

Major carp egg and embryonic developmental stages



INTRODUCTION

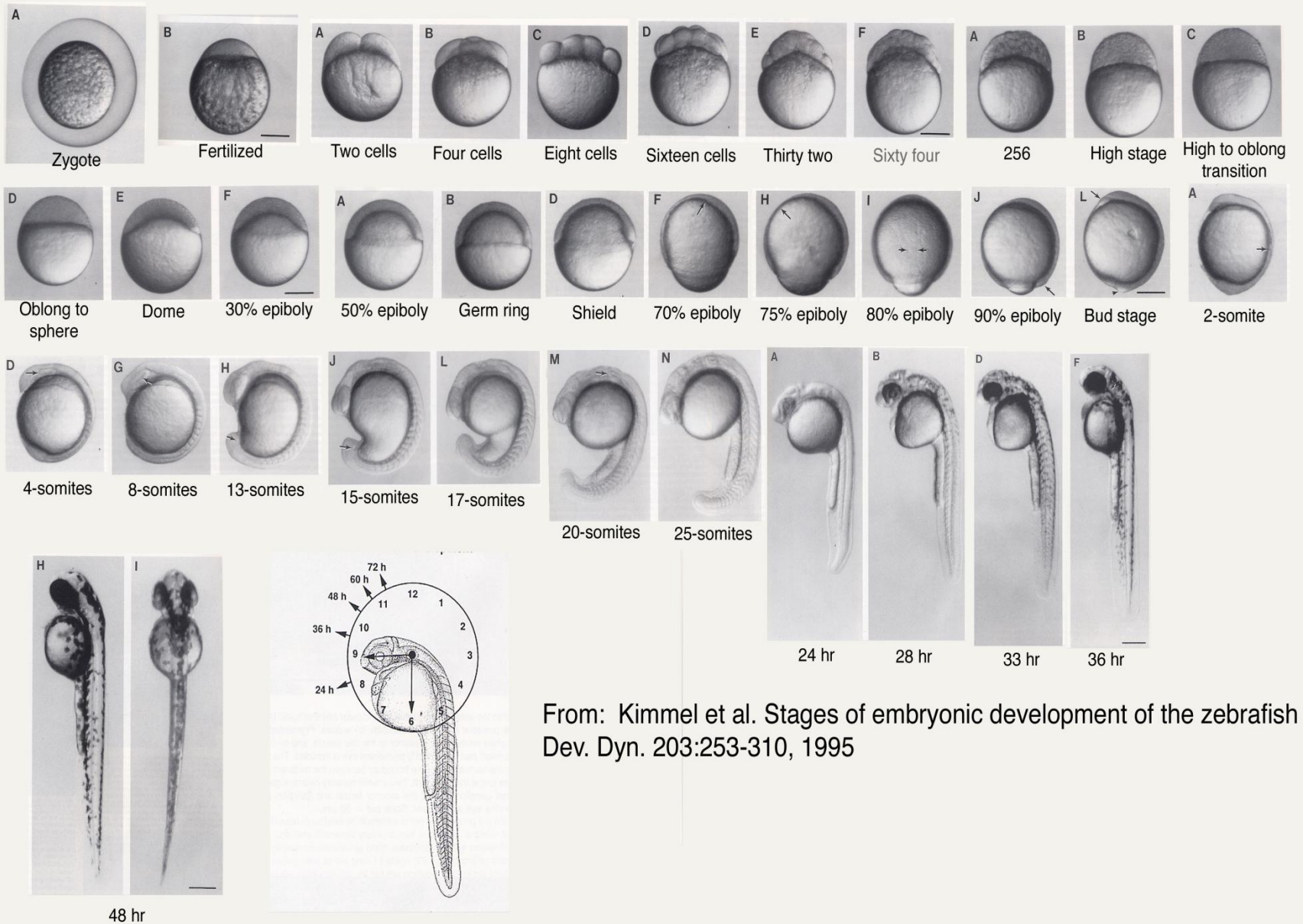
- The fertilization of major carp eggs is external
- The fertilized eggs absorb water and swell considerably in 10-15 minutes and they become a little hard - known as water hardening
- They are bead-like, non-adhesive, semi-buoyant and have a large perivitelline space
- The size of the eggs varies between 2.5 and 6.5 mm



Important major carp egg and embryonic stages and time required for each stage are as follows :

<u>Sl. no.</u>	<u>Time required at 24-31°C</u> <u>(Cumulative)</u>	<u>Stage</u>
1.	0 min.	Fertilization
2.	10-15 min.	Water hardening and blastodisc formation
3.	30-50 min.	First cleavage (2 cells)
4.	40-65 min.	Second cleavage (4 cells)
5. cells)	50-80 min.	Third cleavage (8
6.	60-90 min.	Fourth cleavage (16 cells)
7. cells)	70-120 min.	Fifth cleavage (32
8.	2-2½ hrs.	Morula stage – less than half of yolk invaded by germ layer
9.	2½-3 hrs.	Blastula – about half of yolk invaded by germ layer
10.	3-3½ hrs.	Gastrula – about three-fourth of yolk is invaded by germ layer

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| 11. | 3-4 hrs. | Yolk-plug stage – complete invasion of yolk by germ layer excepting a small pore (blastopore) |
| 12. | 4-6 hrs. | Elongation of yolk mass-embryonic stage starts |
| 13. | 5-6 hrs. | Pea-shaped embryo – somites and myotomes appear |
| 14. | 8-10 hrs. | Comma-shaped embryo- optic vesicles appear, occasional twitching movement starts, gill rudiments and pectoral fin bud appear, heart appear |
| 15. | 14-15 hrs. | Advanced embryo – increase in the number of somites and myotomes, twitching movement quite rapid |
| 16. | 18-20 hrs. | Hatching – it takes place over a period of 2-3 hrs at 24-31°C |



From: Kimmel et al. Stages of embryonic development of the zebrafish
Dev. Dyn. 203:253-310, 1995