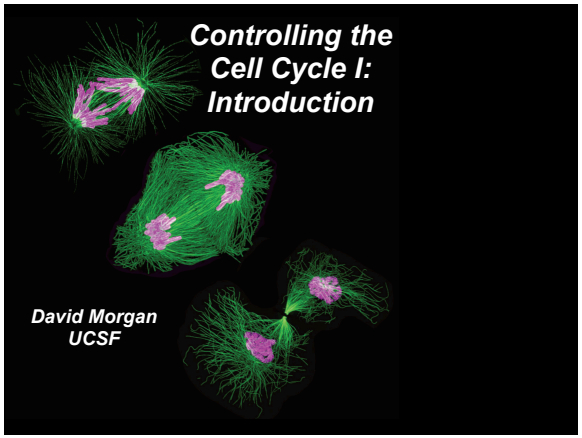
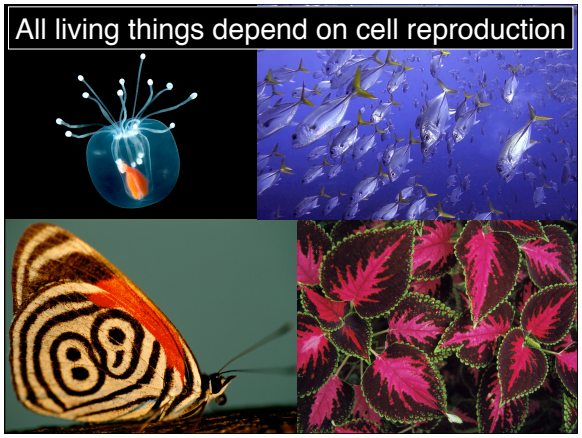
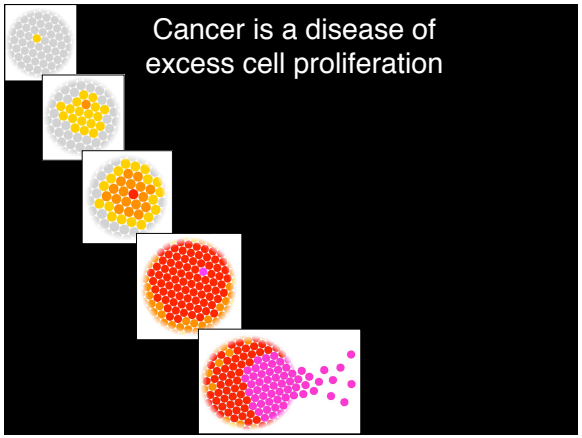
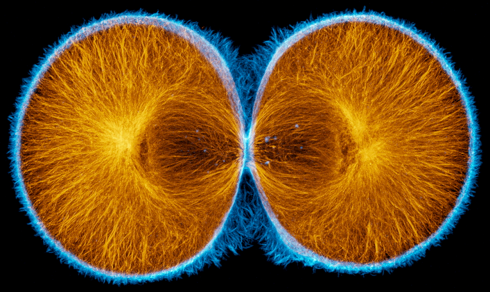

Controlling the
Cell Cycle I:
Introduction
David Morgan
UCSF


All living things depend on cell reproduction

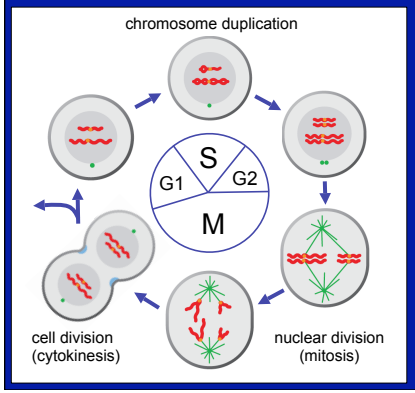

Cancer is a disease of
excess cell proliferation

Cells multiply by dividing

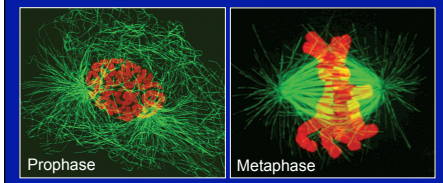


G. Von Dassow

The cell cycle



The stages of mitosis

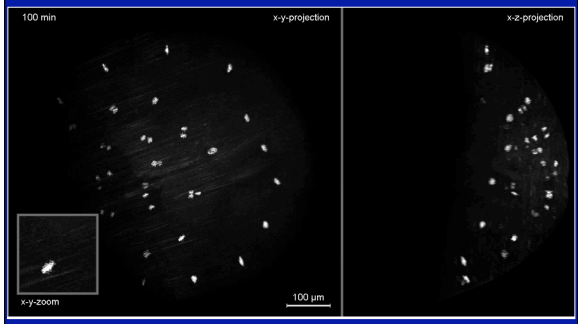


J. Canman & E.D. Salmon

The metaphase-anaphase transition

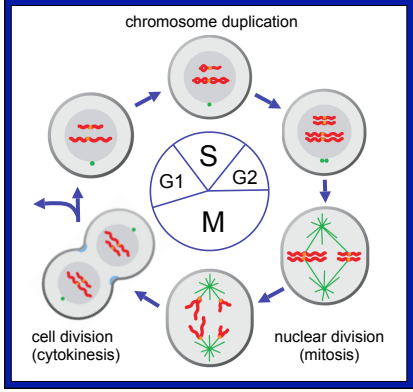
D. Cimini & E.D. Salmon

Cell division in the fish embryo

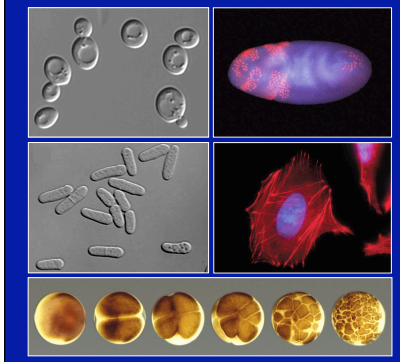


P.J. Keller et al. (2008) *Science* **322**:1065

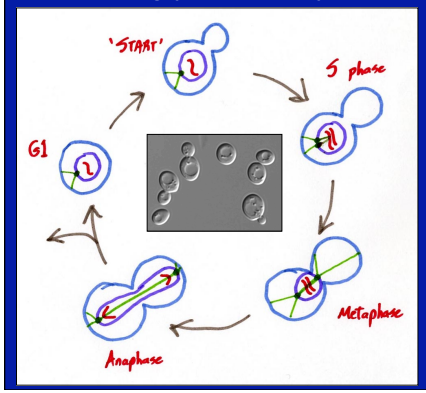
The problem: how is it controlled?



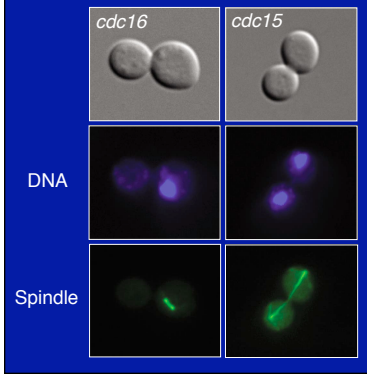
Cell-cycle model systems



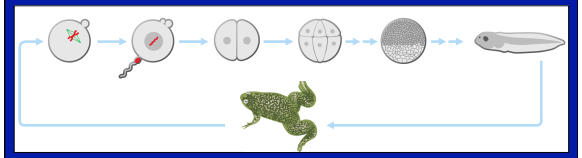
Budding yeast cell cycle

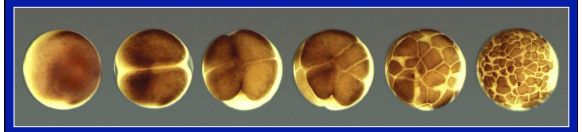


The power of *cell division cycle* mutants



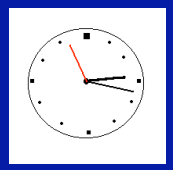
Xenopus laevis: early embryo

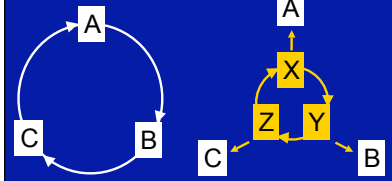




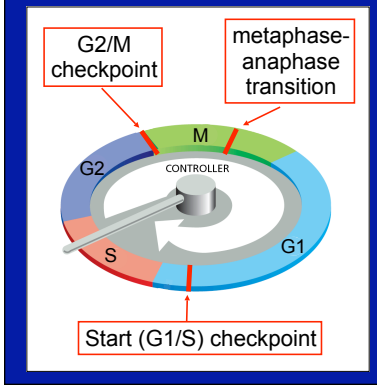
S M S M

Cell cycle control: dominoes or clocks?

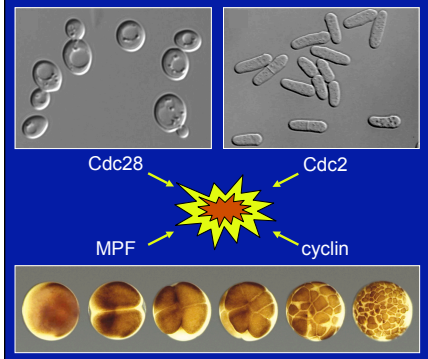




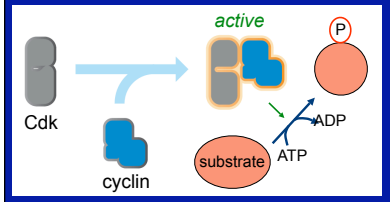
The cell-cycle control system



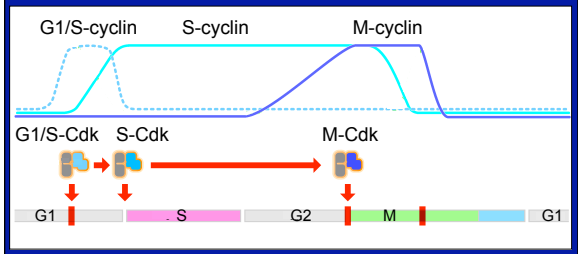
1988: When worlds collide



Heart of the cell-cycle control system: Cyclin-dependent kinases (Cdks)

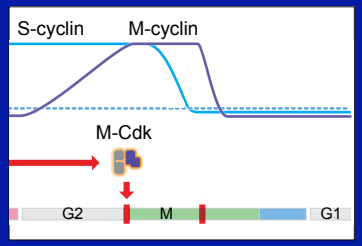


The cell cycle is governed by Cdks

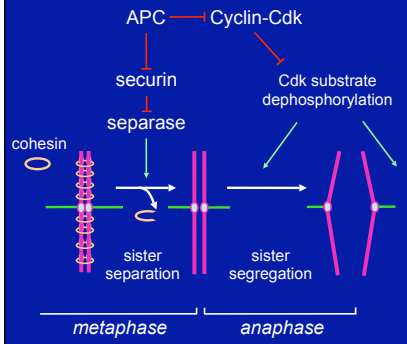
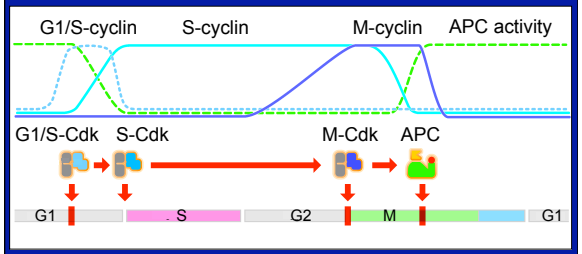


Morgan, D.O. *The Cell Cycle: Principles of Control*
London: New Science Press, 2007

The Anaphase-Promoting Complex triggers the metaphase-anaphase transition



How the APC promotes anaphase



The cell cycle control system