

The magic of gastrulation: from cells to embryo, from molecules to models and back again

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Abstract

Lewis Wolpert suggested that gastrulation is a more important event in our lives than marriage, birth or death. It is during gastrulation that cells first organise themselves into layers and communicate with one another, they move around the embryo to generate form and the embryo starts to fix its initial body pattern. Most of what we know about this comes from experiments in frogs and fish, which gastrulate differently from amniotes (reptiles, birds and mammals). Furthermore, many fundamental questions remain unanswered, including: what mechanisms control embryo polarity and ensure that only a single axis forms (rather than twins)? Do cells acquire their distinct identity (fate) and then move to the correct locations, or do they move before becoming specified? In either case, where are the instructions that direct cell movements to their destinations? What makes amniotes different from frogs and fish at this stage of development? In this talk I will explore how we are approaching these questions using a combination of experimental embryology, molecular genetics, modern imaging technology and computer modelling to test whether how far our knowledge is sufficient to explain the phenomenology.