a program of differential gene expression leads to the different cell types in a multicellular organism:
-a genetic program for embryonic development
    -differentiation: process by which cells become specialized in structure and function
    -morphogenesis: development of the form of an organism and its structures
-sequential regulation of gene expression during cellular differentiation:
    -differentiation of cell types: outcome of determination and is marked by the expression of genes for tissue-specific proteins
    -apoptosis: a type of programmed cell death
-pattern formation (setting up the body plan):
    -pattern formation: development of a spatial organization in which the tissues and organs of an organism is in their characteristic places
    -propositional information: molecular cues that control pattern formation

sequential regulation of gene expression during cellular differentiation:
1) determination: signals from other cells lead to activation of a master regulatory gene called myod, and the cell makes myod protein, a specific transcription factor that acts as an activator
2) differentiation: myod protein stimulates the myod gene further and activates the genes encoding other muscle-specific transcription factors, which in turn activate genes for muscle proteins

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cloning of organisms showed that differentiated cells could be 'reprogrammed' and ultimately led to the production of stem cells:
-organismal cloning: cloning that results to an individual that is identical to its parent or single cell donor
-finding of gurdon's experiment on frogs: the potential of a transplanted nucleus to direct normal development is inversely related to the age of the donor

cloning plants:
-totipotent cell: any mature cell that can 'dedifferentiate' and then give rise to all the specialized cell types of the organism

stem cells of animals:
-stem cells: relatively unspecialized cell that can both reproduce itself indefinitely and differentiate into specialized cells of one or more types
-types of stem cells:
    -embryonic stem (es) cell: capable of giving rise to differentiated embryonic cells of any types
    -adult stem cell: can only give rise to some cell types
-a cell is described as pluripotent when it is capable of differentiating into many different cell types