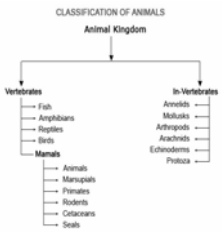
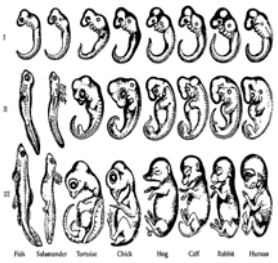
Estados de desarrollo en mamíferos

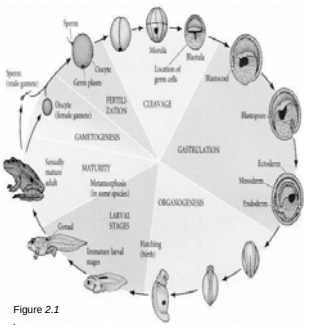


Estados de desarrollo en mamíferos

Modelos:
Ratón
Humano



The Circle of Life: The Stages of Animal Development



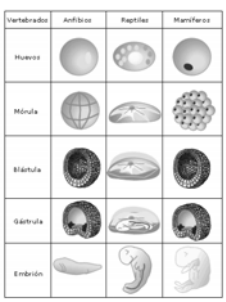


Figure *2.1*
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Developmental history of a frog. The stages from fertilization through hatching (birth) are known collectively as embryogenesis. The region set aside for producing germ cells is shown in bright purple. Gametogenesis, which is completed in the sexually mature adult, begins at different times during development, depending on the species. (The sizes of the varicolored wedges shown here are arbitrary and do not correspond to the proportion of the life cycle spent in each

Desarrollo

- Combinación equilibrada de varios procesos:
  - Proliferación celular (mitosis y citocinesis)
  - Crecimiento
  - Diferenciación celular
  - Morfogénesis u organogénesis
- División celular en Mamíferos
- Gastrulación en Mamíferos
- Eje antero-posterior en mamíferos
- Formación de ejes Dorsal-ventral y derecho e izquierdo
- Neurulacion

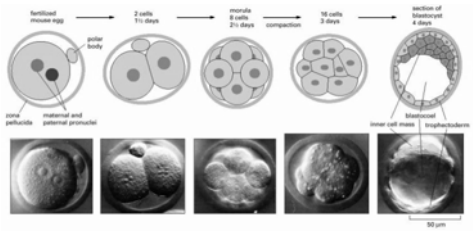

Figure 21-83
. **The early stages of mouse development**
The zona pellucida is a jelly capsule from which the embryo escapes after a few days, allowing it to implant in the wall of the uterus. (Photographs courtesy of Patricia Calarco.)

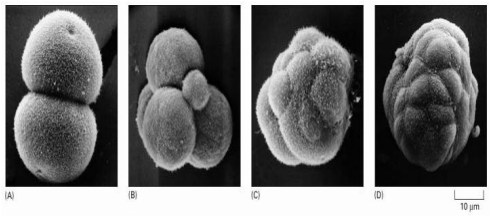

Figure 21-84
. **Scanning electron micrographs of the early mouse embryo**
The zona pellucida has been removed. (A) Two-cell stage. (B) Four-cell stage (a polar body is visible in addition to the four blastomeres—see Figure 20-22). (C) Eight-to-sixteen-cell morula—compaction occurring. (D) Blastocyst. (A-C, courtesy of Patricia Calarco; D, from P. Calarco and C.J. Epstein, *Dev. Biol.* 32:208–213, 1973. © Academic Press.)

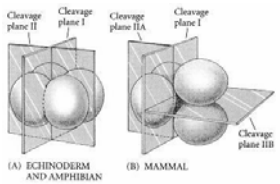

Figure 11.21
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Comparison of early cleavage in (A) echinoderms and amphibians (radial cleavage) and (B) mammals (rotational cleavage). Nematodes also have a rotational form of cleavage, but they do not form the blastocyst structure characteristic of mammals. (After Gulyas 1975.)

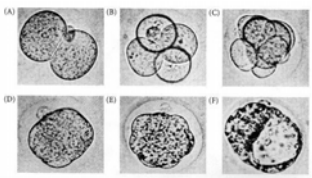

Figure 11.22
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The cleavage of a single mouse embryo in vitro. (A) 2-cell stage. (B) 4-cell stage. (C) Early 8-cell stage. (D) Compacted 8-cell stage. (E) Morula. (F) Blastocyst. (From Mulnard 1967; photographs courtesy of J. G. Mulnard.)

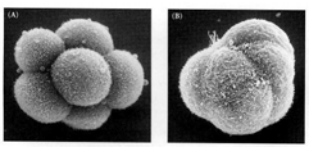

Figure 11.23
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Scanning electron micrographs of (A) uncompacted and (B) compacted 8-cell mouse embryos. (Photographs courtesy of C. Ziomek.)

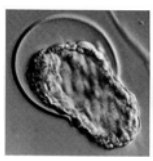

Figure 11.25
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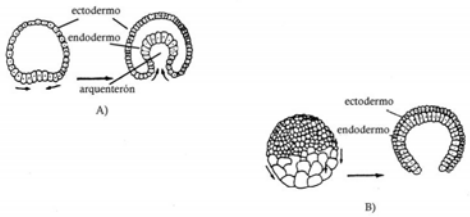
Mouse blastocyst hatching from the zona pellucida. (Photograph from Mark et al. 1985, courtesy of

Gastrulacion



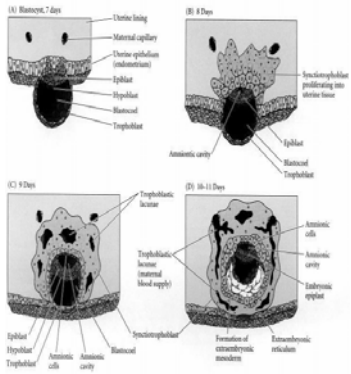


Figure 11.27

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Tissue formation in the human embryo between days 7 and 11. (A, B) Human blastocyst immediately prior to gastrulation. The inner cell mass delaminates hypoblast cells that line the blastocoel, forming the extraembryonic endoderm of the primitive yolk sac and a two-layered (epiblast and hypoblast) blastodisc similar to that seen in avian embryos. The trophoblast in some mammals can be divided into the polar trophoblast, which covers the inner cell mass, and the mural trophoblast, which does not. The trophoblast divides into the cytotrophoblast, which will form the villi, and the syncytiotrophoblast, which will ingress into the uterine tissue. (C) Meanwhile, the epiblast splits into the amnionic ectoderm (which encircles the amnionic cavity) and the embryonic epiblast. The adult mammal forms from the cells of the embryonic epiblast. (D) The extraembryonic endoderm forms the yolk sac. (After Gilbert 1988; Larsen 1993.)

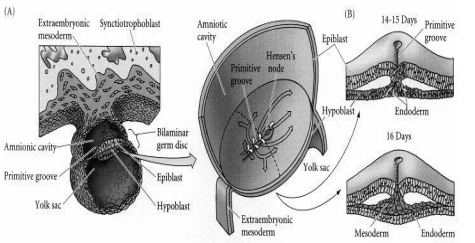

Figure 11.28

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Amnion structure and cell movements during human gastrulation. (A) Human embryo and uterine connections at day 15 of gestation. In the upper view, the embryo is cut sagittally through the midline; the lower view looks down upon the dorsal surface of the embryo. (B) The movements of the epiblast cells through the primitive streak and Hensen's node and und erneath the epiblast are superimposed on the dorsal surface view. At days 14 and 15, the ingressing epiblast cells are thought to replace the hypoblast cells (which contribute to the yolk sac lining), while at day 16, the ingressing cells fan out to form the mesodermal layer. (After Larsen 1993.)

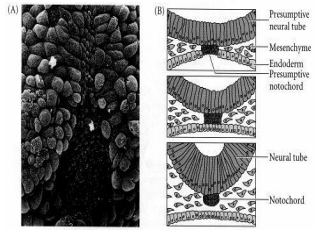

Figure 11.29

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Formation of the notochord in the mouse. (A) The ventral surface a the 7.5-day mouse embryo, seen by scanning electron microscopy. The presumptive notochord cells are the small, ciliated cells in the midline that are flanked by the larger endodermal cells of the primitive gut. The node (with its ciliated cells) is seen at the bottom. (B) The formation of the notochord by the dorsal infolding of the small, ciliated cells. (From Sulik et al. 1994; photograph courtesy of K. Sulik and G. C. Schoenwolf.)

Figure 11.30

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Human embryo and placenta after 40 days of gestation. The embryo lies within the amnion, and its blood vessels can be seen extending into the chorionic villi. The small sphere to the right of the embryo is the yolk sac. (The Carnegie Institution of Washington, courtesy of C. F. Reather.)

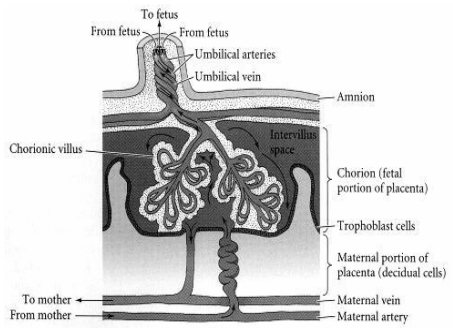

Figure 11.31

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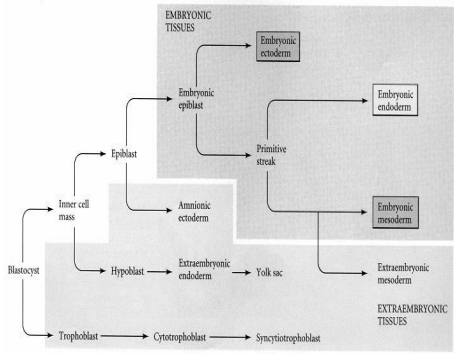
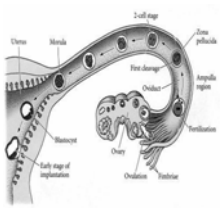
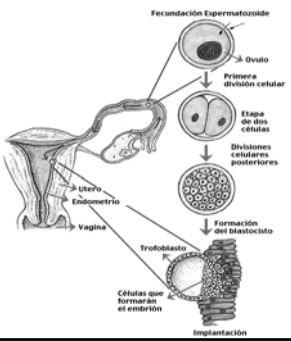
Relationship of the chorionic villi to the maternal blood in the uterus.



Desarrollo de un embrión humano

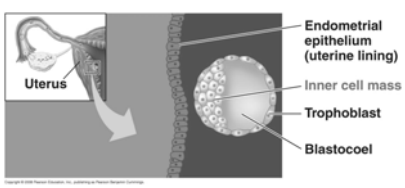
- La fecundación en los mamíferos ocurre en el oviducto y las etapas tempranas del desarrollo ocurren mientras el embrión viaja al útero





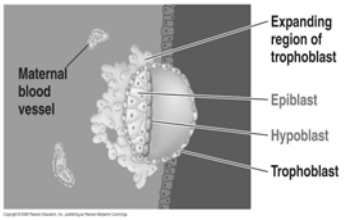
Desarrollo de un embrión humano

- Cerca de 7 días después de la fecundación, el embrión tiene aproximadamente 100 células alrededor de la cavidad central
- Ésta es la etapa que se conoce como blastocisto, versión humana de la blástula



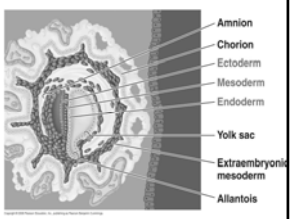
Desarrollo de un embrión humano

- El tropoblasto es la capa externa del blastocito que inicia la implantación en el **endometrio**, por medio las enzimas de secreción que habilitan en este



Desarrollo de un embrión humano

- Una vez implantado en el útero la gastrulación empieza y las membranas extraembrióticas comienzan a crecer
- La gastrulación ocurre por el movimiento hacia adentro de las células del epiblasto (masa interna de las células del blastocito)

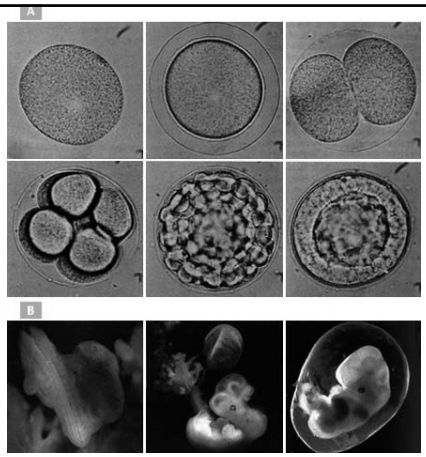


Desarrollo de un embrión humano

- La gastrulación produce un embrión de tres capas, (ectodermo, mesodermo y endodermo) con cuatro membranas extraembriotica
  - Corion – intercambio de gases
  - Amnion – cavidad amniótica (fluido que rodea el embrión)
  - "Yolk sac" – Células sanguíneas
  - Alantoides – Cordón umbilical

Desarrollo de un embrión humano

- Luego de la gastrulación esta la formación de la notocorda y el tubo neural (primeros eventos de la organogénesis)
- Al final del primer trimestre de desarrollo los rudimentos de la mayoría de los órganos se han desarrollado de las tres capas de germinación



Resumen

- Los peces, reptiles, aves sufren una escisión discoidal meroblastica, en el que las divisiones celulares tempranas no dividen a través de la yema del huevo. Estas células forman un blastodermo.

  Los mamíferos sufren división holoblastica rotacional, caracterizado por un ritmo lento de la división, una orientación única división, escaza sincronía de división, y la formación de un blastocisto.

- El blastocisto se forma después que los blastómeros sufren compactación. Este contiene células externas-las células del trofoblasto, que se convierten en el corion, y una masa celular interna que se convierte en el amnios y el embrión.
- El corion forma la porción fetal de la placenta, el cual suministra oxígeno y nutrición al embrión, proporciona hormonas para el mantenimiento del embarazo, y proporciona las barreras al sistema inmunológico de la madre.
- La gastrulación en mamífero no es diferente a la de las aves. Parece que hay dos centros de señalización, uno en el nodo y uno en el endodermo visceral anterior. Esto último es fundamental para generar el cerebro anterior, mientras que el primero es crítico en la inducción de las estructuras axiales caudal del mesencéfalo