**Lec.3**

**Embryology**

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**Implantation**

**Implantation** occurs at the end of the first week. Trophoblast cells invade the epithelium and underlying endometrial stroma with the help of proteolytic enzymes.

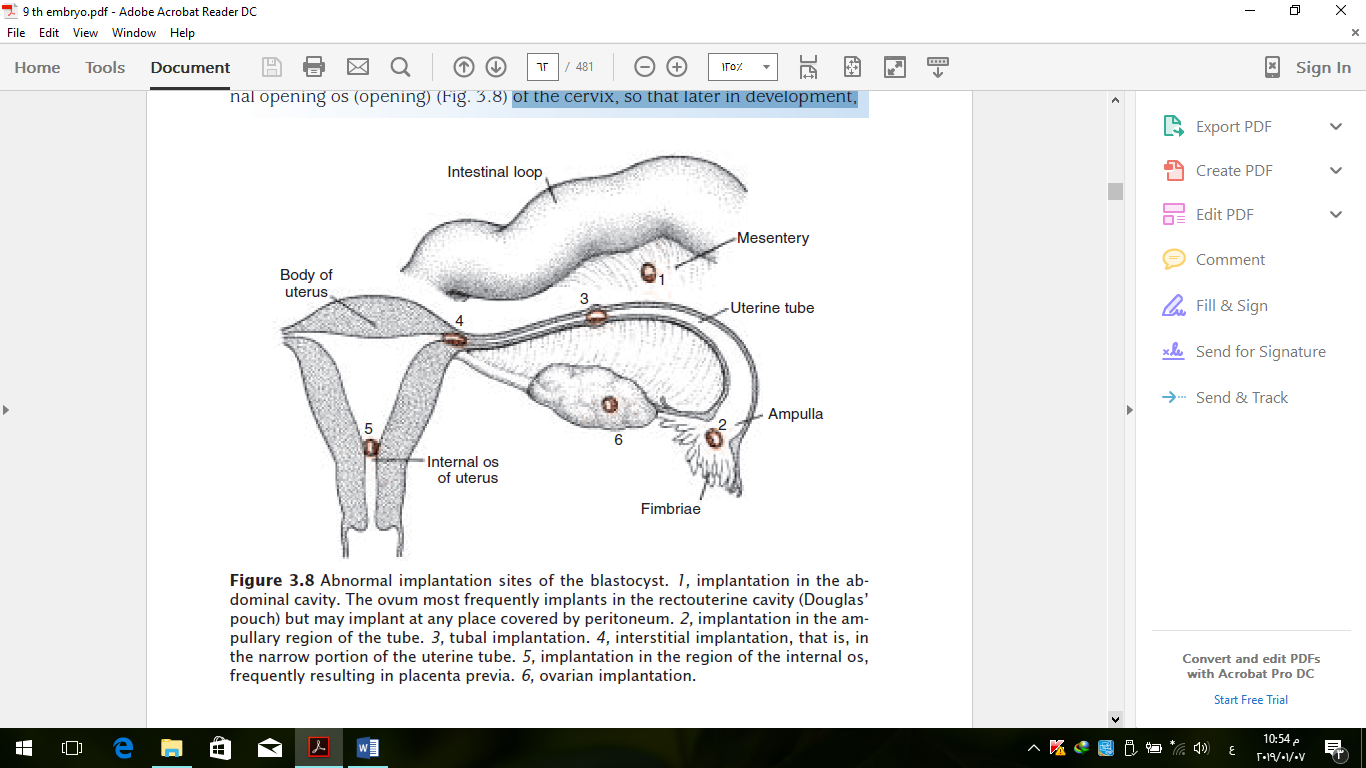
(**ectopic pregnancies**)

Implantation may also occur outside the uterus, such as in the rectouterine pouch, on the mesentery, in the uterine tube, or in the ovary, this is known as ectopic pregnancy.

Abnormal implantation sites sometimes occur even within the uterus.

Normally the human blastocyst implants along the anterior or posterior wall of the body of the uterus.

Occasionally the blastocyst implants close to the internal opening os (opening) of the cervix, so that later in development, the placenta bridges the opening (**placenta previa**) and causes severe, even life-threatening bleeding in the second part of pregnancy and during delivery.



***Second Week of Development:***

***(Bilaminar embryonic Disc development)***

**Day 8 :**  At the eighth day of development:

* The **blastocyst** is partially embedded in the endometrial stroma.
* **the trophoblast** has differentiated into two layers:

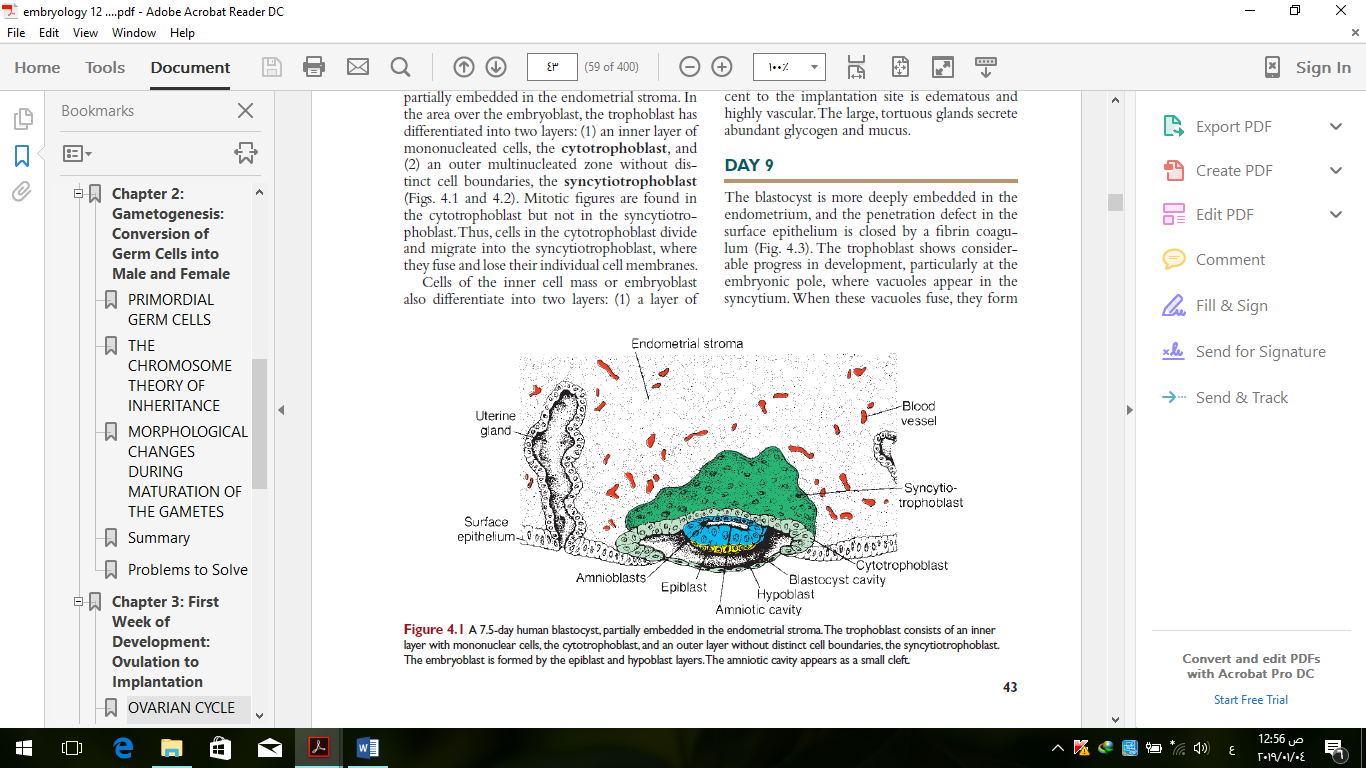
1. an inner, actively proliferating layer, the **cytotrophoblast**
2. an outer layer, the **syncytiotrophoblast,** which erodes maternal tissues.

* Cells of the inner cell mass **or embryoblast** also differentiate into two layers, Together, they form a flat disc.

(*a*) a layer of small cuboidal cells, known as the **hypoblast layer.**

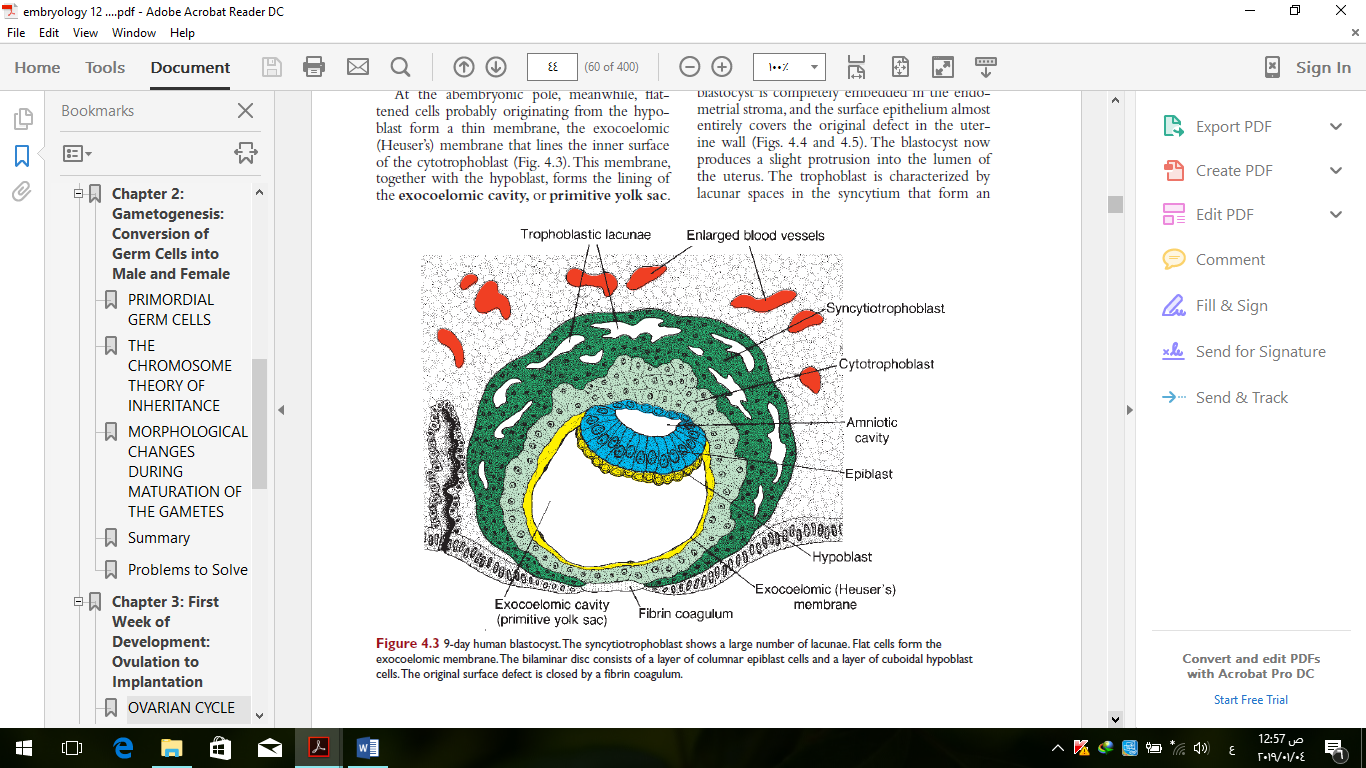
(*b*) a layer of high columnar cells, the **epiblast layer.**

* At the same time, **a small cavity** appears within the epiblast. This cavity enlarges to become the **amniotic cavity.** Epiblast cells adjacent to the cytotrophoblast are called **amnioblasts.**



**Day 9**

* The **blastocyst** is more deeply embedded in the endometrium
* the **trophoblas**t shows considerable progress in development, particularly at the embryonic pole, where vacuoles appear in the syncytium. When these vacuoles fuse, they form large lacunae, and the phase is thus known as the **lacunar stage.**
* At the abembryonic pole, meanwhile, flattened hypoblast cells form a thin membrane that lines the inner surface of the cytotrophoblast (exocoelomic membrane). This membrane, together with the hypoblast, forms the lining of the **exocoelomic cavity,** or **primitive yolk sac.**



**Days 11 and 12:** By the 11th to 12th day of development

* the **blastocyst** is completely embedded in the endometrial stroma.

it's now produces a slight protrusion into the lumen of the uterus.

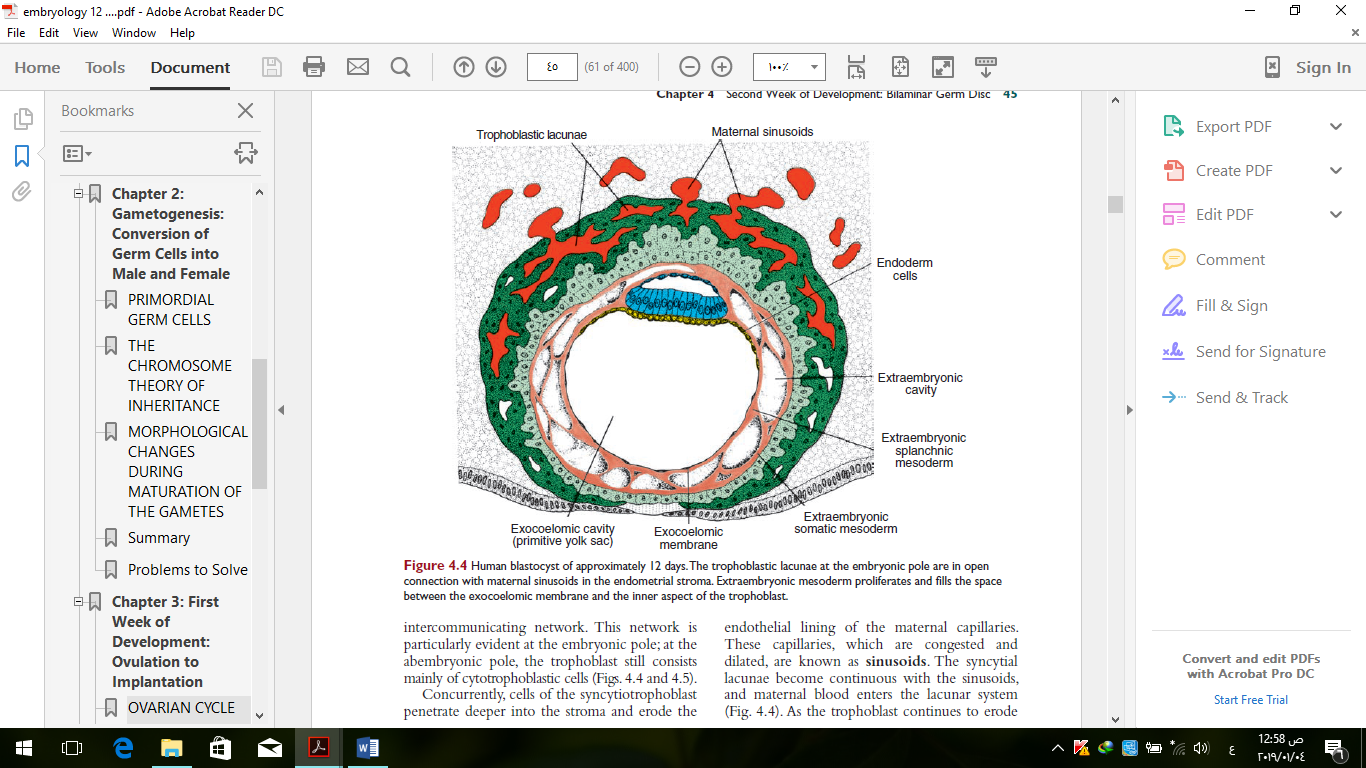
* at the abembryonic pole, the trophoblast still consists mainly of cytotrophoblastic cells.

Concurrently, cells of the syncytiotrophoblast penetrate deeper into the stroma and erode the maternal capillaries. These capillaries, are known as **sinusoids.** The syncytial lacunae become continuous with the sinusoids and maternal blood enters the lacunar system.

As the trophoblast continues to erode more sinusoids, maternal blood begins to flow through the trophoblastic system, establishing the **uteroplacental circulation.**

In the meantime, **a new population of cells appears** between the inner surface of the cytotrophoblast and the outer surface of the exocoelomic cavity (the extraembryonic mesoderm)

* By the end of the second week, extraembryonic mesoderm fills the space between the trophoblast and the amnion and exocoelomic membrane internally



**Extraembryonic mesoderm** lining the cytotrophoblast and amnion is **extraembryonic somatic mesoderm;** the lining surrounding the yolk sac is **extraembryonic splanchnic mesoderm.**

When vacuoles develop in this tissue, the **extraembryonic coelom** or **chorionic cavity** forms.

Growth of the bilaminar disc is relatively slow compared with that of the trophoblast; consequently, the disc remains very small.

