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Week 2 of Development: Bilaminar Germ Disk Formation and Implantation

By the end of the first week, a blastocyst consisting of an embryoblast and a trophoblast is formed. At the beginning of the second week, the embryoblast splits into two layers: the epiblast and the hypoblast, or primitive endoderm. A cavity, called the amniotic cavity, develops at the embryonic pole of the blastocyst between the epiblast and the overlying trophoblast. It quickly becomes surrounded by a thin layer of cells derived from epiblast. This thin layer constitutes the lining of the amnion, one of the four extraembryonic membranes. The remainder of the epiblast and the hypoblast now constitute a bilaminar embryonic disc, or bilaminar blastoderm, lying between the amniotic cavity (dorsally) and the blastocyst cavity (ventrally). The cells of the embryonic disc develop into the embryo proper and also contribute to extraembryonic membranes.

During the second week, the hypoblast apparently sends out two waves of migratory endodermal cells into the blastocyst cavity (blastocoel). The first of these waves forms the primary yolk sac (or the exocoelomic membrane or Heuser's membrane) and the second transforms the primary yolk sac into the secondary yolk sac. In the middle of the second week, the inner surface of the trophoblast and the outer surface of the amnion and yolk sac become lined by a new tissue, the extraembryonic mesoderm. A new cavity; the extraembryonic coelom, or chorionic cavity develops as the extraembryonic mesoderm splits into two layers. With formation and splitting of the extraembryonic mesoderm, both the amnion and yolk sac (now sometimes called the *definitive* yolk sac) become double-layered structures: amnion, consisting of ectoderm on the inside and mesoderm on the outside; and yolk sac, consisting of endoderm on the inside and mesoderm on the outside. In addition, the outer wall of the blastocyst is now called the chorion like the amnion and yolk sac, it too contains a layer of mesoderm. Meanwhile, implantation continues.

The trophoblast differentiates into two layers: a cellular trophoblast, called the cytotrophoblast, and an expanding peripheral syncytial layer, the syncytiotrophoblast. These trophoblast layers contribute to the extraembryonic membranes, not to the embryo proper. The syncytiotrophoblast, cytotrophoblast, and associated extraembryonic mesoderm, together with the uterus, initiate formation of the placenta. During this process, the fetal tissues establish outgrowths, the chorionic villi, which extend into maternal blood sinusoids.