

SUMMING-UP

1 Why animals feed

- Feeding serves to replenish the energy consumed in vital processes. Animals are heterotrophic and thus energy is derived from organic matter that is ingested.
- The changes which food undergoes

inside the digestive apparatus are carried out in four phases:

- the first phase is **ingestion**, the entry of food into the body of the animal;
- the second phase is **digestion**, i.e. the mechanical and chemical destruction of the ingested food;

- digestion reduces food into simple molecules that can be taken up by **absorption**, i.e. enter inside the cells;
- the last phase is called **elimination** and involves the expulsion of non-digestible residues from the body.

2 How animals feed

- Animals have a digestive system that varies according to the complexity of the organism and with its feeding habits. Some species have no digestive apparatus and absorb food molecules through the surface of the body or cell.
- In most animals there is a digestive apparatus. There are basically two types of digestive apparatus:

- the gastrovascular cavity,
- the digestive tract.
- The **gastrovascular cavity** is an internal cavity of the body that has only one opening to the outside, the mouth. This system is typical of simple animals such as jellyfish.
- The **digestive tract** is a channel through the body and has two openings to the outside, the mouth for the entrance of food and the anus

for the elimination of waste. In the digestive tract changes to the food take place in sequence, in the different sections of the alimentary canal.

- The digestive apparatus varies greatly depending on the animal's **diet**: ruminants have a very particular digestive tract adapted to a vegetarian diet.

3 The path of food through the human digestive tract

- Humans have a complex digestive apparatus, in which sections that have different functions can be identified. Digestion takes place in the section from the mouth to the small intestine.
- The **mouth** is the opening through which food enters. The greater part

of the mechanical destruction of food takes place in the mouth.

- The **pharynx** and **oesophagus** are the successive sections which convey food into the stomach. The mechanism of swallowing prevents food entering the respiratory tract, while the peristalsis pushes the bolus of food along the digestive tract.
- After passing the **cardia**, a valve that

prevents regurgitation, food passes into the **stomach**, where it is subjected to chemical digestion. After a period of time of between 2 and 6 hours, the stomach empties itself and the chyme (partially digested food) can enter the small intestine, where chemical digestion is completed.

4 Chemical digestion

- **Chemical digestion** is the demolition of the food molecules into monomers that are small enough to be transported into the cells.
- Chemical digestion begins in the mouth, but is completed in the stomach and small intestine.
- The **stomach** is a muscular organ, large and voluminous, in which food is stored after meals. The inner

surface of the stomach is made up of **gastric pits**, on the walls of which are the **principal cells** (which secrete pepsinogen), **parietal cells** (which secrete hydrochloric acid) and **mucus cells** (which protect the surface of the stomach from attack by the gastric juices).

- Chemical digestion continues in the first section of the small intestine, the **duodenum**, into which the digestive

juices produced by the **liver** (bile) and **pancreas** (pancreatic juice) flow.

- In addition to functions related to digestion, the liver and the pancreas have other functions: in particular the liver is involved in the regulation of glycaemia (the amount of glucose in the blood), in protein metabolism and drug metabolism, the pancreas also produces hormones involved in the metabolism of sugars.

5 The absorption process in the human gut

- Simple food molecules resulting from digesting are absorbed from the intestine. To increase the absorption surface, the intestine is long and has walls folded into villi and microvilli.
- It is possible to recognise three basic

features in the intestine. The **small intestine** is the longest and the one in which the absorption of food molecules and, to a lesser extent, water takes place.

- After the small intestine, a dead-end branch ends in the appendix. The next section is the **large intestine**,

which is the most important part of the colon, where the absorption of most liquids and minerals takes place.

- The last part is the **rectum**, in which the residue of digestion accumulates before its expulsion in the form of faeces.

SUMMING-UP

6 The human diet

- Ingested food primarily serves to restore the energy consumed in vital processes and also provide the “building blocks” to repair or replace the cellular constituents of the body.
- There are several types of substances

present in food: fats, proteins, carbohydrates, vitamins, mineral salts and water. For the same weight, fats supply about three times the energy as proteins or carbohydrates. The other substances cannot be used to produce energy.

- Some substances are called **essential**:

they have to enter the body as part of the diet since the human body is not able to produce them from other components.

- There are different types of diet. Among these, the **Mediterranean diet** is believed to be the most appropriate combination of foods.

7 How plants feed

- Plants derive energy through the process of photosynthesis: their food consists of the absorption of water, carbon dioxide and certain mineral salts, that are all necessary for the

synthesis of proteins and nucleic acids.

- Water and mineral salts are absorbed from the soil through the **roots**. To increase the surface area of absorption, roots are branched and

have small appendages: **root hairs**.

- In many vegetable species, the surface area of absorption is further increased as a result of **mycorrhizae**; the symbiotic relationship between fungi and plant roots.