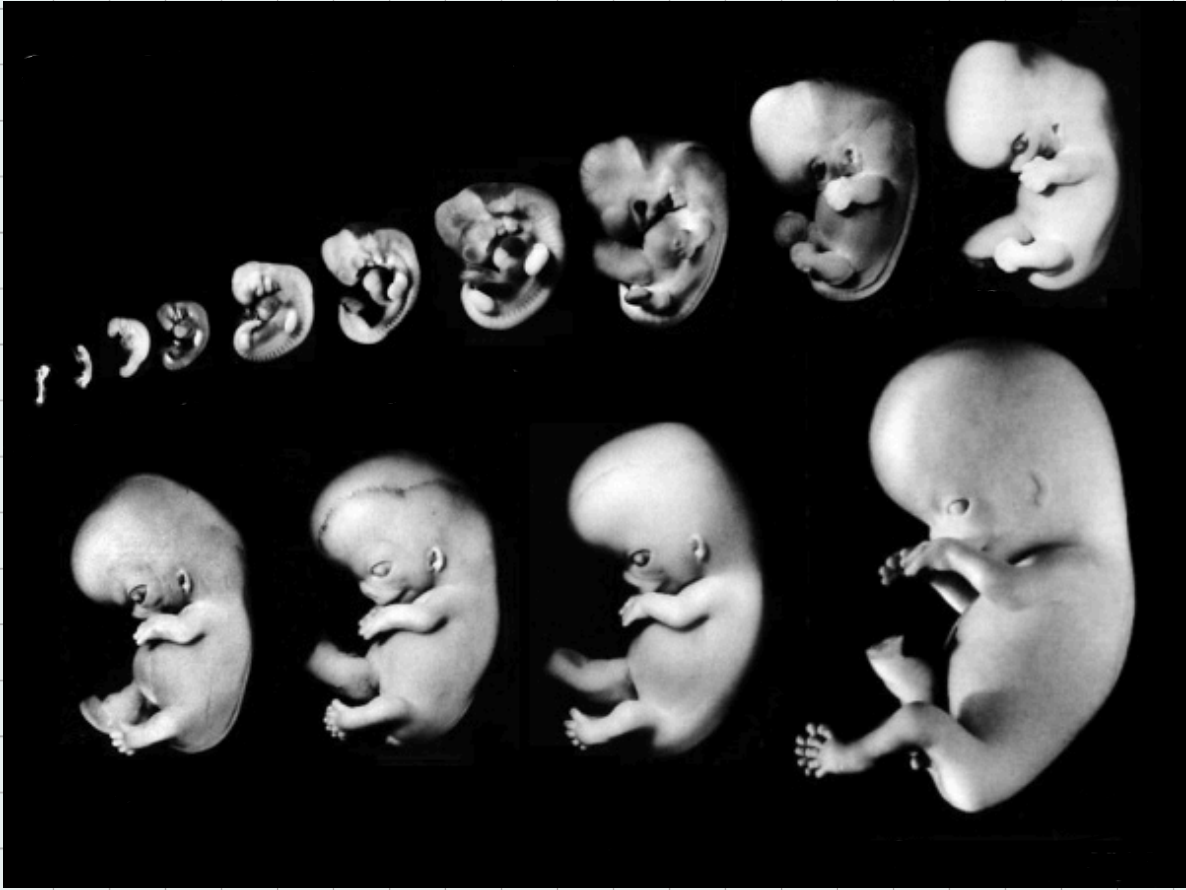


# Embryology

علم الأجنة



قال تعالى: "وَلَقَدْ خَلَقْنَا الْإِنْسَانَ مِنْ سُلَالَةٍ مِّنْ طِينٍ \* ثُمَّ جَعَلْنَاهُ نُطْفَةً فِي قَرَارٍ مَّكِينٍ \* ثُمَّ خَلَقْنَا النُّطْفَةَ عَلَقَةً فَخَلَقْنَا الْعَلَقَةَ مُضْغَةً فَخَلَقْنَا الْمُضْغَةَ عِظَامًا فَكَسَوْنَا الْعِظَامَ لَحْمًا ثُمَّ أَنْشَأْنَاهُ خَلْقًا آخَرَ فَبَارَكَ اللَّهُ أَحْسَنُ الْخَالِقِينَ"  
(المؤمنون، آية: 12 - 14)

Prepared by: Raghad Al-Momani

لجنة  
طب الأسنان

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# INTRODUCTION

## Embryology

يتعامل مع من علم الأحياء فرع  
**1: A branch of biology dealing**  
 With embryos and their development

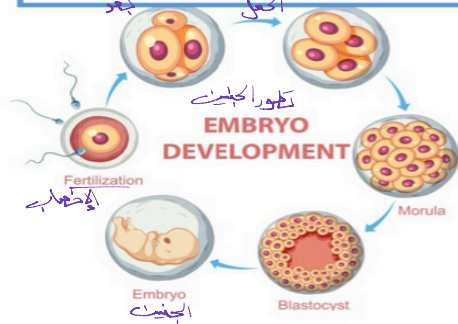
التي تظهر الظواهر السمات الأجنة  
**2: The features and phenomena exhibited in**  
 the formation and development of an embryo.

هو عبارة عن فرع من علم الأحياء والذي يتعامل مع الأجنة وتطورها  
 ويبحث في السمات والظواهر التي تظهر في تكوين وتطور الجنين.

## INTRODUCTION [EMBRYO vs FETUS]

**EMBRYO:** من الفرد البشري النامي  
 The developing human individual from the  
 time of implantation to the end of the eighth  
 week after conception

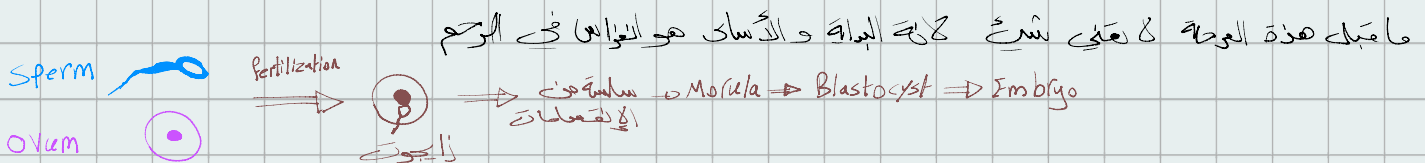
**FETUS:** A developing human from  
 usually two months after conception to  
 birth



يوجد اختلاف بين (Fetus and embryo) لكن المصطلح يشير إلى الجنين لكن في مراحل مختلفة

Embryo: هو الكائن البشري النامي من وقت الزرع إلى نهاية الأسبوع الثامن بعد الحمل  
 تحدث عملية fertilization ثم التمايز للخلايا ثم عملية زرع البويضة الخدي في الرحم ثم

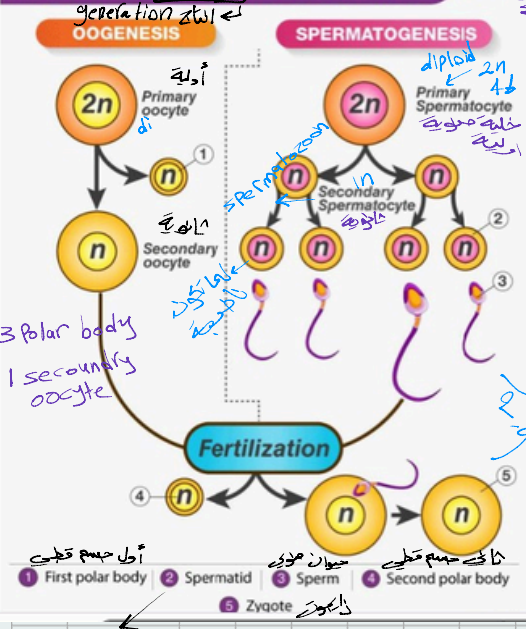
إخصاب الجنين  
 لا يعني implantation  
 ودرجات أخصاب البويضة أو أخصاب الأجنة (in vitro)  
 IVF  
 In vitro Fertilization



Fetus: الأجنة الذي يبدأ بعد الحمل إلى الولادة.  
 8 weeks

Embryo: From the time of implantation to the end of the eighth week (أسبوع = 8 أسابيع)  
 Fetus: from two months after conception to birth / week after conception  
 8 weeks

تكوين الحيوانات المنوية  
تكوين البويضات  
SPERMATOGENESIS Vs OOGENESIS



Gametogenesis is the process of division of diploid cells to produce new haploid cells. In humans, two different types of gametes are present. Male gametes are called sperm and female gametes are called ovum.

**Spermatogenesis:** Sperm formation  
**Oogenesis:** Ovum formation

**spermatid:** a male gametocyte, from which a spermatozoon develops → سpermatozoون

**ovum:** a cell that develops into an egg or ovum; a female gametocyte

**polar body:** one of the small cells that are by-products of meiosis

**meiosis:** the division of a cell nucleus in which the chromosomes are separated into two daughter cells. It is normally followed by cytokinesis

**meiosis:** cell division of a diploid cell into four haploid cells, which develop to produce gametes

Spermatid is the haploid male gametoid that results from division of secondary spermatocytes.

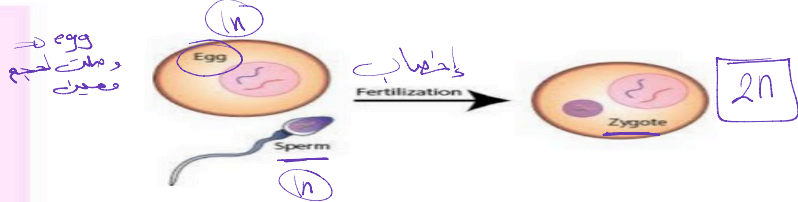
العدد يكون كبير من male لازم يكون موجود في بيوية واحدة

تكوين الحيوانات المنوية	تكوين البويضات
The production of <u>sperm</u> from <u>spermatogonia</u> is known as <u>spermatogenesis</u>	The production of <u>ovum</u> from <u>oogonia</u> is known as <u>oogenesis</u>
يحدث في الخصيتين Occurs in <u>testes</u>	يحدث داخل المبيض Occurs inside the <u>ovary</u>
<u>all</u> stages are completed in <u>testes</u>	في عملية تكوين البويضات المراحل الأولى تحدث في <u>ovary</u> . The <u>later</u> stages occur in the <u>oviduct</u> .
It is a <u>continuous</u> process عملية مستمرة مألها توقفت	It is a <u>discontinuous</u> process. The early stages take place in the <u>ovary</u> and the <u>later</u> stages take place in the <u>oviduct</u> .
Produces <u>four</u> gametes	Produces <u>one</u> gamete
<u>four</u> sperm are produced during the spermatogenesis producing four sperm	<u>one</u> large ovum and <u>three</u> small polar bodies

3 polar body  
ovum

# Fertilization

- 1 | \_\_\_\_\_ → لہو البوریٹھ
- 2 | \_\_\_\_\_ → خروج من المپیشن
- 3 | \_\_\_\_\_ → ارتداد
- 4 | \_\_\_\_\_ → ارتداد الأمیوتی

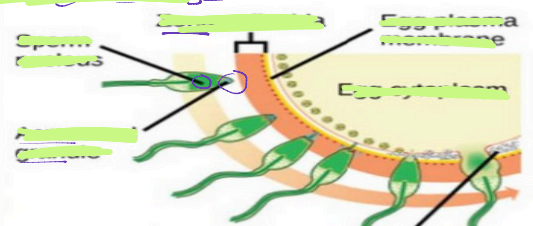
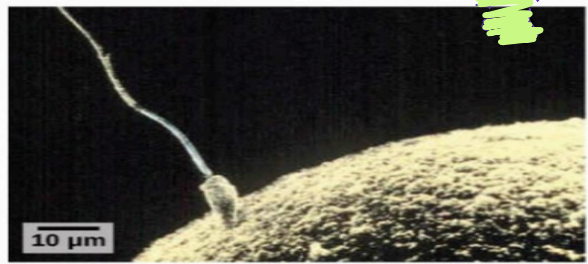


## Key Terms

- **fertilization:** It is the process during which \_\_\_\_\_ unites with a \_\_\_\_\_ to form a single cell \_\_\_\_\_.
- **zona pellucida:** a glycoprotein membrane surrounding the plasma membrane of an \_\_\_\_\_
- **acrosome:** a structure forming the end of the head of a spermatozoon
- **polyspermy:** the penetration of an ovum by more than one sperm (\_\_\_\_\_)

البوریٹھ  
خروج من  
ارتداد  
ارتداد الأمیوتی

\* مد ظلت لایفہ عدد الكروموسومات آسٹوس الطبیعی  
\* خارج بنتی الفحات البوریٹھ

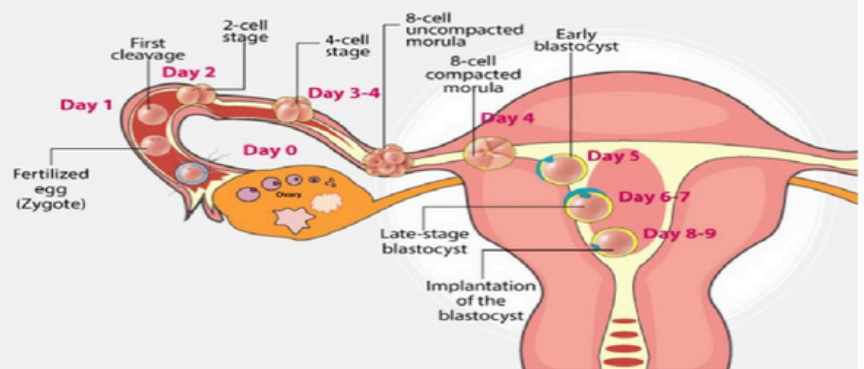


الخطوات في  
برستجات البوریٹھ تعقظ دخول الحيوانات البوریٹھ الأخرى.

## What are the different phases of fertilization?

1. **PENETRATION**, where the sperm releases acrosomal enzymes to penetrate inside the egg.
2. **ACTIVATION**, where the egg membrane depolarizes.
3. **FUSION** of nuclei and formation of zygote.

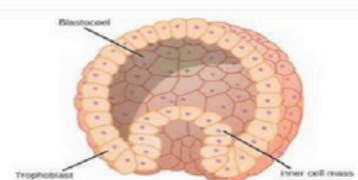
## FERTILIZATION AND IMPLANTATION



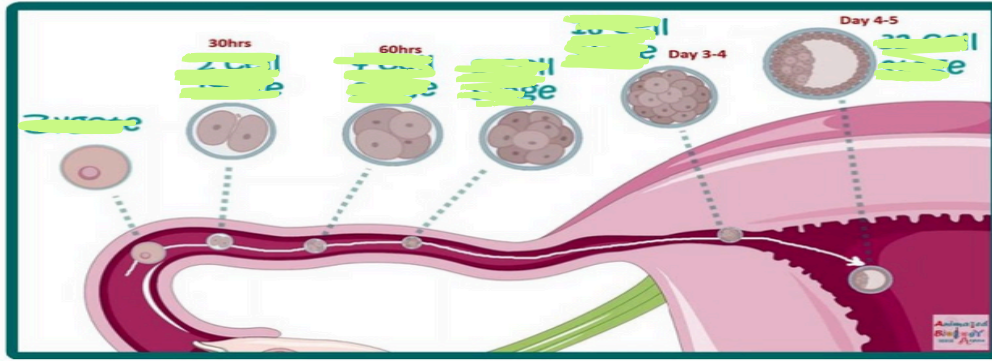
## CLEAVAGE and BLAST CYST FORMATION

### Key Terms

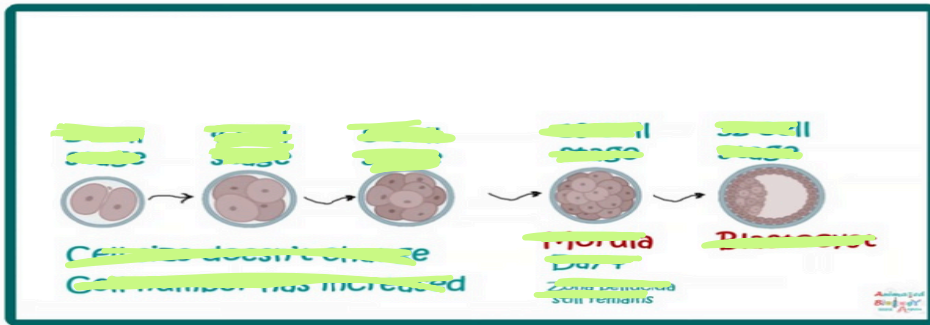
- **blastomere:** any cell that results from division of a fertilized egg
- **blastula:** a 6-32-celled hollow structure that is formed after a zygote undergoes cell division
- **meroblastic:** undergoing only partial cleavage
- **holoblastic:** cleaving, and separating into separate blastomeres
- **inner cell mass:** a mass of cells within a primordial embryo that will eventually develop into the distinct form of a fetus in most eutherian mammals
- **gastrulation:** the stage of embryo development at which a gastrula is formed from the blastula by the inward migration of cells
- **trophoblast:** the membrane of cells that forms the wall of a blastocyst during early pregnancy, providing nutrients to the embryo and later developing into part of the placenta



# CLEAVAGE and BLAST CYST FORMATION



# CLEAVAGE and BLAST CYST FORMATION



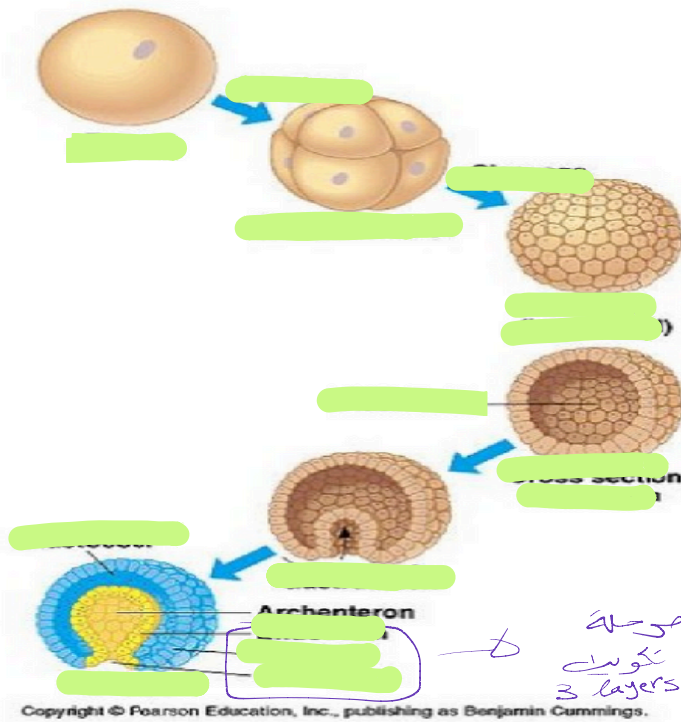
صور التفرع

## Gastrulation

- The typical blastula is **3-cell**. *عبارة عن كرة من الخلايا*
- The next stage in embryonic development is the formation of the **blastocyst**. *من التطور الجنيني*
- The cells in the blastula **are arranged in a hollow sphere**. *هي مكونة*
- The cells in the blastula **are arranged in a hollow sphere**. *3 الكويرات مكانياً*
- During gastrulation, the blastula **invaginates** to form the **gastrula**. *تكون على نفسها*
- Each of these layers is called a **germ layer**, which **differentiate** into **different tissues**. *تتمايز*

أجهزة عصبية مختلفة

طبقة  
الغضروفية



## Differentiation of germ layers

The three germ layers give rise to different cell types in the animal body:

the ectoderm forms:

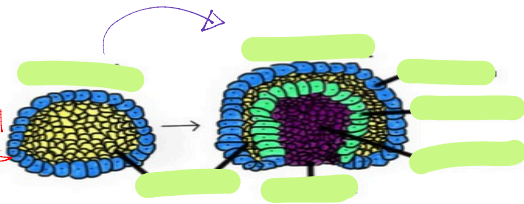
- the nervous system
- epithelial tissue

the mesoderm gives rise to:

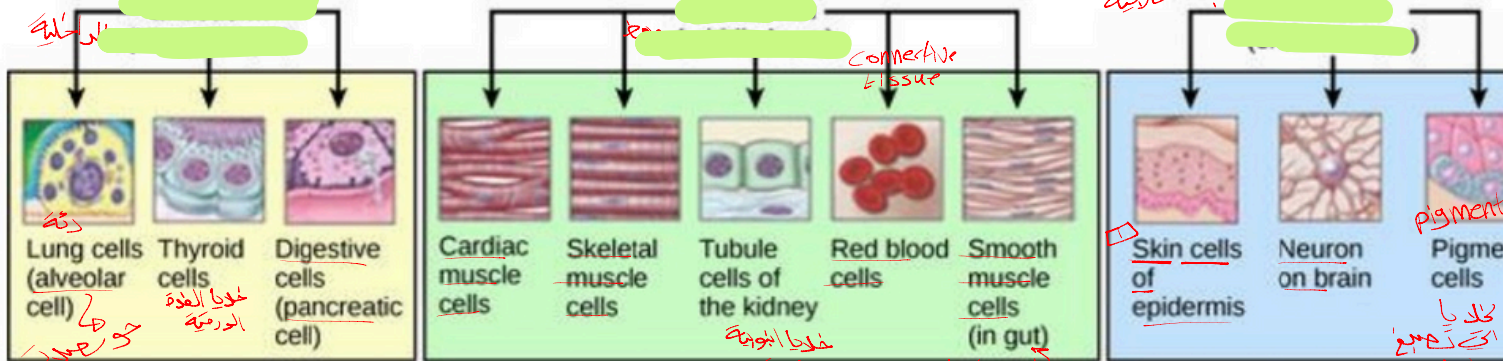
- connective tissue
- muscle

the endoderm gives rise to the:

- epithelial cells of the digestive system



جهاز العنبري  
الطبقة الخارجية  
من الجدار  
الأنسجة الطرية  
العظام  
جهاز الهضمي  
خلايا متمايزة



كعك اي اي ابي داخله  
Endocrine gland



Upper and lower limb  
3 طبقات

