

## Definition of Key Terms in Developmental Biology (2018)

- **Radial glial cells (radial glia):** Neural progenitor cells found in the ventricular zone (VZ) of the developing brain. At each division, they generate another VZ cell and a more committed cell type that leaves the VZ to differentiate.
- **Intermediate progenitor cells (IP cells):** Neuron precursor cells of the subventricular zone (SVZ); derived from radial glial cells; divide symmetrically.
- **Lineage tracing (fate mapping):** A method that delineates all progeny produced by a single cell or a group of cells. In a lineage-tracing experiment, the cells of interest are marked at one time point, and the progeny derived from these marked cells are revealed at a later time point.
- **Neural crest:** A transient band of cells, arising from the lateral edges of the neural plate, that joins the neural tube to the epidermis. It gives rise to a cell population—the neural crest cells—that detach during formation of the neural tube and migrate to form a variety of cell types and structures, including sensory neurons, enteric neurons, glia, pigment cells, and (in the head) bone and cartilage.
- **Epithelial–mesenchymal transition (EMT):** A process by which epithelial cells lose their cell polarity and cell–cell adhesion, and gain migratory and invasive properties to become mesenchymal (stem) cells that can invade tissues and form organs in new places.
- **Stem cells:** A relatively undifferentiated cell that when it divides produces at least one of two daughter cells that retains its undifferentiated character (self-renewal), and a daughter cell that can undergo further differentiation.
- **Pluripotent stem cells** (inner cell mass and undifferentiated germ cells): Self-renewing cells with the capacity to form representative tissues of all three germ layers of the developing embryo—ectoderm, mesoderm and endoderm, as well as the germ lineage, but typically provide little or no contribution to the trophoblast layers of placenta.
- **Adult stem cells:** Stem cells found in the tissues of mature organs. Adult stem cells are usually involved in replacing and repairing tissues of that particular organ.
- **Embryonic stem cells (ESCs):** Pluripotent stem cells derived from the inner cell mass (ICM) of a blastocyst that are capable of generating all the cell types of the body.
- **Induced pluripotent stem (iPS) cells:** Adult cells that have been converted to cells with the pluripotency of embryonic stem cells. Usually accomplished by the activation of certain transcription factors.
- **Totipotent cells** (zygote and the blastomeres): Totipotent cells are capable of forming every cells in the embryo and the trophoblast cells of the placenta.
- **Multipotent** (hematopoietic stem cells) — multipotent stem cells can be in either the embryo or the adult, and their commitment is limited to a relatively small subset of all the possible cells of the body.
- **Unipotent** (Spermatogonia) — only involved in regenerating a particular type of cell.
- **Progenitor cells** (Basal neural progenitors) — limited self-renew capabilities. They have the capacity to divide only a few times before differentiating.
- **Stem cell niches:** Particular locations (environment) that allow the controlled self-renewal and survival of the stem cells within the niche and the controlled differentiation of those stem cell progenies that leave the niche.
- **Asymmetric cell division vs. Symmetric cell division:** An asymmetric cell division produces two daughter cells with different cellular fates. In contrast, symmetric cell divisions give rise to daughter cells of equivalent fates. Notably, stem cells divide asymmetrically to give rise to two distinct daughter cells: one copy of the original stem cell as well as a second daughter programmed to differentiate into a non-stem cell fate.
- **Somites:** Blocks of mesodermal cells on either side of the neural tube, which produce muscle and many of the connective tissues of the back (dermis, muscle, vertebrae and ribs).
- **Myofiber:** Several myoblasts align together and fuse their cell membranes to form a single large cell with several nuclei.
- **Satellite cells:** Populations of stem cells and progenitor cells that reside alongside the adult muscle fibers, which are responsible for the growth and regeneration of muscles.

- **Pattern formation (Morphogenesis):** A set of process by which embryonic cells form ordered spatial arrangements of differentiated tissues.
- **The limb field:** The area representing a group of mesodermal cells capable of forming a limb on their own.
- **The apical ectodermal ridge (AER):** A structure that forms from the ectodermal cells at the distal end of each limb bud and acts as a major signaling center to ensure proper development of a limb. After the limb bud induces AER formation by secreting Fgf10, the AER and limb mesenchyme—including the zone of polarizing activity (ZPA)—continue to communicate with each other to direct further limb development.
- **The progress zone:** Highly proliferative limb bud mesenchyme directly beneath the apical ectodermal ridge. The proximal—distal growth and differentiation of the limb bud are made possible by a series of interactions between the AER and the progress zone.
- **The zone of polarizing activity (ZPA):** A small block of mesodermal tissue near the posterior junction of the young limb bud and the body that contains signals which instruct the developing limb bud to form along the anterior—posterior axis.
- **Gametogenesis:** The process by which the gametes (sperm and egg) are formed.
- **Germ plasm:** The cytoplasmic region containing germ line specification components.
- **Primordial germ cells (PGCs):** Gamete progenitor cells, which typically arise elsewhere and migrate into the developing gonads.
- **Genital ridge:** A thickening of the splanchnic mesoderm and of the underlying intermediate mesodermal mesenchyme on the medial edge of the mesonephros; it forms the testis or ovary. Also called the germinal ridge.