

# The Synchronisation of Pluripotency Transitions with Morphogenesis during Mouse Peri-implantation Development

## PROPOSITIONS

1. Rosette pluripotency is a novel intermediate state during peri-implantation found in the rosette formed in the epiblast between naïve and primed pluripotency, which has distinct transcriptional and epigenetic properties (*this thesis*).
2. Rosette pluripotency can be captured *in vitro* via dual inhibition of the WNT and MEK pathways, so-called rosette-like stem cells, which maintain rosette pluripotency characteristics (*this thesis*).
3. WNT activation maintains naïve pluripotency in culture while preserving imprints, which suggests better developmental potential than traditional cultures (*this thesis*).
4. Rosette pluripotency allows polarization, and transition to primed pluripotency occurs concomitantly with lumenogenesis; these pluripotent and morphogenetic transitions are mediated by independent pathways (*this thesis*).
5. The key transcription factor that allows transition to rosette pluripotency is OTX2, which redundantly induces polarization pathways and, together with its function in enabling commitment to primed pluripotency, thereby promotes the coordinated progression of pluripotency and morphogenesis (*this thesis*).
6. “The origin and development of a new life is one of the greatest mysteries of biology, yet this is something that all of us have done” – Magdalena Zernicka-Goetz, *The Dance of Life*.
7. “[...] how an egg becomes an animal. Attention will be concentrated on early development because this is the time at which the important events are happening” – JMW Slack, *From Egg to Embryo: Determinative Events in Early Development*.
8. “Embryonic stem (ES) cells provide unparalleled information on early development. Like astronomers looking back to the Big Bang for fundamental insight about the Universe, biologists rake over the molecules inside these remarkable entities for clues as to how a single original cell turns into trillions, with a dizzying array of forms and functions” – Cyranoski, *Nature*.
9. “Even though stem cell research currently involves instrumental animal use, it has the potential to end certain types of animal testing, a result that animal advocates would welcome. Recall that stem cells have the potential to generate a perpetual supply of human cells of all types for disease modeling, drug discovery, and toxicology testing” – Deckha, *Stanford Journal of Animal Law & Policy*.
10. “All scientists, regardless of discipline, need to be prepared to confront the broadest consequences of our work—but we need to communicate its more detailed aspects as well” – Jennifer Doudna, *A Crack In Creation: Gene Editing and the Unthinkable Power to Control Evolution*.
11. “Que tot està per fer i tot és possible” – Miquel Martí i Pol.