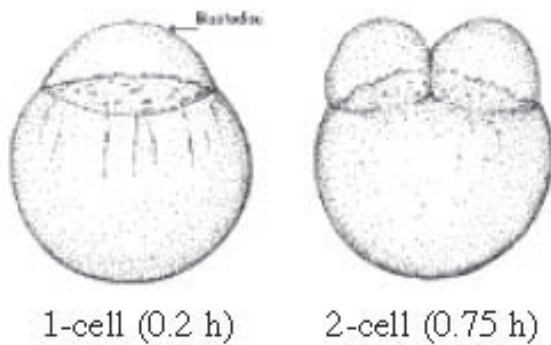


Developmental Biology Laboratory

Observations of the Zebrafish Embryo

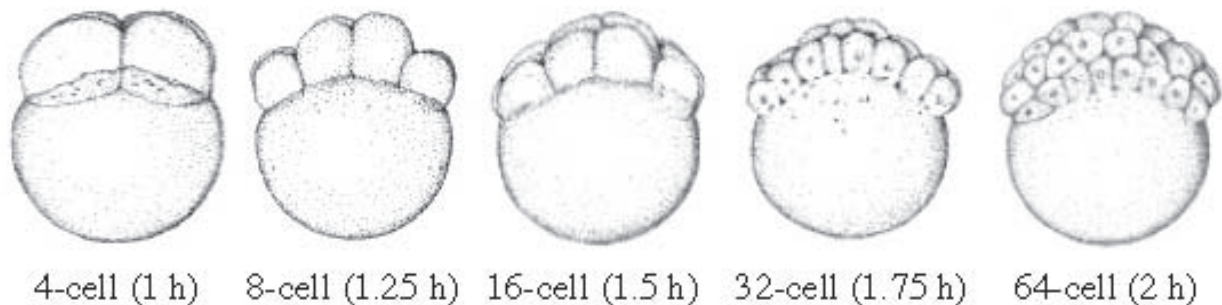
Adapted from <http://www.neuro.uoregon.edu/k12/zfk12.html>

Zygote Period (0-.75h)



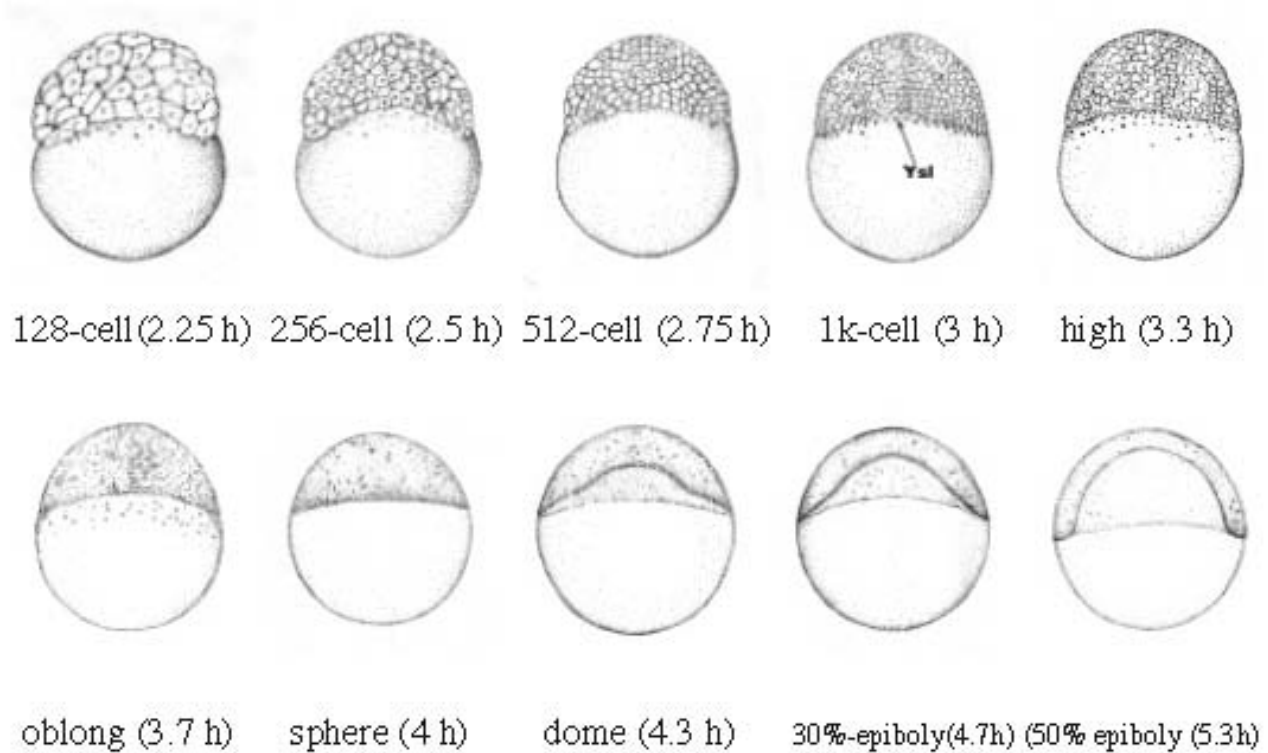
Cytoplasm streams toward animal pole to form the blastodisc.

Cleavage Period (0.75-2.2 h)



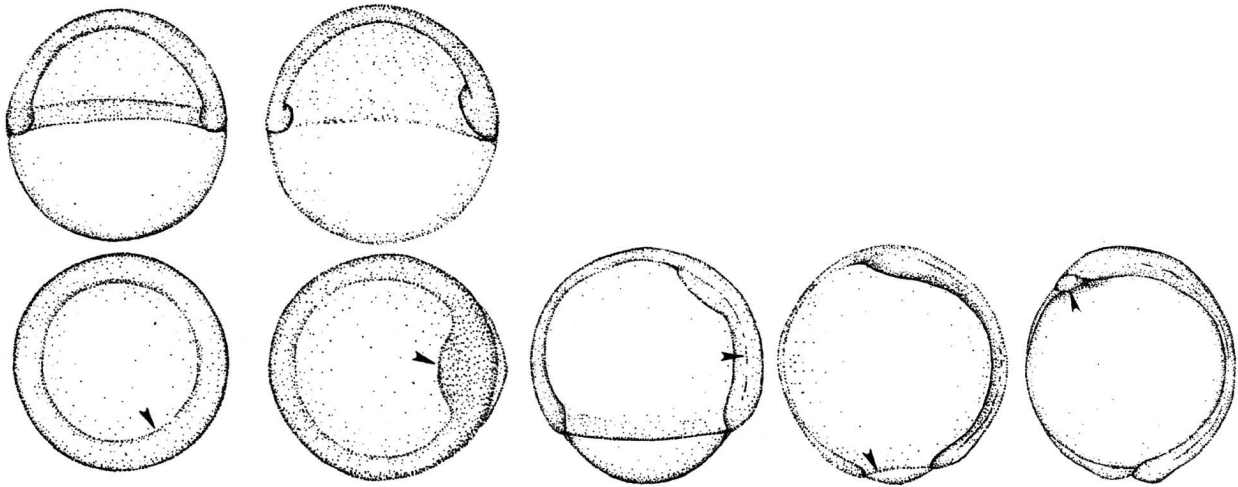
During this period, the first 6 cleavages occur. The cells, or blastomeres, divide synchronously at about 15 minute intervals.

Blastula Period (2.25-5.25 h)



Midblastula transition occurs at the 10th cleavage. At this division, cell membranes do not form between cells of the bottom, marginal, row of blastomeres, and thereafter, it develops into the “yolk syncytial layer (YSL)” of the yolk cell. After midblastula, transition cell divisions are asynchronous. Margin reaches 30% epiboly.

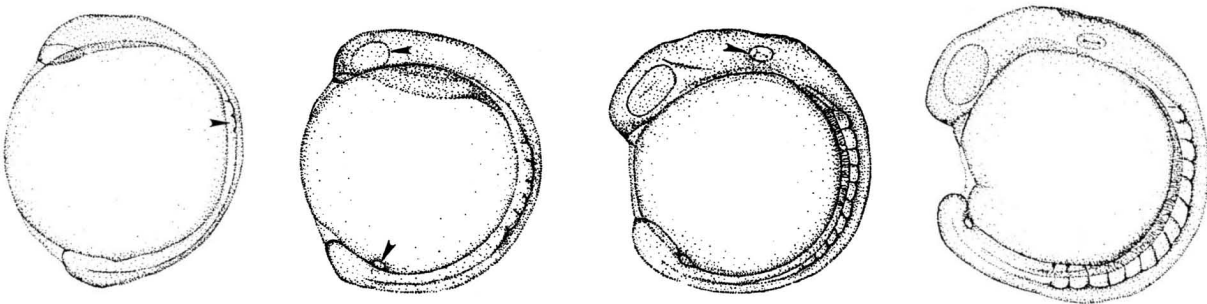
Gastrula Period (5.3-10 h)



germ ring (5.7 h) shield (6 h) 75% epiboly (8 h) 90% epiboly (9 h) bud (10 h)

Morphogenetic movements of involution, convergence, and extension form the epiblast, hypoblast, and embryonic axis through the end of epiboly.

Segmentation Period (10-24 h)



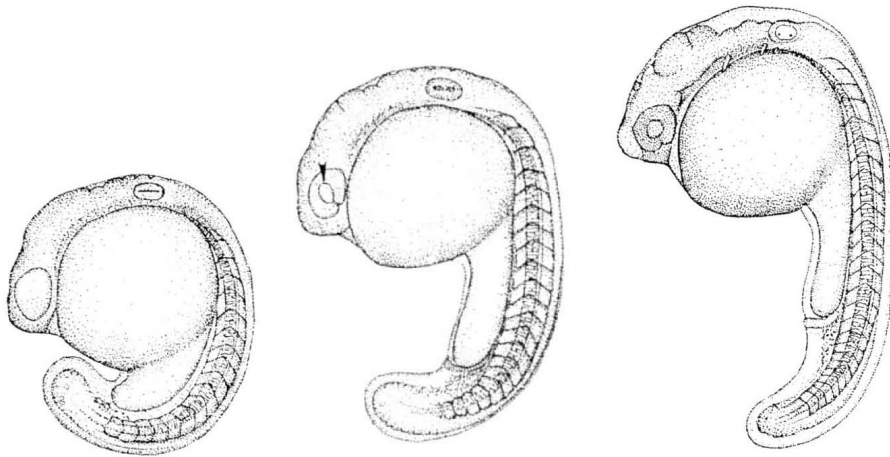
3-somite (11 h)

6-somite (12 h)

10-somite (14 h)

14-somite (16 h)

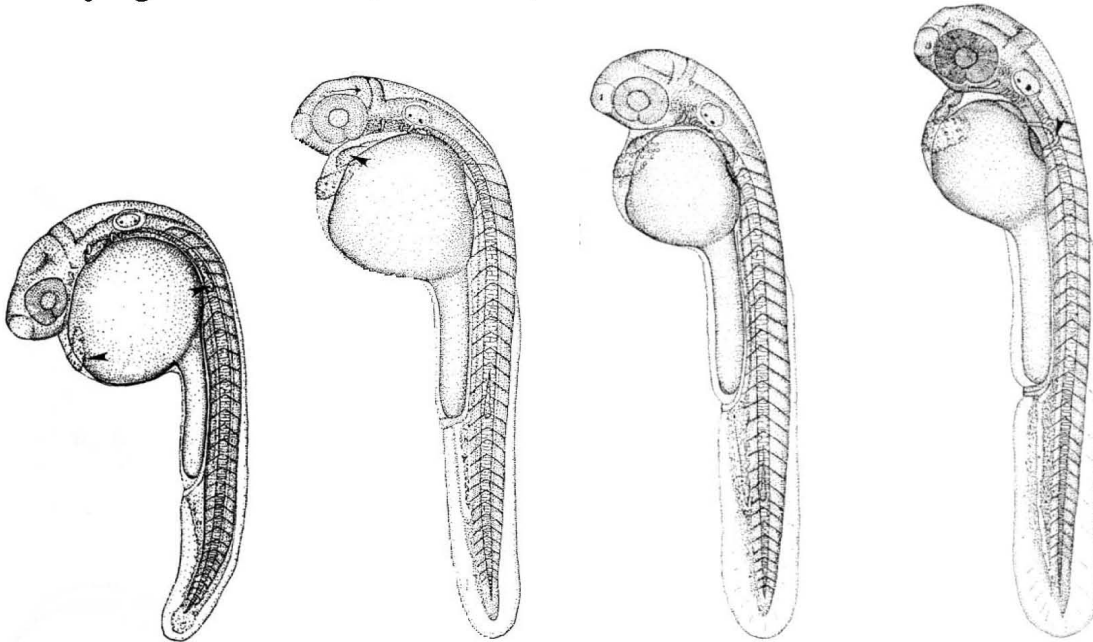
Segmentation Period (continued)



18-somite (18 h) 21-somite (19.5 h) 26-somite (22 h)

Somites, pharyngeal arch primordia, and neuromeres develop; primary organogenesis; earliest movements; the tail appears

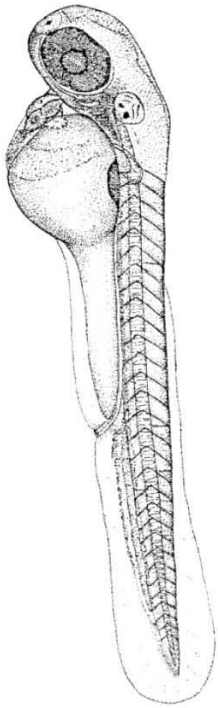
Pharyngula Period (24-48 h)



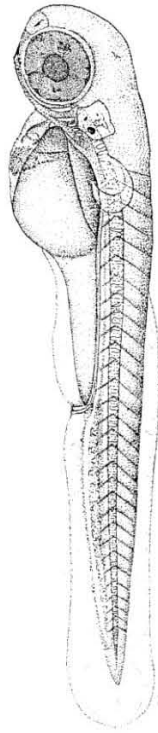
Prim-6 (25 h) Prim-16 (31 h) Prim-22 (35 h) High-pec (42 h)

Phylotypic-stage embryo; body axis straightens from its early curvature about the yolk sac; circulation, pigmentation, and fins begin development.

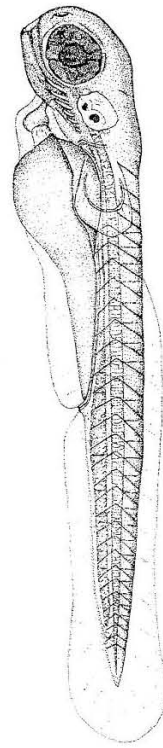
Hatching Period (48-72 h)



long-pec (48 h)



pec-fin (60 h)



protruding mouth (72 h)

Completion of rapid morphogenesis of primary organ systems; cartilage development in head and pectoral fin; hatching occurs asynchronously. At 72 h, swim bladder inflates; food-seeking and active avoidance behaviors.

The identification of genes with unique and essential functions in the development of the zebrafish, *Danio rerio*

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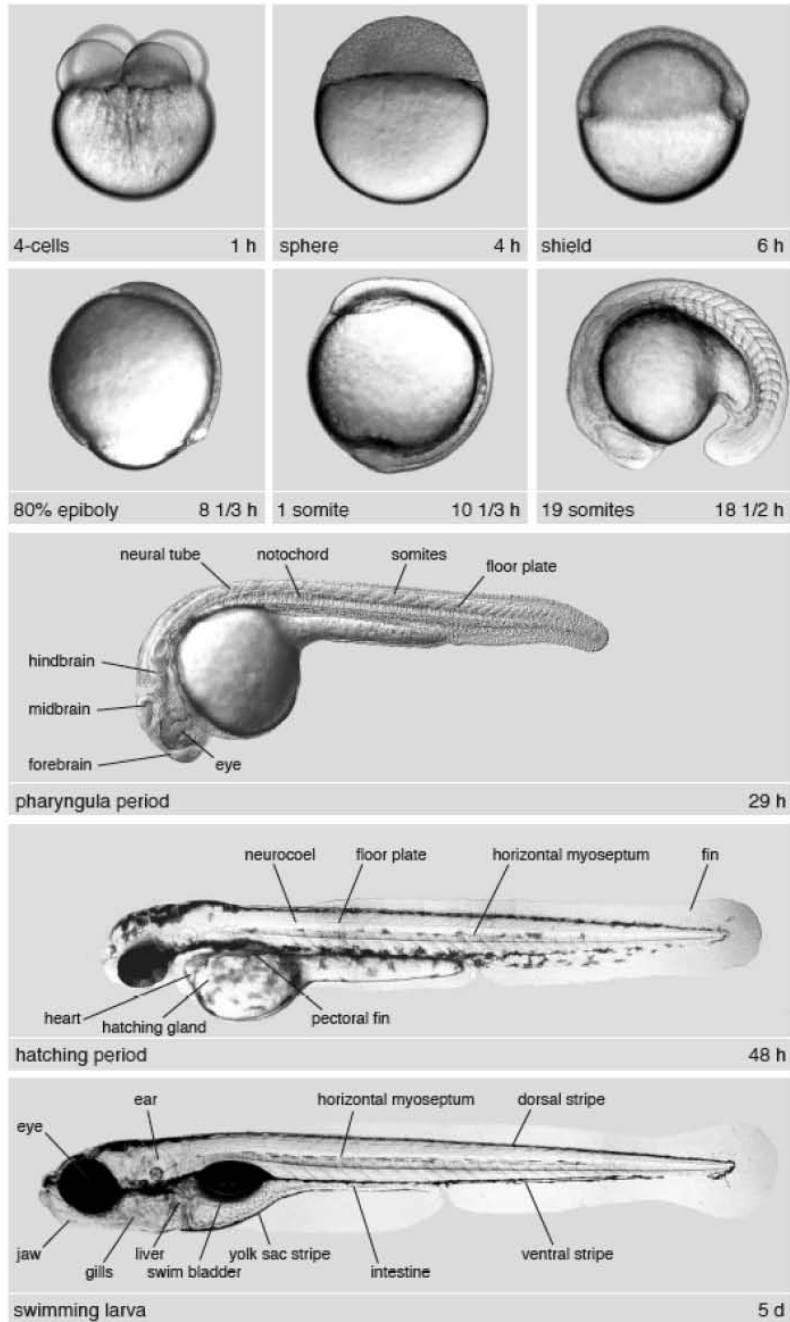


Fig. 1. Living embryos of relevant stages during the first 24 hours of development and of the approximate age during the three screening periods. The structures that were on the checklist are marked.

