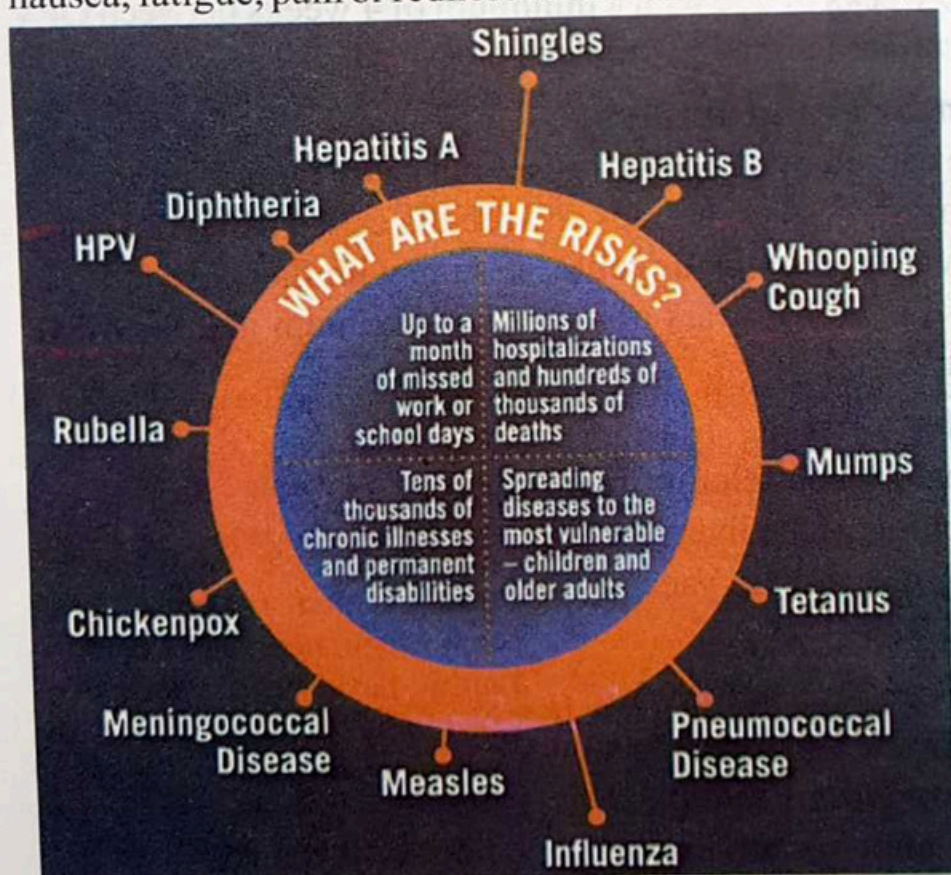


Fig.27.2: Vaccines for 14 Deadly Diseases

Extra Information

In last 70 years' vaccines have helped to eradicate infectious diseases like small pox. World Health Organization (WHO) estimates that 2 to 3 million deaths are prevented every year through immunization against diphtheria, tetanus, whooping cough and measles.

Interesting Information

Human papillomavirus (HPV) is most common sexually transmitted infection, causes genital warts and cancer.

Shingle: Shingle is viral infection that causes a painful rash blisters occur anywhere on the body, most often appears in torso.

Table 27.1: List of Viral Diseases Against which Vaccine are Required

i)	Hepatitis A	Hep-A Vaccine protects against hepatitis A.
ii)	Hepatitis B	Hep-B Vaccine protects against hepatitis B.
iii)	Flu	Flu-Vaccine protects against influenza.
iv)	Measles, Mumps and Rubella	MMR-Vaccine protects against measles, mumps and Rubella.
v)	Polio	OPV and IPV-Vaccine protects against polio.

27.1.3 Role of vaccines in Preventing Diseases

It is always better to prevent a disease than to treat it after it occurs. *i.e.* **prevention is better than cure**. Diseases that used to be common around the world can now be prevented by vaccines. Over the years' vaccines have prevented countless cases of disease.

i) Vaccination against Polio

Poliomyelitis is a **disabling disease** caused by polio virus that results in muscle weakness and **paralysis**. Two types of polio vaccines are used: (1) An inactivated polio virus (IPV) given by injection and (2) weakened polio virus (OPV) given by oral route. WHO recommends OPV vaccine at birth followed by a primary series of 3 OPV and at least one IPV doses starting at 6 weeks of age with a minimum of 4 weeks between OPV doses. These vaccines have **eliminated** polio from most of the world.

ii) Vaccination against measles and mumps

Measles and mumps are caused by different viruses but share unique symptoms. There is a common vaccine against measles, mumps and rubella called **MMR vaccine**. MMR vaccine is administered via **subcutaneous route**, starting with first dose at 12-15 months of age and second dose is at 4-6 years of age. The maximum age for MMR vaccine administration is 12 years.

iii) Vaccination against Hepatitis

Hepatitis is an inflammatory condition of liver, commonly caused by viral infections of the liver that are classified as hepatitis A, B, C, D, and E. Vaccine is available only for hepatitis A and B.

iv) Vaccination against Tetanus (Lockjaw)

Tetanus also called **lockjaw** is a serious infection caused by a bacterium *Clostridium tetani*. This bacterium produces a toxin that affects brain leading to stiffness in the muscles. Tetanus is prevented by tetanus

Extra Reading

Vaccines cause "herd immunity" which means if the majority of people in a community have been vaccinated against a disease, an unvaccinated person is less likely to get sick because others are less likely to get sick and spread disease.

vaccine also known as **tetanus toxoid**, is an **inactivated vaccine**. During childhood five doses are recommended. Additionally, one dose every ten years is recommended.

27.1.4 Schedule of Vaccination of Common Infectious Disease

Table 27.2: Schedule of Vaccination

Disease	Vaccine	Type	Age group
Polio	OPV (Oral Polio Vaccine)	Live weakened vaccine	From birth to 5 years of age
Hepatitis	Hepatitis-B Vaccine	Recombinant DNA	At any age
Measles + Mumps+ Rubella	MMR (Measles, Mumps, Rubella and Vaccine)	Combination vaccine	Up to one year of age
Diphtheria + Tetanus	Diphtheria toxoid (DT) vaccine, Tetanus toxoid (TT) vaccine	Toxoid vaccine	Generally in childhood

27.2 Animal Husbandry

Animal husbandry is the branch of agriculture which deals with the practice of breeding, farming, management and care of livestock like cattle, sheep, horses, cow and chickens for advantages. In animal husbandry genetic qualities and behaviours considered to be advantageous to humans are further developed. Animals are raised for meat, milk, eggs, fibre, leather and

other products like vaccines and antiserum for medical use. Cattle and sheep are improved to yield more meat, milk and wool by **agriculturalists**. Animal husbandry includes proper feeding, watering and cleaning the living area of animals. The breeding of farm animals is managed by farmers with a view to encouraging traits considered as desirable that include fast growth rates, low feed consumption, higher yields, better quality fibres. **Selective breeding** has been responsible for large increases in productivity. Good husbandry, proper feeding and maintaining hygiene contribute to animal health which brings economic benefits. When animals become sick they are treated by veterinary medicines by farmer and veterinarian.

Role of Livestock in National Economy

Livestock are the domesticated animals **reared** commercially for sale on a farm or agricultural business. It is an inclusive general word, which includes animals like cattle, sheep, goats and birds *etc.* The livestock animals give us food like meat, eggs and milk. The horses, donkeys and mules are also part of livestock.

The livestock plays an important role in the economy of Pakistan. About 30-40%

Extra Information

Cows have almost 360-degree sight and can see all colors except red. It can drink a whole tub of water in just one day and have strong sense of smell.

of income in our country comes from livestock. The livestock sector contributes 50% of the agriculture value added products and 11% to national gross domestic product (GDP). 8% of total exports derived from livestock and their products.

Pakistan is luckily having some best dairy breeds like **Nili**, **Ravi** and **Kundi buffaloes** and **Red Sindhi** and **Sahiwal cattle**. (Table 27.3)(Fig.27.3)

Table 27.3: Some outstanding Breeds of Milk Producing Cows and Buffaloes

S.No.	Name of Cow	Milk yield per lactation Cycle
i)	Holstein-Friesian	12,700 L
ii)	Friesen	7800 L
iii)	Ayrshire	7,711 L
iv)	Jersey	7,260 L

Name of Buffalo		
i)	Nili-Ravi	1500 - 2300 L
ii)	Jaffarabadi	1000 - 1200 L
iii)	Godavari	1200 - 1500 L
iv)	Bhadawari	800 - 1000 L



Fig. 27.3: Cow and Buffalo

27.3 Latest Techniques applied to Enhance Crop and Fruit Yields

27.3.1 Plant Breeding

It is the application of genetic principles to produce plants that are more useful to humans. Genetic potential of crops is improved through **plant breeding**.

There are various plant breeding techniques used for changing the traits of plants to improve quality and

Extra Information

Plant breeding was initiated by Mendel when he crossed different varieties of pea plants.

quantity of crops. Some methods are mentioned below.

i) **Selection**

One of the ancient and major techniques of plant breeding is selection. In this method plants with desirable characteristics are selected and used for further breeding and cultivation.

ii) **Hybridization**

It is the frequently used method of plant breeding in which desired traits found in different plants are brought together into plant via cross pollination. Individual produced as a result of cross between two genetically different parents is called **hybrid**. Hybridization does not change genetic contents of organisms but it produces new combination of genes. The main objective of hybridization is to create genetic variation. Segregation and recombination produce many new gene combinations in second generation. Improved or increased function of any biological quality in a hybrid than both of its parents refers to **heterosis** or **hybrid vigour**. Heterosis is used to increase yields, uniformity and vigour. Hybrid breeding methods are used in maize, sorghum, rice, sugar beet, onion, spinach, sunflower, and broccoli.

Acclimatization

This is the process in which the plants are introduced to a new environment where plants adjust to gradual changes of climatic conditions in its new environment *i.e.* change in temperature, humidity photoperiod and pH. In acclimatization the introduction of genotypes from the place where it is grown to an entirely new area takes place. It is the easiest and most common method of crop rotation.

Acclimatization is different from adaptation as **acclimatization** is short term response to the change in the environment while **adaptation** is long term response to the change in environment occurs over several generations. Moreover, acclimatization does not bring genetic change and reversible while adaptation brings genetic changes and irreversible.

Backcross

Backcross is formed when a hybrid is crossed with one of its parents to introduce a specific trait such as disease resistance. Backcross breeding is an effective method to transfer one or a few genes controlling a specific trait from one line into a second breeding line. Backcross is significant in **Horticulture** and **Animal Breeding** to produce desired characters in species.

Home Gardening

A home garden is a plot of ground usually inside or near a house where ornamental

Interesting Information

Dairy cows typically live to their third lactation before being **culled**. Naturally, a cow can live for 20 years.

flowers, fruits, vegetables and herbs are cultivated. It is a delightful and fertile region of house. It is a place for people to live, children to play and it also produces a variety of foods and other things for use in home and to enhance income. A well-developed home garden is a complete farming system. (Fig.27.4)



Fig. 27.4: Home Garden

Importance

A home garden creates a healthy atmosphere in house. It provides instant access to fresh products one can save time and money on buying products from the market. **Organic fruits** and vegetables can be grown at home by skipping the chemical fertilizers and pesticides. The flavour and quality of freshly picked produce from a home garden is superior to store-brought produce with unknown chemicals. Garden plots often reduce soil erosion by holding soil in place. **Ornamental plants** add beauty to the garden.

Table 27.5: Seasonal Vegetables and Fruit Plants

Winter January, February	Cabbage, cauliflower, celery root, grapefruit, mandarin oranges, sweet oranges, pears, spinach, sweet potatoes, etc.
Spring March, April, May	Asparagus, basil, beans, berries, broccoli, cabbage, cucumbers, radish, mangoes, okra (lady's finger) oranges, papayas, peas, etc.
Summer June, July, August	Corn, cucumbers, dates, figs, grapes, mangoes, okra, peaches, chilli peppers, sweet peppers, plums, tomatoes, watermelon, etc.
Fall Sept., Oct., Nov.	Apples, cabbage, cauliflower, cranberries, cucumbers, dates, grapes, pears, chilli peppers, sweet peppers, spinach, sweet potatoes, etc.

27.4 Role of Microbes in Human Welfare

Living organisms that are not visible to naked eye are called **microbes** or **microorganisms**. Microbes exist everywhere in air, soil, water, human body and inside plants and animals. Microbes are essential components of life on earth and can be beneficial to humans in several ways. Not all microbes are **pathogenic**.

Extra Information

There are more microbes in human body than the number of cells in our body. There number is estimated to be in trillions.

27.4.1 Role of Microbes in Household Food Processing

Microbes are useful in household food processing in a number of ways. Microbes' convert food items to other varieties. By the action of lacto bacillus bacteria Yogurt can be produced from milk. **Dough** used to make bread is fermented using baker's yeast. Other food items produced with the help of microbes are cheese, wine, soya sauce, etc. The yeast used to make bread is also used to ferment malted cereals and fruits juices to make **beverages** i.e. beer, whiskey, wine, brandy, etc.

Table 27.6: Role of Microbes in Household Food Processing

Source/ Substrate	Microbe Used	Food Product
Pasteurized milk	<i>Streptococcus thermophilus</i> <i>Lactobacillus vulgaricus</i>	Yogurt
Pasteurized milk	<i>Streptococcus</i> sp. <i>Lactobacillus</i> sp.	Cheese
Variety of organic compounds	<i>Penicillium</i> sp. <i>Saccharomyces</i> sp.	Acetic acid i.e. vinegar
Mixture of wheat and soya beans + salt water	<i>Aspergillus oryzae</i> <i>Lactobacillus</i> and yeast	Soya sauce
Cereal grains ground into flour	<i>Saccharomyces cerevisiae</i>	Bread

27.4.2 Role of Microbes in Industrial Production

Industries use microbes to make products that are valuable to Human. Microbes produce chemicals (**Antibiotics**) that can kill or stop the growth of disease causing organisms.

Detergents used to remove oily stains contain enzymes such as **lipases** are derived from microbes. Further microbes help to produce bioactive molecules like **Cyclosporine-A** used to suppress immune system during organ transplant. Microbes can also be used to produce certain non-microbial products such as the diabetes medication **insulin**. They produce chemicals like **ethanol** which is used as fuel, solvent and for various other purposes. **Biofertilizers** consist of living microbes that are added to soil to increase fertility.

Interesting Information

All microbes in a person combined weigh about as much as your brain: about three pounds.

27.4.3 Role of Microbes in sewage treatments

Sewage that is generated by humans daily is treated in **sewage treatment plants** (STPs) to make it less harmful before releasing in to natural water bodies. The main

component of sewage is organic matter but there are other substances such as oil, heavy metals, nitrogen and phosphorous compounds (from detergents and artificial fertilizers). Microbes use the organic material in sewage as their sources of carbohydrate for respiration. Treatment of sewage by microbes involves the following three steps:

- i) Primary Treatment
- ii) Secondary Treatment
- iii) Tertiary Treatment

i) Primary Treatment

The first step in treating sewage is filtration to remove large objects. These large objects usually go to a **landfill site** or **incinerator**. The remaining material is then allowed to settle so that much of solid material drops to the bottom of tank. The process of sedimentation removes soil and small pebbles. The solid material that settles is primary sludge while the **supernatant** forms the **effluent**. The effluent is then passed through secondary treatment.

ii) Secondary Treatment

The treatment of waste water subsequent to the removal of suspended solids by microorganisms such as algae. Fungi or bacteria under aerobic or anaerobic conditions during which organic matter in waste water is oxidized is termed biological treatment or secondary treatment. In aerobic conditions the **organic contaminants** are converted to CO_2 , water and other products. In anaerobic conditions the organic contaminants are converted to a **biofuel gas** comprising CO_2 , methane or other products.

iii) Tertiary Treatment

It is the final cleaning process that improves waste water quality before it is discharged. The treatment removes remaining inorganic compounds such as nitrogen and phosphorus. (Fig.27.5)

Extra Information

Researcher suggest that the microbes play a role in digestion, the regulation of your immune system, disease prevention, wound healing, gut lining protection, appetite control, brain development and even our emotions.

Extra Information

Sewage or domestic / municipal wastewater, is a type of wastewater that is produced by a community of people. It is characterized by volume or rate of flow, physical condition, chemical and toxic constituents and its bacteriologic status (which organisms it contains and in what quantities).

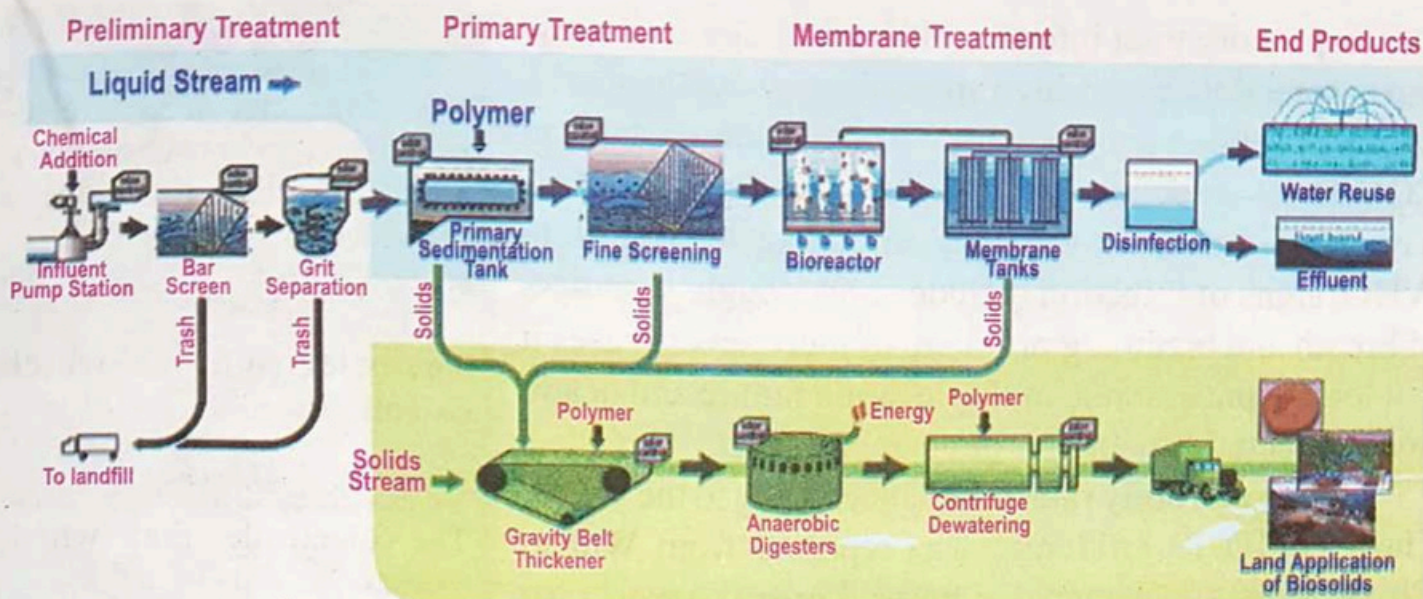


Fig. 27.5: Sewage Treatment Plant

27.4.4 Role of Microbes in Energy Production

Microbes have tremendous potential to produce energy. A microbial fuel cell is capable of generating electricity directly from large variety of organic and inorganic compounds using microbes as **catalyst**. Conventionally fuel cells convert chemical energy to electrical energy by **consumption of fuel** at **anode** and an **oxidant** at **cathode**. The electrons and protons released, travel through an external circuit producing electricity. Microbes can be used to convert the sunlight, CO_2 and nitrogen into a renewable fuel sources. Production of **biodiesel** from **microalgae** and production of hydrogen gas (H_2) by bacteria are other examples of microorganisms in energy generation.

Extra Reading

The SARS (Severe Acute Respiratory Syndrome) is a group of viruses which cause respiratory tract disorders. These viruses thought to be spread from animal sources (perhaps bats). An epidemic of SARS affected 26 countries and resulted in more than 8000 infected cases reported in 2003. This virus was called SARS CoV-1.

The recent **Coronavirus** was first identified in December, 2019. Therefore, it was given name COVID-19 (Coronavirus Disease 2019). In March 2020, the name SARS-CoV-2 is given to this virus. The word corona is a Latin word meaning crown or halo. It is a +ve strand RNA enveloped virus. It is minute in size (65-125 nm in diameter). It is roughly spherical in shape. It causes flu

Pandemic

An epidemic occurring Worldwide or over a very wild area, crossing international boundaries and usually affect a large number of people.

Epidemic

It is rapid spread of disease to a large number of people in a given population with a short period of time.

like respiratory tract infection. It is a contagious disease and is spreading with a high speed throughout the world. So for 16 million people worldwide have affected due to COVID-19 infection. More than half million people have been died from this viral infection. According to WHO, signs of infection include fever, cough, shortness of breath and breathing problem. In more severe cases it can lead to pneumonia, multiple organ failure and death. Some infected patient may be asymptomatic.

The mortality rate is 3.4% according to the WHO. The COVID-19 **epidemic** was reported from Wuhan City of China and spread almost all over the world, so WHO declared it as **pandemic**. Most of the death cases are found in USA, UK, Brazil, Italy, Spain, France, Iran and China. In Pakistan hundreds of thousands of people have been affected. So for more than six thousand people have been died.

Oxidant

Substance that accepts electron from another substance in a redox reaction. It is reduced in a reaction.

Anode

The electrode at which oxidation occurs.

Cathode

The electrode that which reduction occurs.

Science, Technology and Society (STS)

Assess the impact of livestock in boosting up the national economy.

Livestock and poultry production including milk and eggs is the second most important sector of agriculture in our country. Pakistan being an agricultural based economy has a great potential in livestock. Livestock has a share of 10.8% of Pakistan total GDP. Livestock sector employs 35 million people and produces almost \$500 million products. Vast majority is of small firms of less than 2 hectares that maintain herds of 1 to 3 animals. Pakistan is fortunate to be the home tract of some of the finest natural breeds of livestock as compared with other regional countries.

SUMMARY

- Animal and plant breeds are improved by techniques of genetic engineering.
- Integrated disease management is a struggle of combating fatal and other common diseases by using a range of measures.
- Introduction of an antigenic substance (Vaccine) in the body to produce active immunity against a specific disease is called vaccination.
- It is always better to prevent a disease than to treat it after it occurs.
- Poliomyelitis is a disabling disease caused by polio virus.
- Measles and mumps are caused by different viruses but share unique symptoms.

- Tetanus is caused by a bacterium *Clostridium tetani*.
- Animal husbandry includes proper feeding, watering and cleaning the living areas of animals.
- Livestock are the domesticated animals reared commercially for sale on a farm or agricultural business.
- Backcross is formed when a hybrid is crossed with one of his parents.
- Living organisms that are not visible to naked eye are called microbes.
- Industries use microbes to make products that are valuable to men.
- Microbes have tremendous potential to produce energy.

EXERCISE

SECTION-I: OBJECTIVE QUESTIONS

Multiple Choice Questions (MCQs)

A. Select the correct answer.

1. Td-vaccination is the best way to prevent a tetanus infection.
(a) Morphology (b) Histology
(c) Anatomy (d) Physiology
2. Casein is?
(a) Milk protein (b) Starter culture
(c) Toxin (d) Gyle
3. Integrated disease management aims to improve the quality of
(a) Environment (b) Life
(c) Food (d) Animals
4. Tetanus is also called
(a) Muscle cramp (b) Muscle fatigue
(c) Lockjaw (d) Paralysis
5. Animal husbandry is the branch of science deals with care of
(a) Livestock (b) Fruits
(c) Diseases (d) Vaccination
6. The best way to prevent polio is
(a) Antibiotics (b) Cleanliness
(c) Vaccination (d) Healthy food

7. Which of the following method is used for crop improvement
 (a) Selection (b) Fertilization
 (c) Vaccination (d) Watering
8. The main component of sewage is
 (a) Oil (b) Inorganic matter
 (c) Minerals (d) Organic matter
9. A back cross is made when a hybrid is crossed with its
 (a) Sibling (b) Offspring
 (c) Parents (d) Other species

B. Fill in the Blanks.

1. Integrated disease management aims to improve and maintain the of life.
2. Vaccine is a biological preparation contain in killed or attenuated form.
3. Prevention is better than
4. Hepatitis is an inflammatory condition of
5. About 30-40% of income in our country comes from
6. Hybridization does not change contents of organism but it produces new combination of genes.
7. Measles and mumps are caused by different viruses but share unique
8. A home garden creates a environment in house.
9. Biofertilizers consist of living
10. Microbes have tremendous potential to produce

SECTION-II: SHORT QUESTIONS

C. Give the short answers of the following questions.

1. Define integrated disease management.
2. Write importance of vaccination against prevention of diseases.
3. Write two types of vaccines recommended for polio.
4. Write importance of acclimatization for plant breeding.
5. Define back cross, write its importance.
6. Write importance of home gardening.
7. Write role of microbes for energy production.

D. Give detailed answers of the following questions.

1. Define and explain animal husbandry and role of livestock in national economy.
2. Explain the latest techniques applied to enhance crop production.
3. Describe the role of microbes in human welfare.
4. Describe three steps of sewage treatment by microbes.

GLOSSARY

A

A-band:

Abiotic:

Abortion:

Acid Rain:

Acrosome:

Adrenocorticotrophic Hormone (ACTH):

Addictive Drug:

Aldosterone:

Allele:

Alternation of generations:

Alveolar duct:

Alveolus:

Ammonification:

Analgesic:

Androecium:

Aneuploidy:

Anticodon:

Anther:

Antibiotics:

The length of myosin with overlapping actin in a sarcomere.

The non-living components of the environment or ecosystem like water, sunlight, soil, heat, *etc.*

Termination of pregnancy.

The rain containing sulphuric acid and nitric acid; with pH range from 3 to 6.

Cap-like head of sperm cell which helps it in penetrating the egg cell contains enzymes.

This hormone is secreted by the anterior pituitary gland which stimulates the adrenal cortex to release corticosteroids.

The drug which makes a person dependent on it, or addicted.

A hormone secreted by the adrenal glands that controls the reabsorption of sodium in the descending loop of Henle's of nephron.

The alternative form of a gene (Tt, Rr).

In plants, the phenomenon in which the sporophyte (diploid and asexual) and gametophyte generations (haploid and sexual) alternate with each other.

The bronchioles end as fine tubules called the **alveolar ducts**.

A sac-like structure present next to the alveolar duct in lungs (Unit of lung).

The decomposition of protein of dead plants and animals, and nitrogenous wastes to change ammonia by ammonifying, bacteria.

The medicines that reduce pain.

The male reproductive whorl of the flower; consists of stamens, produce pollen grains.

Variation in chromosome number involving one or a few of chromosomes.

A sequence of three nucleotides on the transfer RNA molecule that recognizes and pair with a specific codon on a messenger RNA molecule.

The sac-like structure of a stamen in which pollen grains are enclosed.

The medicines which inhibit or kill bacteria.

Artificial selection:

Selective breeding between individuals for certain traits, or combination of traits.

Aspirin:

Acetaminophen; A pain-killer medicine.

Asthma:

An inflammation of the bronchi of lung that causes swelling and narrowing to the airways.

Autosomes:

Other than the sex chromosomes contains genes for bodily traits.

Atmospheric

Nitrogen fixation:

The conversion of atmospheric gaseous nitrogen to nitrates by thunderstorms and lightning.

B

Ball-and –socket joint:

The joint that allows movement in all directions *e.g.* hip and shoulder joints.

Biceps:

A flexor muscle on the front of the upper arm bone contains two heads.

Biomass:

The total weight of living tissue in a community.

Binary fission:

Division into two; the simplest method of asexual reproduction in prokaryotes and many unicellular eukaryotes.

Biocidal:

The antibiotics that work by killing bacteria.

Biogeochemical cycle:

The cyclic pathway through which chemical elements move from environment to organisms and back to the environment.

Biosphere:

The last level of ecological organization, all the ecosystems of the world together form the biosphere (living and non-living part of world).

Biostatic:

The antibiotics which reduces bacterial multiplication and prevent the reproduction of bacteria.

Biotechnology:

The use of living organisms in systems or processes for the manufacture of useful products or for services for humankind.

Biotic:

The living components of the ecosystem include producers, consumers and decomposers.

Bone:

Hard connective tissue; moves, supports and protects the various organs of the body.

Breathing:

The process through which animals take air in their bodies to get oxygen and remove carbon dioxide.

Breeds:

The animals which are bred through artificial selection.

Bronchioles:

Fine tubules without cartilages formed by the division of the bronchi.

Bronchitis:

Inflammation in the bronchi or bronchioles of lungs.

Bronchus:

The part of air passageway; formed by the division of the trachea.

(Pl. bronchi)

Blastocoels:	The fluid-filled cavity in blastula.
Blastocyst:	The developmental stage of the fertilized ovum by the time it is ready to implant.
Blastula:	A ball of cells surrounding a fluid-filled cavity called blastocoel. It is produced by the repeated cleavage of a zygote.
Budding:	An outgrowth; a type of asexual reproduction in which a bud develops as a small outgrowth on parent's body and forms the new individual.
Bulb:	Underground vertical shoots which have modified leaves such as onion.

C

Calcitonin:	Thyroid hormone that plays a role in regulating calcium levels.
Calyx:	The outer whorl of flowers; consists of sepals (green part).
Carbon Cycle:	The biogeochemical cycle in which carbon flows between organisms and the environment.
Carnivore:	The consumers which eat only animal flesh.
Carpel:	Part of the gynoecium of the flower; consists of stigma, style and ovary (female part).
Cartilage:	The connective tissue that makes part of the human skeleton, soft and flexible.
Cervix:	In female reproductive system, the part between uterus and the vagina.
Chemosynthetic:	Organisms (usually bacteria) that derive energy from inorganic reactions; also known as chemosynthetic.
Chondrocytes:	Cartilage forming cell.
Chromatin:	The chemical material that make the structure of the chromosome (DNA and Proteins).
Chromosomes:	These are thread like structures in the nucleus of a eukaryotic cell which is made of DNA and protein.
Chromosome theory of inheritance:	Holds that chromosomes are the cellular components that physically contain genes; proposed in 1903 by Walter Sutton and Theodore Boveri.
Clavicle:	The collar bone, in pectoral girdle.
Climax community:	The stage in community succession where the community has become relatively stable through successful adjustment to its environment.
Cloning:	Type of asexual reproduction in which identical offspring are produced from a vegetative tissue or cell of one parent.

Dialyzer:	The apparatus used for haemodialysis, which act as artificial kidney.
Diaphragm:	The muscular structure that forms the floor of the chest cavity; present below lungs, separate thorax from abdomen.
Diencephalon:	Part of the forebrain; consists of the thalamus and hypothalamus.
Dihybrid cross:	A genetic cross in which two pairs of contrasting traits are studied (Rr Yy).
Distal convoluted tubule:	The last part of the nephron between collecting duct and loop of Henle.
Divergent evolution:	The divergence of a single interbreeding population or species into two or more descendant species came due to adapting in different environment.
Dominant:	An allele or a gene that is expressed in an organism's phenotype, masking the effect of the recessive allele or gene when present.
DNA hybridization:	The formation of hybrid DNA molecules that contain a strand of DNA from two different species.
DNA ligase:	An enzyme that seals together two DNA fragments from different sources to form a recombinant DNA molecule.
DNA polymerase:	An enzyme that links the complementary nucleotides together to form the newly synthesized strand.
Dominance hierarchy:	A social structure among a group of animals in which one is dominant and the others have subordinate nonbreeding positions.

E

Ecological niche:	The role, occupation or job an organism it performs in an ecosystem; closely associated with feeding.
Ecological Pyramid:	A representation of the number of individuals or amount of biomass or energy present in various trophic levels of a food chain.
Emphysema:	Lung disease in which the walls of the alveoli are destroyed.
Endosperm:	In the female gametophyte, the triploid nucleus formed by the fusion of sperm and the fusion diploid nucleus (Nutritive in function).
Endometrium:	The inner most lining of the uterus.
Endospore:	The spore formed inside the bacterial cell (during unfavorable conditions).
Endothermy:	The internal control of body temperature; the ability to generate and maintain internal body heat.

Environment:	The sum total of physical (abiotic) and biotic conditions which influence the organism.
Epididymis:	A storage area for sperms on the upper part of the testes.
Epinephrine:	A hormone of adrenal medulla that secreted under stress; contributes to the "fight or flight" response.
Epistasis:	The masking of the effects of one gene (hypostatic) by the action of another gene (epistatic).
Excretion:	The process by which the metabolic wastes (ammonia, urea and uric acid) are removed from the body.
Exons:	Exons are coding portion of DNA separated by introns that does not code for any amino acid sequences.
Exhalation / expiration:	The phase of breathing in which air is removed from the lungs.
Extensor:	A muscle that extends a joint.
Extinction:	The elimination of a species, both by natural (dinosaurs) and human-induced.

F

Fallopian tube or oviduct:	A part of the female reproductive system; receives egg cell discharged from the ovary.
Fermentation:	The process in which there is an incomplete oxidation-reduction of the organic substrate (glucose).
Fermenter:	A device that provides optimum environment in which organisms can grow to produce commercial products.
Fibroblast:	Connective tissue that secrete elastin and collagen protein fibres.
Fibrous cartilage:	The cartilage that has large number of fibres in the matrix <i>e.g.</i> the cartilage in intervertebral disc.
Flexor:	A muscle that bends a joint.
Follicle:	A structure in the ovary in which the mature egg develops.
Food Chain:	The series of organisms in an ecosystem, in which an organism eats the preceding one and is eaten by the next one.
Food Web:	A network of interconnected food chains; has a number of feeding connections among different organisms of a community.
Founder effect:	The difference in gene pools between an original population and a new population founded by one or a few individuals randomly separated from the original population.
Fragmentation:	A type of asexual reproduction in which an organism breaks up into many pieces and each piece develops into mature animal.

G

Gametogenesis:	The process of the formation of gametes.
Gametophyte:	The haploid generation in plant life cycle; produces gametes.
Gaseous exchange:	Taking in and giving out of gases (oxygen and carbon dioxide) by organism during respiration.
Gene:	Unit of inheritance; consists of the length of DNA that contains specific instructions for the synthesis of a protein molecule.
Gene pool:	The sum of all the genes carried by members of a population.
Gene therapy:	The insertion of foreign genes into cells through the use of recombinant DNA technology; usually done to replace defective genes to treat genetic disorders.
Genetic drift:	Random changes in the frequency of alleles from generation to generation; especially in small populations, can lead to the elimination of a particular allele by chance alone.
Genetically Modified Organism (GMO):	The organisms which are genetically modified such as cattle / chicken).
Genotype:	The specific combination of allele in an individual; may be homozygous or heterozygous (TT, Tt, tt)
Glial cells:	The cells that serve as support and nourish cells in the nervous system. Thus help to protect neurons.
Global Warming:	Increase in the temperature of the earth. Due to the addition of greenhouse gases in atmosphere, which do not allow solar radiations to reflect back into the space.
Glomerular filtrate:	The material that passes from glomerulus into the Bowman's capsule.
Glomerulus:	The network of capillaries in the Bowman's capsule of nephron.
Gonorrhoea:	A sexually transmitted disease that is caused by a bacterium (<i>Neisseria</i>).
Gout:	A type of arthritis; characterized by the accumulation of uric acid crystals in the moveable joints.
Grafting:	A type of artificial vegetative propagation in which a piece of stem is cut from the plant and is inserted into another plant with established root system.
Guttation:	Appearance of drops of xylem sap on the tips or edges of leaves (in early morning)
Gynoecium:	The central whorl in the flower; consists of carpels (Female part).

H

Hallucinogen:	Drug that causes changes in perception, thoughts emotions and consciousness.
Hemizygous:	Having one or more genes that have no allele counterparts e.g. "XY" sex chromosomes.
Hemodialysis:	The dialysis in which patient's blood is pumped through the dialyzer for cleaning.
Heroin:	A commonly abused narcotic; derived from morphine; affects the central nerve system and causes drowsiness, disorientation, hypotension, etc.
Heterozygous:	The genotype that has two different alleles of a trait (Tt, Rr).
Hilus:	A depression in the kidney through which the ureter, blood and lymphatic vessels and nerves enter and leave the kidney.
Hinge joint:	A joint that permits movement of bones in one plane e.g. elbow and knee joints.
Histone:	The protein present in the structure of chromosome.
Homeostasis:	The maintenance of a constant internal environment in response to environmental changes.
Homologues:	A pair of chromosomes in which one member of the pair is obtained from the organism's maternal parent and the other from the paternal parent; found in diploid cells. Also commonly referred to as homologous chromosomes.
Homologous chromosomes:	A pair of chromosomes having the same size and shape and carrying alleles for the same traits.
Homozygous:	Having two identical alleles of a trait (TT, tt).
Hyaline cartilage:	The cartilage that has collagen fibres in its matrix; found covering the ends of the long bones, in the nose, larynx, trachea and bronchial tubes.

I

Implantation:	The process in which the blastocyst (embryo) embeds in the endometrium.
Incomplete dominance:	A type of inheritance in which neither of the pair of contrasting alleles is dominant over the other and the heterozygous individual is intermediate in phenotype (Japanese 4 o'clock plant)
Inhalation:	Inspiration! Intake of air to lungs.
Inheritance:	The transmission of characteristics forms parents to offspring.

Inheritance of acquired characteristics:
Initiation codon (AUG):

Insertion:
Interspecific Interactions:
Intraspecific Interactions:
Intron:

Iodopsin:
Iris:

Islets of Langerhans:

Lamarck's view that features acquired during an organism's lifetime would be passed on to succeeding generations, leading to inheritable change in species overtime.
Three-base sequence on the messenger RNA that codes for the amino acid, methionine. The start codon on mRNA.
The end of the muscle that is attached with a moveable bone.
Interactions between the members of the different species.

Interactions between the members of the same species.

In eukaryotes, bases of a gene transcribed but later removed from the primary mRNA, the non-coding portion of DNA.
A pigment present in the cones of the retina (green, red and blue).
Colored portion of eyeball, formed by the bending of the choroid behind the cornea of the eye.
Scattered groups of endocrine cells present in pancreas; secrete hormones insulin and glucagon.

J

Joint:

The location at which two or more bones meet.

K

Karyotype:
Klinefelter syndrome:

Total complement of chromosomes in a cell.
In humans, a genetically determined condition in which the individual has two X and one Y chromosome. Affected individuals are male and typically tall and infertile (male eunuch).

L

Lacuna:

The fluid filled space in bone and cartilage, where their cells are present.

Larynx: / Sound Box:

The part of the air passageway between pharynx and the trachea, contains vocal cord, produces sound.

Lenticels:

Respiratory pores in the bark of woody stems and mature roots.

Ligament:

Strong but flexible connective tissue that joins bone to bone.

Lithotripsy:

Method for the removal of kidney stones, without surgery.

Linkage:

The condition in which the inheritance of a specific chromosome is coupled with that of a given gene. The genes stay together during meiosis and end up in the same gamete.

Locus:	The location or position of gene on chromosome.
Loop of Henle:	The U- shaped portion of the renal tubule of nephron.

M

Medulla oblongata:	Last part of brain (part of Hindbrain), controls breathing, heartbeat, blood pressure and many reflexes.
Meninges:	Three membranous layer around the brain and the spinal cord protect them and provide nutrients and oxygen through their capillaries.
Messenger RNA (mRNA):	"Blueprint" for protein synthesis that is transcribed from one strand of the DNA (gene) and which is translated at the ribosome into a polypeptide sequence.
Mixed nerve:	Those nerves which possess axons of both the sensory and motor neurons.
Monohybrid cross:	A genetic cross in which only one pair of contrasting traits is studied (Tt or Rr).
Motor Nerve:	Nerves contain the axons of motor neurons only.
Morula:	The solid-ball of cells, stage of the pre-implantation embryo.
Multiple fission:	Division into many; a method of asexual reproduction used by many unicellular organisms.
Mutation:	Change in chromosome or DNA (gene); produces variations in the traits.
Mutualism:	The symbiotic association in which both the partners get benefit and neither is harmed.
Myelin Sheath:	Formed of Schwann cells. The insulating sheath around the axons of some neurons.
Myofibrils:	Each skeletal muscle cells contain many myofibrils.
Myosin:	Thick myofilament in the centre sections of sarcomeres of muscle cells.

N

Nasal cavity:	Hollow space in the nose; opens to the outside through nostrils.
Natural Resources:	The resources on earth, which provide everything that humans use or consume.
Natural selection:	The process in which organisms with favourable variations survive and produce more offspring than less well-adapted organisms.
Nephron:	The structural and functional unit of kidneys.
Nerve impulse:	Conduction of information to and from brain.

Nerve:	Bundle of axon, covered by myelin sheath.
Net primary productivity (NPP):	The rate at which producer (usually plants) biomass is created in a community.
Neuron or Nerve cell:	The unit of the nervous system; able to conduct nerve impulses.
Niche:	The biological role played by a species, in a ecosystem.
Nitrification:	The oxidation of ammonia to nitrites and nitrates by the nitrifying bacteria.
Nitrogen Cycle:	The flow of nitrogen between environment and the organisms.
Nitrogen Fixation:	Conversion of nitrogen into nitrates.
Nodes of Ranvier:	A gap between two of the Schwann cells that make up an axon's myelin sheath; serves as a point for generating a nerve impulse.
Nostrils: / Nares:	The openings of the nasal cavity called nostrils.
Nondisjunction:	The failure of chromosomes to separate properly during cell division.
Nucleosome or Bead:	The structure formed by the wrapping of DNA around at histone proteins.

O

Oogenesis:	The formation of ovum (egg cell).
Organic evolution:	Biological evolution: The modification of characteristics in the species or populations of organisms during their descent, generation by generation.
Origin:	The initiating end of the muscle that is attached with an immoveable bone.
Osmoconformers:	Marine organisms that have no system of osmoregulation.
Osmoregulation:	The regulation of water content in body fluids, or solute regulation.
Osteoarthritis:	Inflammation in joints due to degeneration in the cartilage present at the joints or due to decreased lubricant production at the joints.
Osteoblasts:	Bone-forming cells.
Osteoclasts:	Cells (a type of WBC) that remove material to form the central cavity in a long bone.
Osteocyte:	The mature bone cells.
Osteoporosis:	A disorder in which the mineral portion of bone is lost, making the bone weak and brittle; occurs most commonly in postmenopausal women.
Ovary:	The female gonad; produces egg cells and female sex hormones.

Oviducts:	Tubes that connect the ovaries and the uterus; transport sperm to the ova, transport the fertilized ova to the uterus.
Ovulation:	The release of the oocyte onto the surface of the ovary.
Ovum:	The female gamete, egg.
Oxytocin:	A peptide hormone secreted by the posterior pituitary that stimulates the contraction of the uterus during childbirth.
Ozone:	A triatomic (O_3) form of oxygen that is formed in the stratosphere. This atmospheric ozone helps filter radiation from the sun.

P

Pacinian corpuscles:	The skin sensory receptors located deep in the epidermis that detect pressure and vibration.
Palaeontology:	The study of ancient life (fossils).
Papillary ducts:	The ducts formed by the joining of many collecting ducts; open into renal pelvis.
Paralysis:	Complete loss of function by one or more muscle groups due to damage in the nervous system.
Parasitism:	A type of interspecific interaction in which smaller partner (parasite) derives food and shelter from the body of larger partner (host) and harms the host.
Parathormone:	Hormone of the parathyroid glands; increases the level of calcium ions in the blood.
Parathyroid:	The endocrine glands located on the posterior sides of the thyroid gland; secrete parathormone.
Parasympathetic system:	The part of the autonomic nervous system that controls heartbeat, respiration and other vital functions. (rest and digestion)
Parthenogenesis:	A form of asexual reproduction in which an unfertilized egg develops into new offspring.
Peritoneal dialysis:	The dialyzing fluid is pumped into the abdominal peritoneal cavity; the wastes from the blood vessels of the peritoneum diffuse into the dialysis fluid which is then removed out.
Phenotype:	The expression of the genotype in the form of trait <i>e.g.</i> tall.
Pituitary:	The endocrine gland attached to the hypothalamus that controls many other endocrine glands in the body thus called master gland of the body.
Pineal gland:	A small endocrine gland located between the cerebral hemispheres of the brain that secretes melatonin.
Pioneer community:	The initial community of colonizing species.

Placenta:	An organ of placental mammals; supplies nutrients to the embryo and fetus and removes wastes.
Plasmids:	Self-replicating, circular DNA molecules found in bacterial cells.
Pleiotropic:	A term describing a genotype with multiple phenotypic effects <i>e.g.</i> sickle-cell anaemia produces a multitude of consequences in those it affects, such as heart disease, kidney problem, <i>etc.</i>
Pneumonia:	The infection of one or both lung; caused by specific bacteria, viruses or fungi; the infected part of the lung becomes filled with fluid and pus.
Pollen grain:	Anther has pollen-sacs in which haploid microspores (pollen grains) are produced through meiosis.
Pollination:	The transfer of pollen grains from flower's anther to stigma.
Polygenic inheritance:	Occurs when a trait is controlled by several gene pairs; usually results in continuous variation.
Polymerase chain reaction (PCR):	A method of copying DNA fragments that is faster than cloning.
Pons:	Part of the hindbrain; assists the medulla in controlling breathing and serves as a connection between the cerebellum and the spinal cord.
Pressure filtration:	The process in which most of the water salts, glucose and urea of the blood is forced out of the glomerulus and passed into bowman's capsule, pressure is generated by contraction of heart.
Producer:	An organism that produces organic compounds from inorganic compounds; an autotroph.
Progesterone and estrogen:	Ovaries secrete estrogen and progesterone, which are responsible for the development of female secondary characters such as the development of breast, <i>etc.</i> prepare uterus for implantation.
Prostate gland:	An accessory gland in the male reproductive system; produces a secretion that neutralizes the acidity.
Proximal convoluted tubule:	The portion of nephron between Bowman's capsule and the loop of Henle's.
Pupil:	The opening in the centre of the iris of the eye.
Purine:	One of the groups of nitrogenous bases that are part of a nucleotide. Purines are adenine and guanine and are double-ringed structures.
Pyrimidine:	One of the groups of nitrogenous bases that are part of a nucleotide. Pyrimidines are single ringed and consist of the bases thymine (in DNA), uracil (replacing thymine in RNA).

R

Receptor:	May be organs; tissues or cells which detect particular type of stimuli.
Recessive trait:	Expresses only in homozygous, do not express heterozygous condition.
Recombinant DNA:	The combination of two different DNAs.
Reflex:	A response to a stimulus which occurs without conscious control
Reflex arc:	The pathway of reflex action.
Renal Corpuscle:	The glomerulus and Bowman's capsule of the nephron.
Renal pelvis:	The funnel-shaped cavity into which the renal pyramids of kidney project, funnel shape portion of ureter.
Renal pyramid:	Cone-shaped areas in the renal medulla.
Renal tubule:	The tubular portion of nephron consists of proximal convoluted tubule, loop of Henle and distal convoluted tubule.
Renin:	An hormone secreted by the kidneys that converts angiotensinogen into angiotensin II (increase BP).
Replication:	The process by which DNA is duplicated before each cell division.
Resting potential:	The non-conducting portion of neuron <i>i.e.</i> inside -ve charge and outside +ve charge.
Restriction Endonucleases:	Enzymes used to cut the gene from the DNA of the organism.
Retina:	The innermost and the sensitive layer in the eye, contains rods and cones.
Rheumatoid arthritis:	Painful inflammation of the membranes at the joints (especially fingers).
Rhodopsin:	A pigment present in the rods of the retina.
Rods:	The photosensitive cells present in the retina of the eye; sensitive to dim light.
RNA transcript:	The term applied to RNA transcribed in the nucleus.

S

Sarcomeres:	The functional units of skeletal muscle.
Schwann cells: (neuroglial cells)	The supporting cells around neurons; form the myelin sheath.
Secretin:	A hormone produced in the duodenum that stimulates alkaline secretions by the pancreas and inhibits gastric emptying.
Sclera:	The tough; white outer layer of the eye.
Semen:	The material containing sperms.

Seminal Vesicle:	The associated gland in male reproductive system; produces secretions having nutrients for the sperms.
Seminiferous tubule:	The coiled tubes present in testes; sperms are formed in these tubules.
Sensory nerve:	The nerves which contain only the axons of sensory neurons.
Single-Cell Protein:	The protein content extracted from pure or mixed cultures of algae, yeasts, fungi or bacteria; the micro-organisms are grown in fermenters where they produce a high yield of protein.
Skeleton:	The framework of hard, articulated structures that provide physical support, attachment for skeletal muscles, and protection for the bodies of animals.
Skeletal muscle:	These are generally attached to the skeleton and causes body parts to move; consists of muscle fibers.
Smooth muscle:	The non-striated, found around all pollen internal organs except heart.
Social behaviour:	Behaviour that takes place in a social context and results from the interaction between and among individuals.
Somatic nervous system:	The portion of the peripheral nervous system consisting of the motor neuron pathways that innervate skeletal muscles.
Somatotrophin:	(STH) or Growth hormone A hormone of the anterior pituitary; promotes the growth of the body.
Sperm:	The male gamete.
Spermatid:	The immature non-motile forms of sperms; are converted into sperms after many changes.
Spermatogenesis:	The process of formation of sperms.
Spermatogonium:	A spermatogonium is an intermediary male gametogonium (a kind of germ cell) in the production of spermatozoa.
Spinal nerve:	The nerves which arise from the spinal cord.
Spongy bone:	The soft and porous interior of the bone; contains blood vessels and bone marrow help in formation of blood cells.
Start codon:	The codon (AUG) on a messenger RNA molecule where protein synthesis begins. AUG code for methionine amino acid.
Sternum:	The breastbone.
Stop codon:	The codon on a messenger RNA molecule where protein synthesis stops. The stop codons are UAA, UGA, UAG.
Suspensory ligament:	The ring that attaches the lens of the eye to the ciliary muscles.
Symbiosis:	Long or short term relationship between members of different species i.e. commensalism and mutualism (in which both are beneficial).

Synapse:

The junction between an axon and an adjacent neuron, help to transmit impulse.

Synapsis:

The alignment of chromosomes during meiosis-I so that each chromosome is beside its homologue (Pairing of homologous chromosomes).

T

Tarsals:

The bones that make up the ankle joint, heal and instep.

Taxis:

The behaviour when an animal turns and moves toward or away from an external stimulus.

Template strand:

Strand of DNA that is transcribed to make RNA.

Tendon:

Tough connective tissue that attaches muscles to bones.

Testes:

The male sex organs (produces sperm).

Testosterone:

The male sex hormone secreted by testis.

Tetrad:

The four chromatids in each cluster during synapsis; formed by the two sister chromatids in each of the two homologous chromosomes.

Thalamus:

The part of the forebrain; which is a relay centre between various parts of the brain and spinal cord.

Thyroid:

The endocrine gland located in front of the trachea beneath the larynx secretes hormones thyroxin and calcitonin.

Thyroid-stimulating-hormone: (TSH)

A hormone secreted by the anterior pituitary of the pituitary gland that regulates the formation and secretion of thyroid hormone.

Thyroxin:

The hormone of the thyroid gland; increases metabolic rate and release of energy; also responsible for the growth of body.

Trachea:

Also called wind pipe and part of the passageway between larynx and bronchi, made of C-shaped cartilages.

Trait:

The characteristics which are controlled and transmitted to next generations through genes.

Transcription:

The synthesis of RNA from a DNA template. The making of RNA from one strand of the DNA molecule.

Transgenic:

Organisms contain recombinant genes.

Translation:

The synthesis of polypeptide on a template of messenger RNA.

Triceps:

An extensor muscle on the back of the upper arm bone.

Tropic hormone:

The hormone made by one endocrine gland that causes another endocrine gland to secrete a hormone.

True-breeding:

The homozygous individual.

U

Umbilical cord:

The structure containing arteries and vein that connects the placenta and the embryo.

Uracil:

Ureter:

Urethra:

Urinary bladder:

Urinary system:

Urine:

The pyrimidine that replaces thymine in RNA molecules and nucleotides.

A tube that carries urine from a kidney to the urinary bladder.

The tube that carries urine from urinary bladder to the outside of the body.

A sac-like organ where urine is temporarily stored before being excreted.

The system responsible for the production and excretion of urine includes kidney, ureters, urinary bladder and urethra.

Fluid containing various wastes that is produced in the kidney stored in bladder and excreted from the body via urethra.

V

Vaccine:

Variations:

Vasectomy:

Vasopressin:

Vector:

Vestibule:

Vestigial structures:

Vital capacity:

Vocal cords:

W

Wild type:

X

X-chromosome:

Z

Z lines:

Zygote:

The material used to produce immunity to a disease by stimulating the production of antibodies.

A characteristic in an individual that differs from the typical characteristics of other individuals of the same species.

A contraceptive procedure in men in which the vas deferens is cut and the cut ends are sealed to prevent the transportation of sperm.

It is also called antidiuretic (ADH). The hormones secreted by the posterior pituitary; responsible for the reabsorption of water from renal tubules of the nephron.

Self-replicating DNA molecules that can be joined with DNA fragments to form recombinant DNA molecules.

Part of the inner ear; helps to maintain balance of the body.

Non-functional remains of organ that were functional in ancestral species and may still be functional in related species e.g. appendix.

The maximum volume of air that a respiratory system can inhale and exhale.

The bands of muscle within larynx vibrate to produce voice.

An individual with normal phenotype.

One of the sex chromosomes.

Dense areas in myofibrils that mark the beginning of the sarcomeres. The actin filaments of the sarcomeres are anchored in the Z line.

One cell life i.e. diploid product of the union of haploid gametes.

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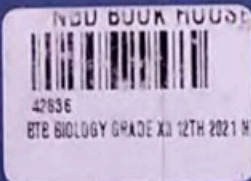
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