

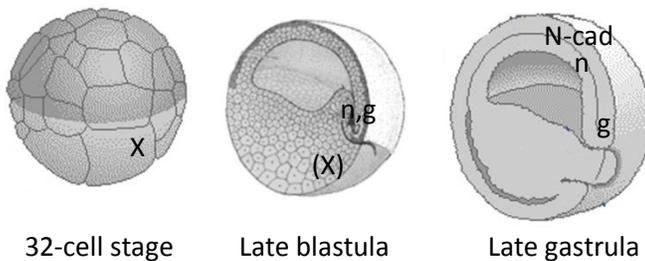
Biology 52 Exam III, April 5, 2006

1.
 - i) arrest (haploid)
 - ii) develop
 - iii) arrest (DNA methylation, histone modification, both of which affect gene expression)
 - iv) develop

c) Electric pulse fuses cell membranes together and activates oocyte (cell divisions begin)
 d) G0 cells have the correct DNA content (2N, 2C) and there is a delay into cell cycle entry

2. PLC-zeta cleaves PIP₂ (a phospholipid) into IP₃ and DAG. IP₃ promotes Ca⁺⁺ release from ER lumen which initiates the cortical reaction; the egg is then activated (cell divisions begin)

3. a)



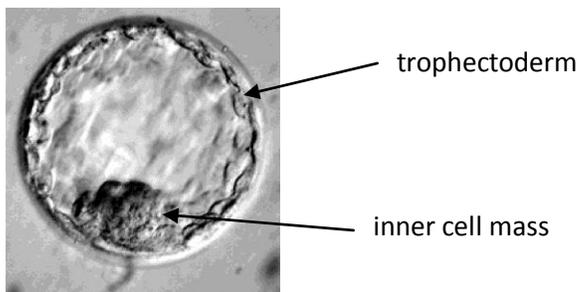
- b) i) secreted signal; ii) BMP-4 antagonist; iii) cell-cell attachment; iv) transcription factor
 - c) UV irradiation prevents cortical rotation; tadpole will not have dorsal axis
 - e) Xnr – inject early into dorsal vegetal cells; noggin & goosecoid – inject into dorsal mesoderm

4. a)



- b) Purify organizer cells by FACS (fluorescence activated cell sorting) or by dissection, isolate RNA, make labeled cDNA probe, hybridize to array, compare to control (non-organizer) tissue
 - c) Perform same experiment as in (b) but on organizer cells that have involuted a little later in development

- 5.

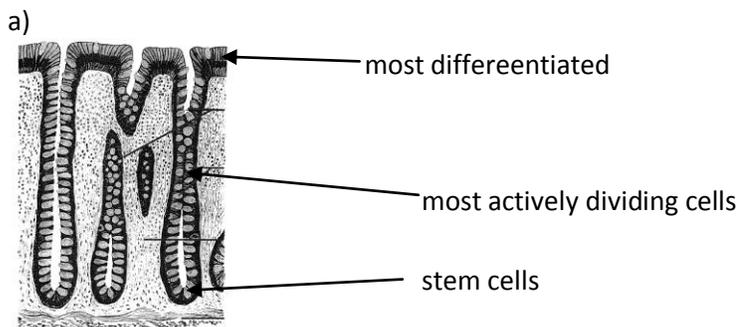


- b) i) trophectoderm; ii) ICM; iii) ICM
 - c) 8-cell stage (compaction); tight junctions form on the outside, gap junctions form on the inside
 - d) 3-cell stage, these cells divide later and express Cdx2

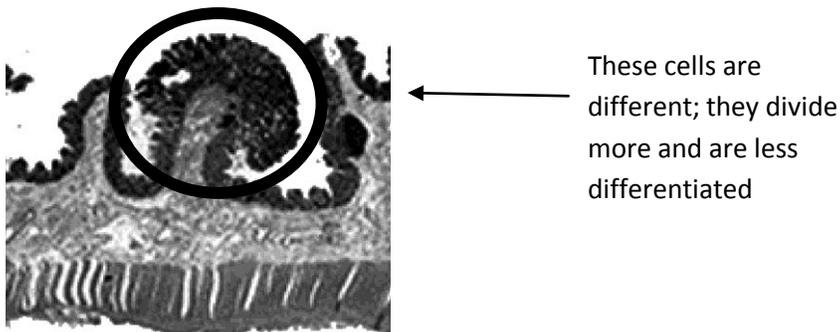
e) label the lagging cell and observe it becomes the trophectoderm; label the leading cell and observe it becomes the ICM; perform RNAi in the lagging cell and observe no trophectoderm forming; perform RNAi in the leading cell and observe the trophectoderm forms normally
 f) separate cells at 3-cell stage; if trophectoderm forms, the cells which gave rise to that tissue were determined

6. a) i) increased erythrocyte production; ii) no erythrocyte production; iii) increased erythrocyte production
 b) kidney
 c) erythrocyte precursors
 d) exercise, live at high altitude
 e) low $P[O_2]$ in your blood stimulates the kidney to make EPO

7.



- b) i) stem cells; ii) cells near rapidly dividing cells; iii) dividing cells; iv) (this question was discarded)
 c) decrease
 d) promotes β -catenin turnover (or inhibits β -catenin)
 e) 4
 f) They have to accumulate a mutation in the "good" (wild type) allele, these homozygous mutant cells have to proliferate, and accumulate more mutations causing genetic instability and metastasis
 g)



h) exposure to mutagens, divide more, and have the correct regulatory makeup to render them susceptible to cancer