

Reproduction in vertebrates

Scope

TOPIC	SUBTOPIC	KEY INFORMATION
REPRODUCTION IN VERTEBRATES	Diversity in reproductive strategies	<p>Focus on strategies given in the 2021 Examination Guidelines using relevant examples:</p> <ul style="list-style-type: none">• External fertilisation and internal fertilisation• Ovipary, ovovivipary and vivipary• Amniotic egg• Precocial and altricial development• Parental care

Reproductive strategies

Notes

Reproduction ensures the continued existence of a species. Different species display different reproductive strategies to make sure that their offspring survive.

Reproductive strategies differ in:

- the number of eggs produced by the female
- the site of fertilisation, inside or outside the body of the female
- the place of development of the embryo and its nourishment
- how quickly the young can fend for themselves
- the type of parental care given to offspring.

External vs Internal fertilisation

External fertilisation takes place outside the female's body.

Internal fertilisation takes place inside the female's body.

External fertilisation	Internal fertilisation
<ul style="list-style-type: none"> • Requires water for fertilisation • Gametes (sperm and egg cells) are released into water • Many gametes released • High mortality rates among young due to lack of protection. Eggs can easily desiccate or be predated on • e.g. fish and amphibia 	<ul style="list-style-type: none"> • No water required for fertilisation • Sperm cells are released into the female's body • Fewer gametes released • Lower mortality rates among young – protection provided by the mother's body or a hardened calcareous / leathery shell. • e.g. reptiles; birds and mammals

Precocial vs Altricial development

Precocial and **altricial development** are terms used to describe how well-developed offspring are at birth.

	Precocial development	Altricial development
Development of the body	well developed	under developed
Eyes after birth	open	closed
Presence of fur / feathers	have fur / feathers	usually naked
Parental care required	low degree of parental care required	high degree of parental care required
Mobility	young can move soon after birth	young have limited ability to move freely
Yolk amount in egg	greater quantity	lower quantity

Ovipary, Ovovivipary & Vivipary

Ovipary, ovovivipary and vivipary are reproductive strategies that differ in respect to:

- where the zygote is formed
- where development occurs
- how the embryo receives its nourishment
- the type of egg or its presence or absence

	Ovipary	Ovovivipary	Vivipary
fertilisation	external or internal	internal	internal
development of embryo	external to the body of the female	inside the body of the female	inside the female's body
nutrition	Yolk is the only form of nutrition for the developing embryo and is usually present in small quantities	Yolk present in the egg. Young are independent of the mother's body	Young receive nutrition from the mother's body through the placenta
type of egg	jelly-like or calcareous	calcareous or leathery	None

Parental care

Parental care is a behaviour that increases the survival of the young. Where more energy is invested before birth, little parental care is shown after birth. Where less energy is invested before birth, more parental care is displayed after birth.

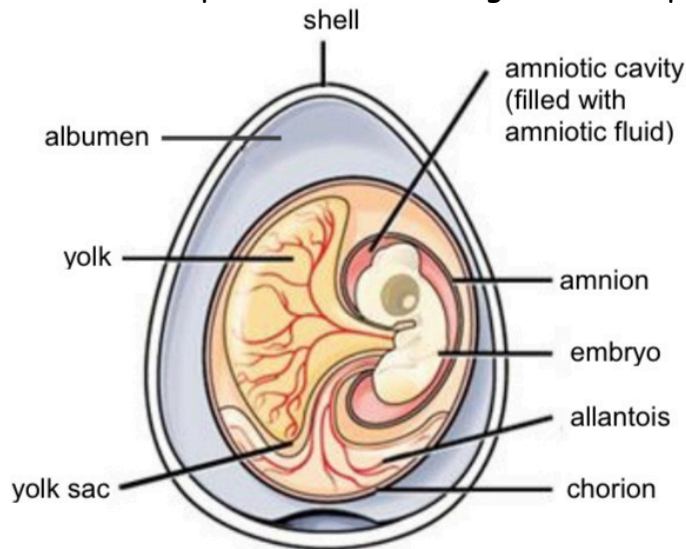
Parental care examples:

- Building of nests and incubation of eggs
- Guarding from predators
- Teaching offspring

Reproductive strategies

Amniotic egg

The **amniotic egg** is a major development in the evolution of animal life on land - from being water dependent for sexual reproduction, to being able to reproduce without the availability of water.



Parts & Functions

- The **developing embryo**

- Three **extra embryonic membranes**:

- the **amnion** - produces amniotic fluid which cushions the embryo and protects it against mechanical injury, temperature changes and dehydration
- the **allantois** - collects nitrogenous waste and assists in the exchange of gases
- the **chorion** - allows for gaseous exchange in reptiles and birds, where a shell is present and in mammals, where no shell is present, it forms the placenta.

- The **yolk sac**

The yolk sac contains the food reserves for the developing embryo.

If yolk is present in smaller quantities, the young are hatched sooner, are under- developed and usually require more parental care. If yolk is present in larger quantities, the incubation period is longer, and the young are usually well developed when they hatch.

- A hardened calcareous or leathery **shell**

The shell helps to protect the developing embryo from mechanical injury and prevent desiccation, while still allowing gases to move through.

Reproductive strategies

Terminology

Biological term	Description
Allantois	The structure in the amniotic egg that stores wastes
Altricial development	The reproductive strategy when offspring are not able to move and feed themselves
Amniotic egg	A type of egg where the embryo develops inside a fluid-filled sac which is surrounded by a shell
Asexual reproduction	Type of reproduction of organisms from parts or the whole parent body form - no gametes involved
External fertilisation	A type of fertilisation in which the nucleus of a sperm fuses with the nucleus of an ovum outside the body of the female
Internal fertilisation	A type of fertilisation in which the nucleus of a sperm fuses with the nucleus of an ovum inside the reproductive system of the female
Ovipary	The reproductive strategy involving the laying of eggs
Ovovivipary	Producing young by means of eggs which are hatched/retained within the body of the parent and the young are born live
Precocial development	The reproductive strategy when offspring are able to move and feed themselves
Sexual reproduction	Type of reproduction that involves the fusion of motile (male) and stationary (female) gametes.
Vivipary	A type of reproduction where the foetus develops inside the uterus
Zygote	The diploid cell formed by the process of fertilisation