

CHAPTER I : GENERAL INFORMATION

I. INTRODUCTION :

While reproduction is not necessary for the life of an individual, it is indispensable for the survival of a species.

→ Reproduction ensures the continuity of the species through the production of new organisms of a species from pre-existing individuals of that species.

In most organisms, reproduction requires the presence of **2 sexes: male and female**, each of the 2 being able of producing specialized sex cells: **gametes**. These are the **spermatozoa** in the male and the **ovum** in the female.

The organs that produce the gametes are called **gonads: testis** in males and **ovary** in females, which form part of the male or female reproductive system.

Reproduction is ensured by the meeting of the 2 gametes, male and female. This is known as **fertilization**, and consists in the fusion of male gametes (spermatozoa) and female gametes (ovum) into a single cell called a **zygote**.

Fertilization results in the passage of two **haploid cells (n chr)**, (the gametes), **into a diploid cell (2n chr)**, the zygote.

II. THE DIFFERENT TYPES OF REPRODUCTION :

Living beings reproduce in the same species. But not all organisms reproduce in the same way. There are two main modes of reproduction in animals: **no-sexual (asexual)** reproduction and **sexual** reproduction.

II.1 No-sexual (asexual) reproduction :

Asexual reproduction exists when the descendants' genes come from a single individual and there is no fusion between a female gamete and a male gamete. In most situations, asexual reproduction is based entirely on mitosis. There is a large variety of asexual reproduction, of which the following are just a few examples:

- **Scissiparity**, an asexual reproductive mechanism in which the parent multiplies by scissiparity: cell division of one individual to give two other similar individuals. (As in paramecia). **Fig.01**.

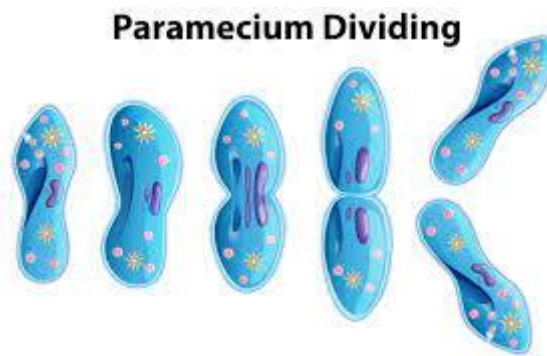
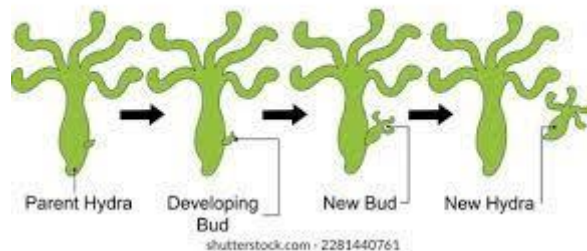


Figure 01 : Paramecium division by scissiparity

- **Budding**, is also a popular asexual reproductive mechanism in invertebrates.

The green hydra is about 1cm long. When food is in abundance, hydras bud, produce a new individual that develops on the hydra itself. The new individuals detach as soon as they are big enough to live an independent life and bud off in their turn. **Fig. 02**.

Budding in Hydra



Asexual reproduction has many advantages. For example, it enables animals living in isolation to produce young without having to look for a partner. It also produces a large number of descendants in a short space of time, making it an ideal mode of reproduction when a habitat needs to be colonized quickly. Theoretically, it is the most advantageous mode of reproduction in stable environments.

II.2 Sexual reproduction :

Sexual reproduction necessarily includes fertilization. For fertilization to happen, haploid gametes (n chr) must be fused: the male gamete (spermatozoon) and the female gamete (ovum). Each gamete is formed under meiosis (cell division that reduces its chromosome count by half). The union of sperm and egg results in the formation of an egg cell (also called a zygote) with the same number of chromosomes as its diploid parents ($2n$ chr).

In this form of reproduction, both sexes can :

-be carried by the same individual: this is called bisexual and is a **hermaphroditic** species, e.g. the snail.

-or be completely separate: the individuals are unisexual and the species is said to be **gonochoric**, e.g. humans.

While the general principle of sexual reproduction is similar, there are differences between organisms, referred to as internal or external fertilization.

Internal fertilization (takes place inside the female's body) and **external fertilization** (takes place outside the female's body).

For example, human fertilization is internal, with spermatozoa introduced into the female's body during sexual relations. Frogs and fish, on the other hand, fertilize externally. the female emits her eggs into the environment, and the male then places his sperm on them.

There are two types of animal: **oviparous** and **viviparous**.

A.Oviparous animals: These are animals whose egg cell develops in an egg, using the nutrient reserves within. Two types of fertilization are possible in oviparous animals (external or internal), depending on the species.

B.Viviparous animals: These are animals whose egg cell develops in their mother's uterus. The embryo develops inside a sac called the placenta, and feeds through the umbilical cord. The period during which the embryo develops is called gestation. This may vary according to the species. The birth of the young is called parturition. Viviparous animals are essentially mammals.

C.The special case of ovoviviparous animals: In some fish and reptiles, embryos develop in eggs that incubate and hatch in the mother's uterus. This is particularly true of certain shark species.

Animal reproduction is often accompanied by courtship, which consists in attracting a sexual partner before fertilizing him or her. This same reproduction may be linked to a particular season, depending on the animal species, as well as to the quantity and quality of food available in the environment. Similarly, animal reproduction depends on sexual maturity. Indeed, each species has a different sexual maturity, necessary for the creation of male and female gametes. Sexual maturity can differ between males and females of the same species.

III. DIFFERENT TYPES OF DEVELOPMENT :

Types of development are generally linked to the species, its anatomy and its environment.

III.1 : Indirect development :

Indirect development is when the animal released at birth is very different from the adult, and must submit to metamorphoses during its growth to reach its definitive adult form. Some insects, such as the beetle, go from egg to larva to nymph to adult.

III.2 : Direct development :

Direct development is when the animal released at birth resembles a miniature adult, as in the case of mammals.