

# Segmentación o clivaje



(a) Cleavage

**Deuterostomes**  
(echinoderms, chordates)

**Eight-cell stage**



**Radial and indeterminate**

**Protostomes**  
(mollusks, annelids, arthropods)

**Eight-cell stage**



**Spiral and determinate**

Clivaje radial e indeterminado

Clivaje espiral y determinado



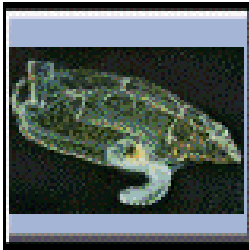
# Clivaje radial y espiral

**A**

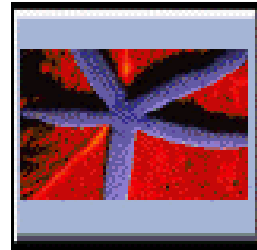
Indeterminate  
Radial  
Deuterostomatous  
Enterocoelous

Determinate  
Spiral  
Protostomatous  
Schizocoelous

Chordata



radial

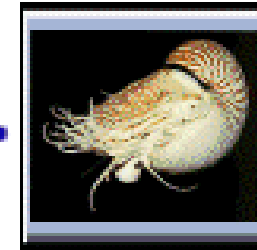


Echinodermata

Annelida

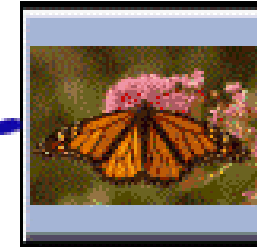


espiral

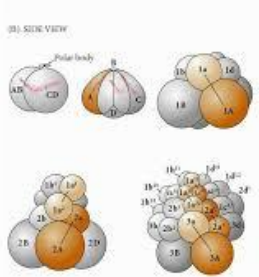


Mollusca

Arthropoda



# Destino de los primeros blastómeros

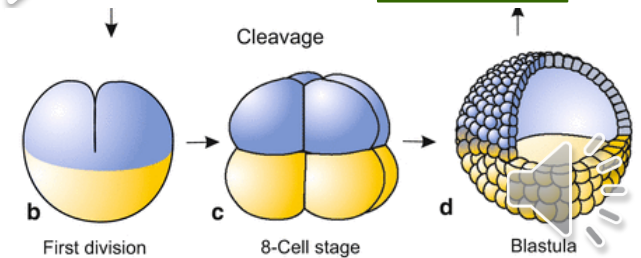


espiral

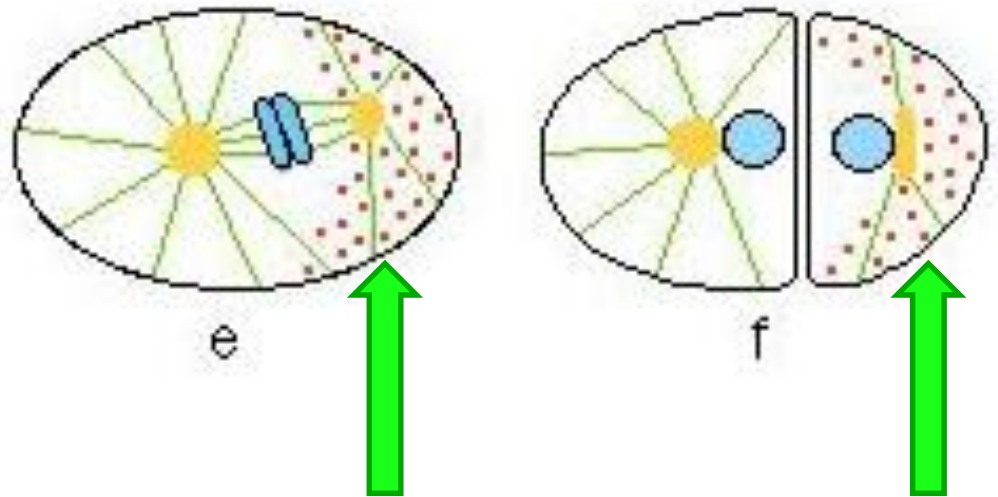
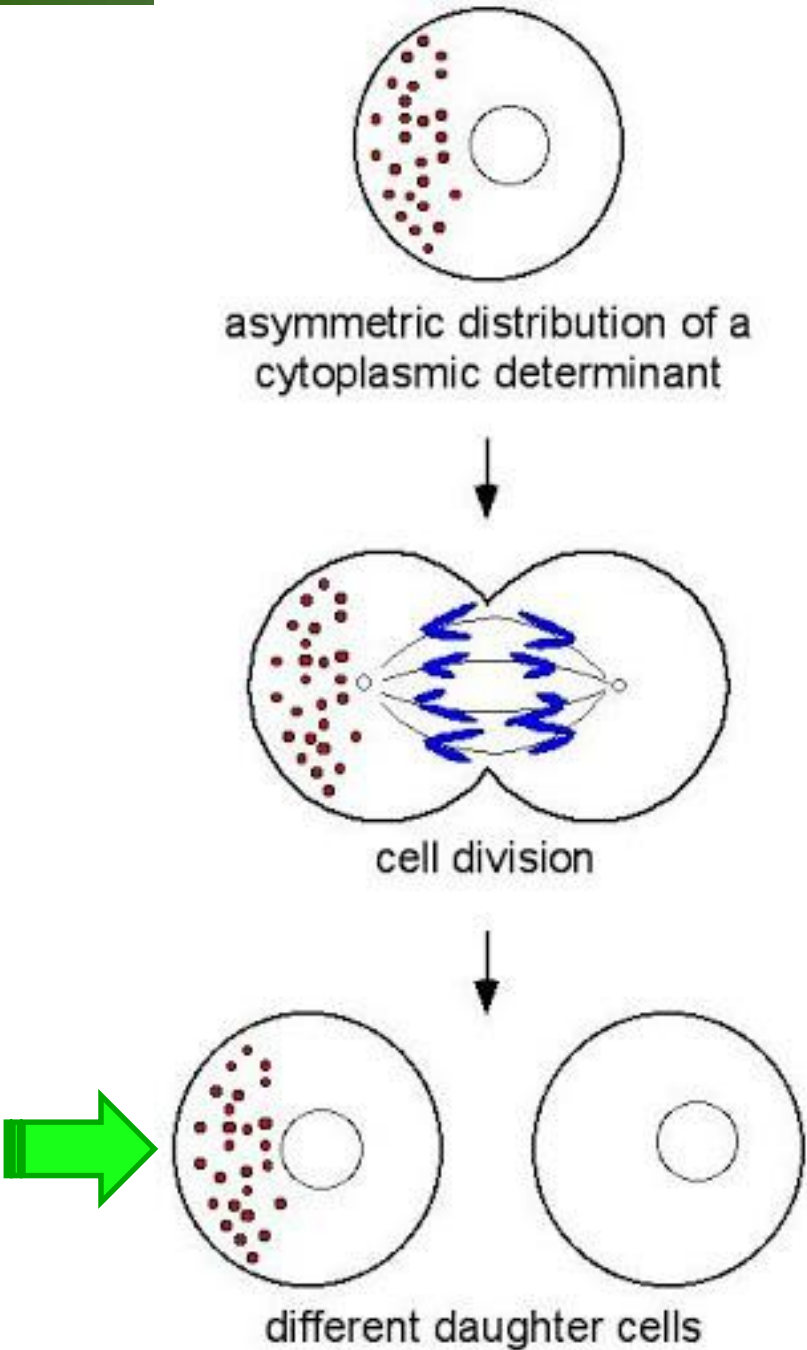
Determinados

Indeterminados

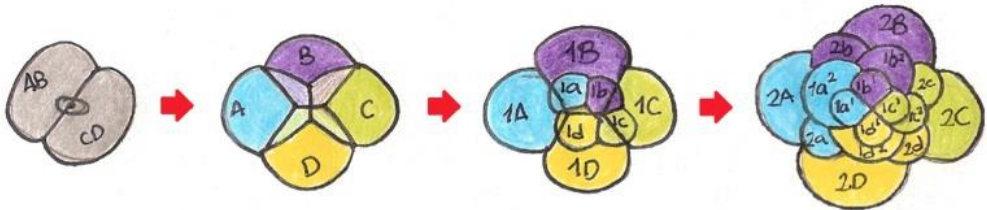
radial



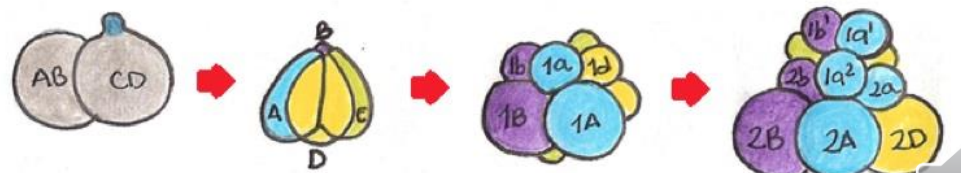
# Segmentación determinada



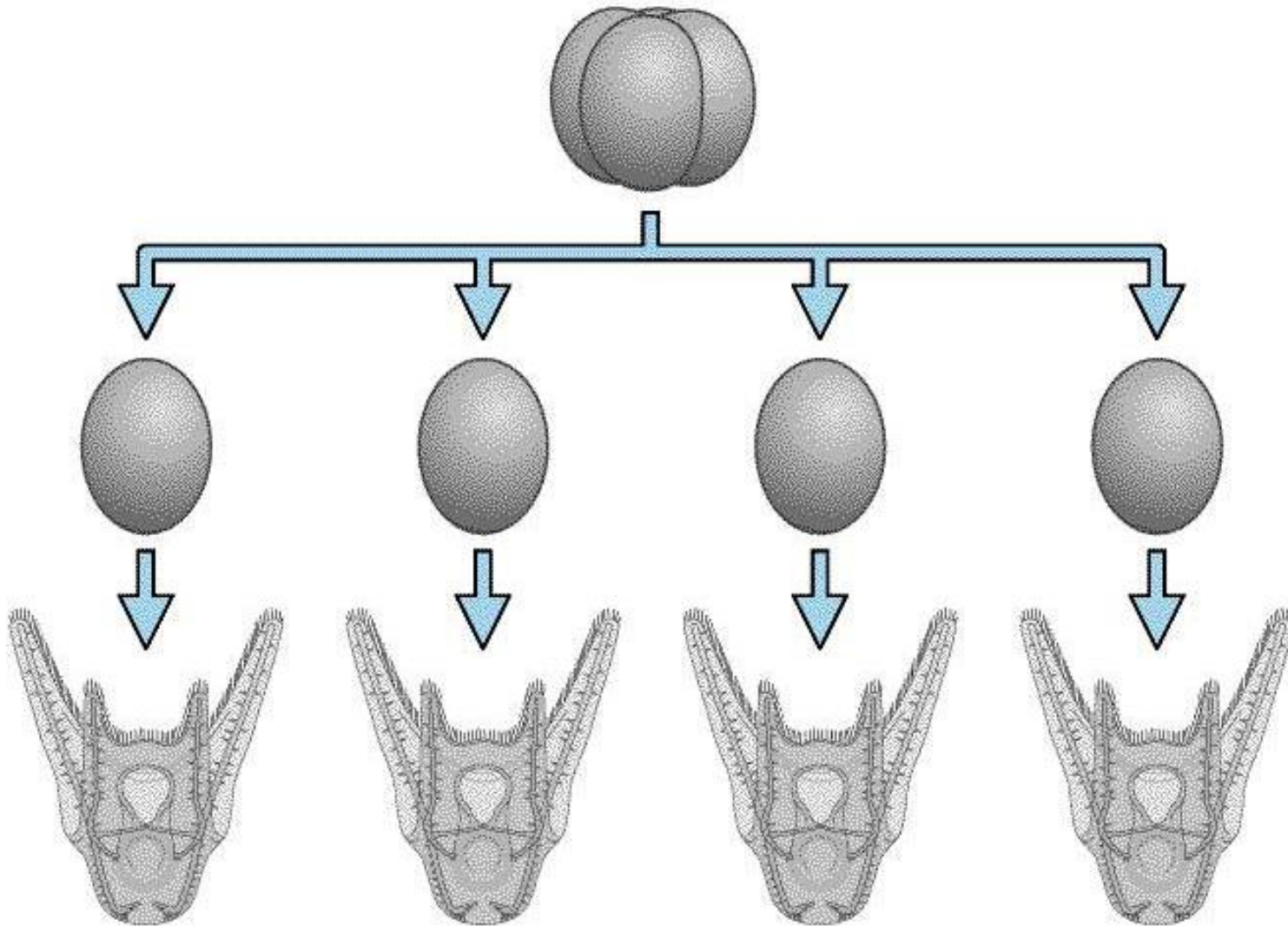
Vista desde el polo animal



Vista de lado



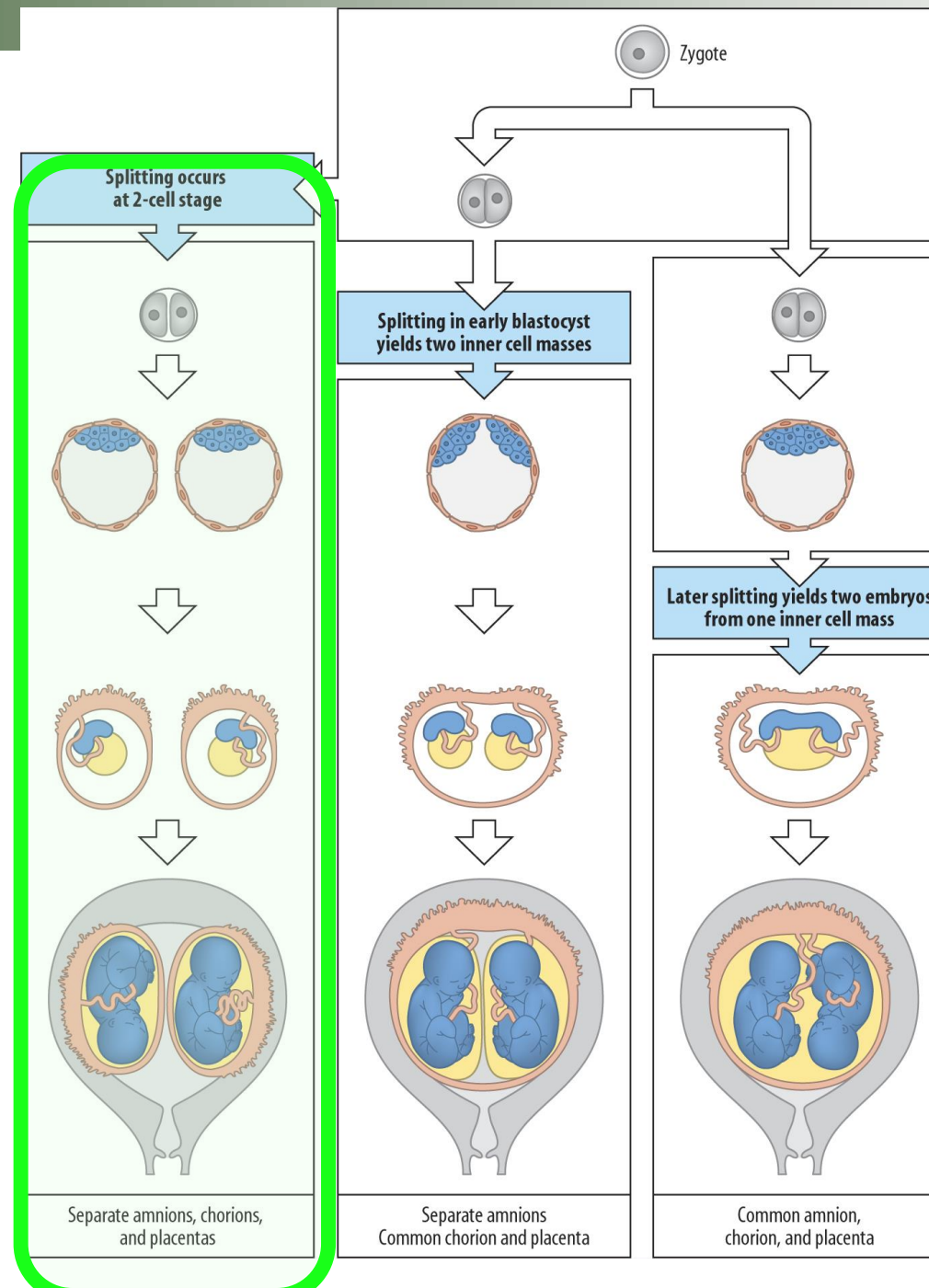
Isolation at four-cell stage gives four small larvae



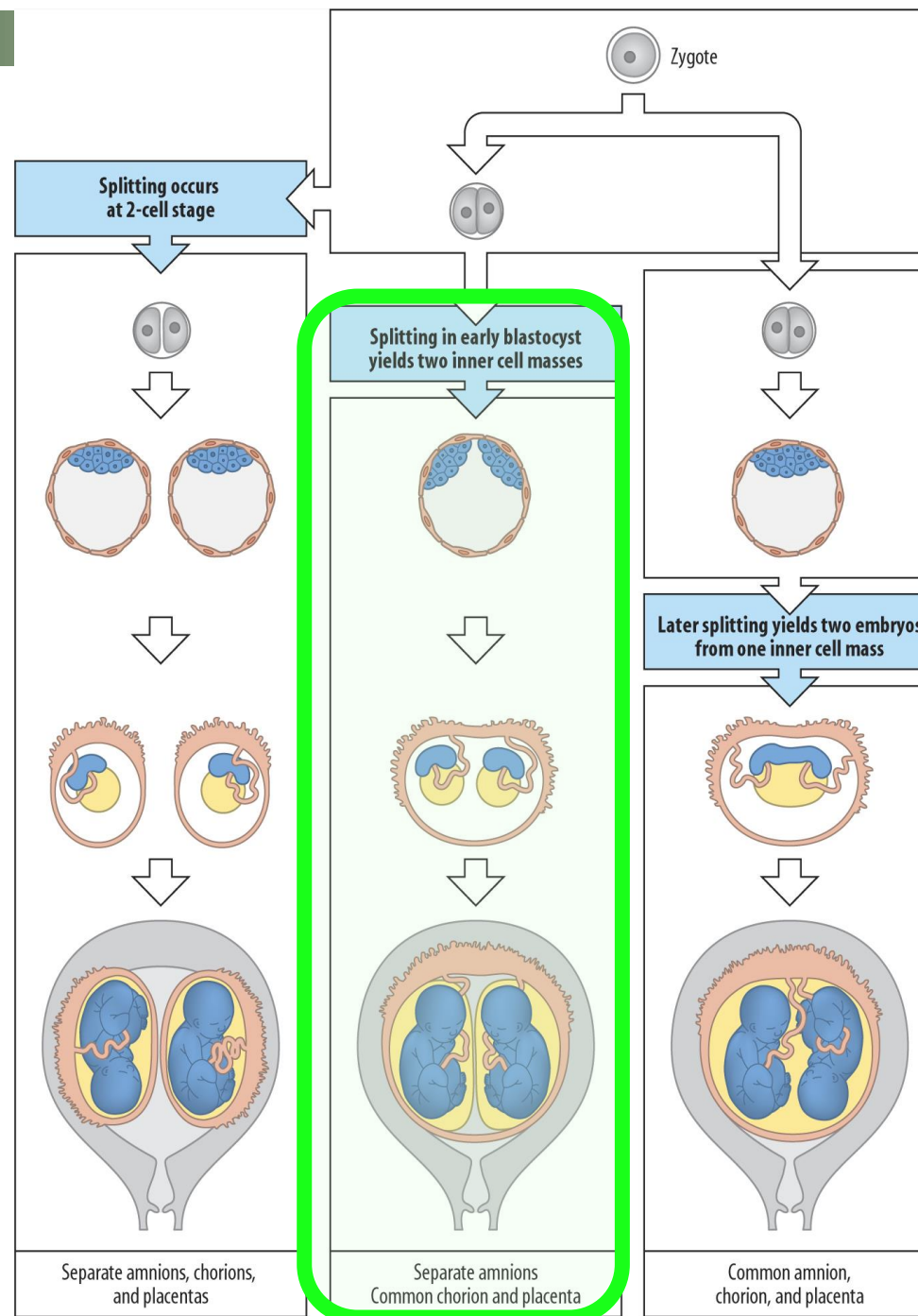
Clivaje indeterminado:  
cada una de las cuatro  
células iniciales puede  
producir un individuo  
completo.



# Segmentación indeterminada

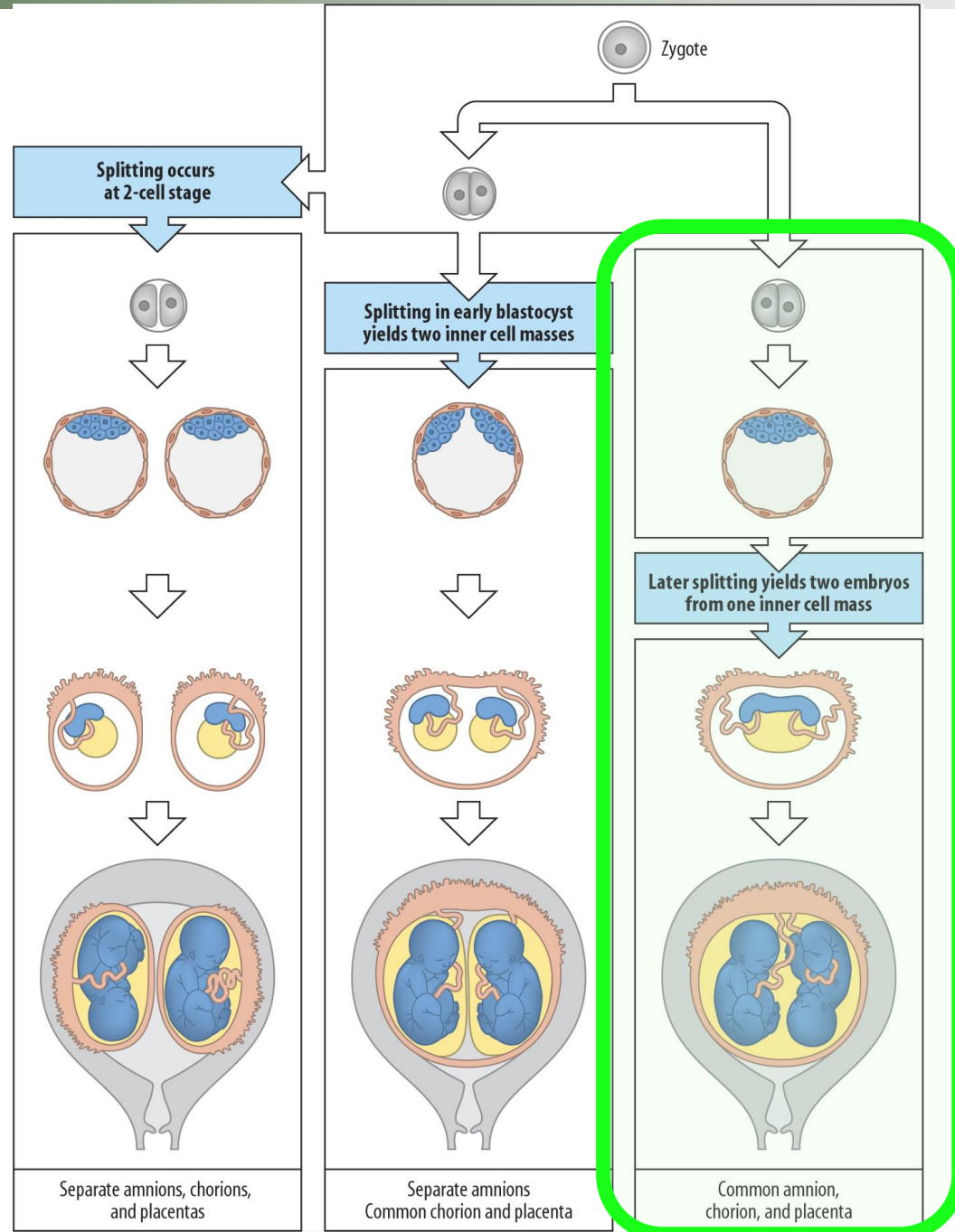


# Segmentación indeterminada



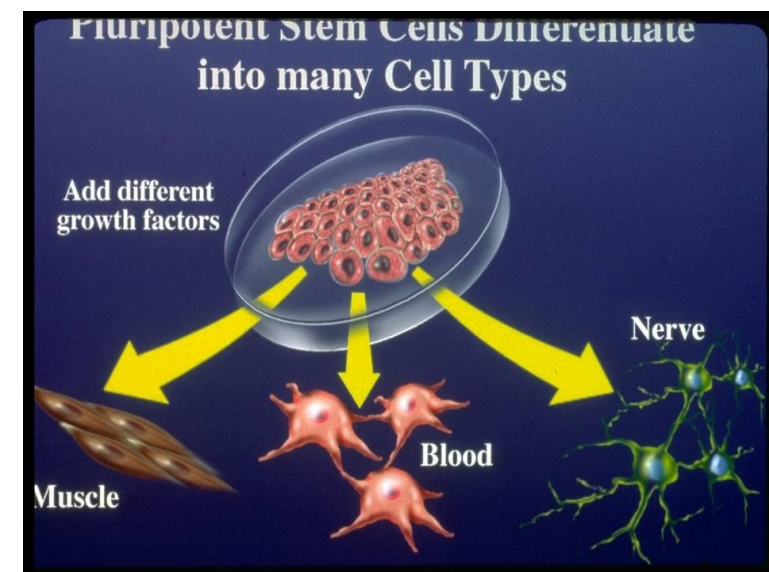
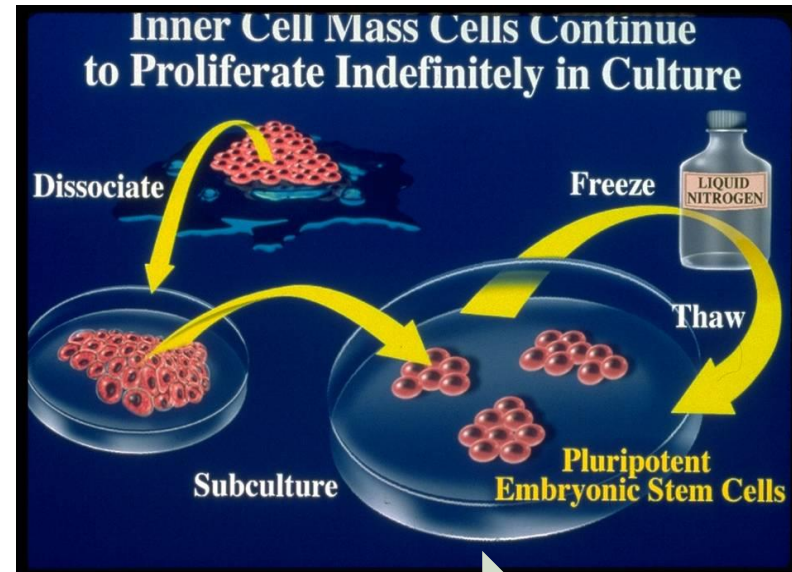
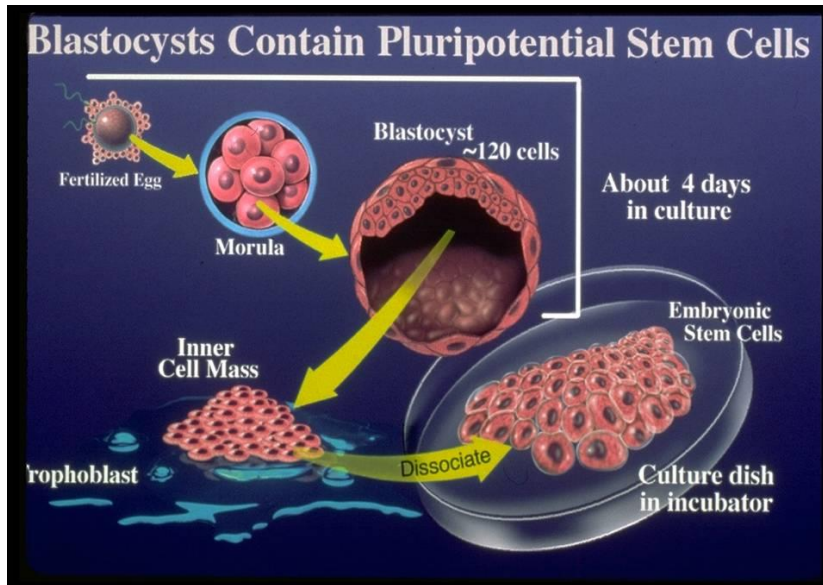


# Segmentación indeterminada



# Clonación terapéutica

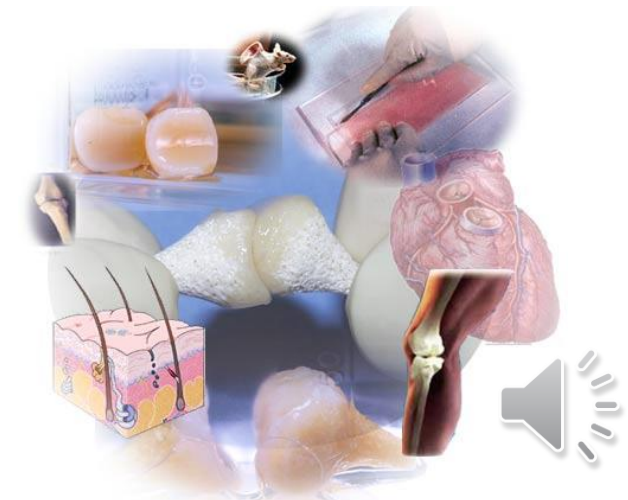
# Segmentación indeterminada



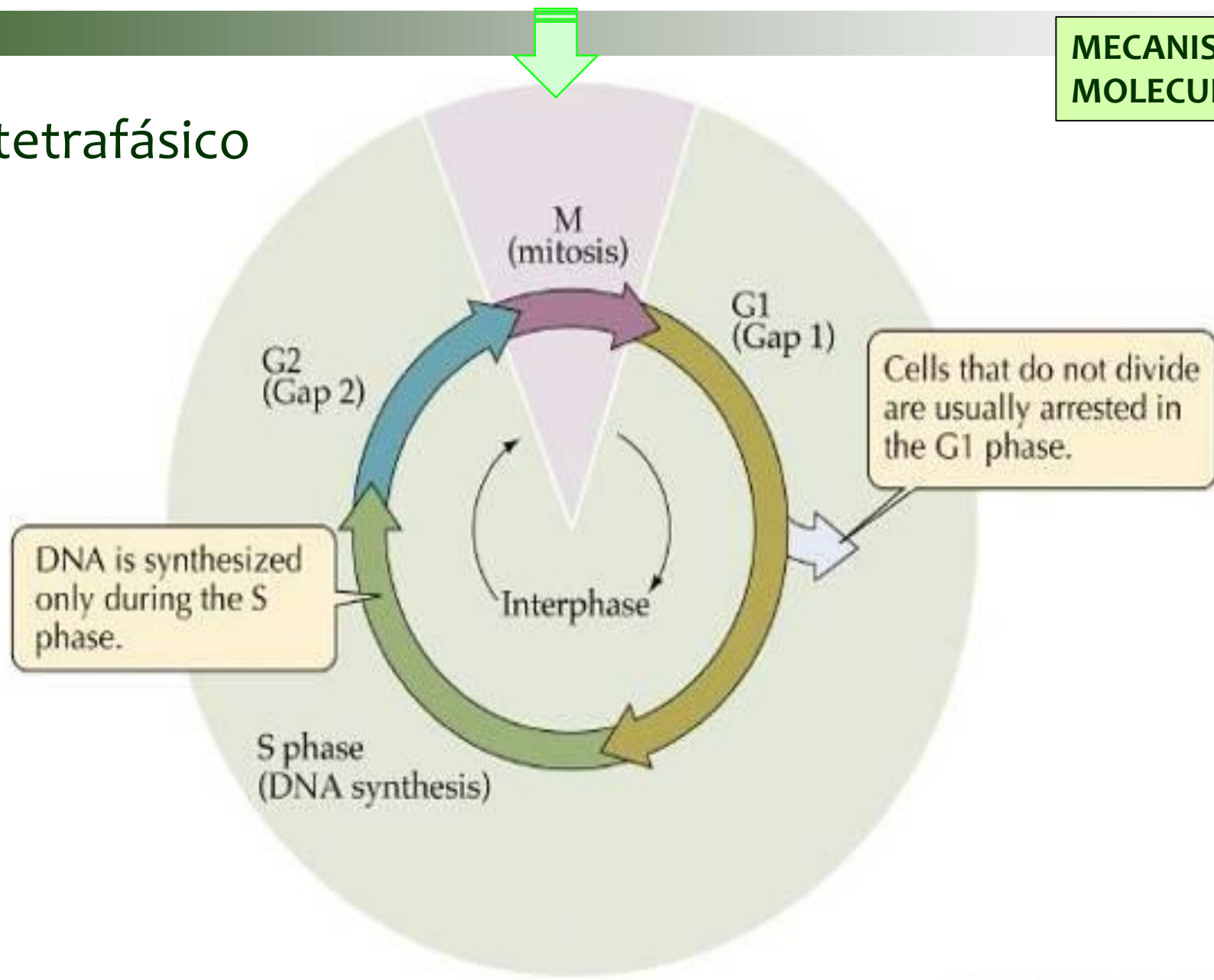
Extracción de células  
del botón embrionario

Cultivo de células del  
botón embrionario

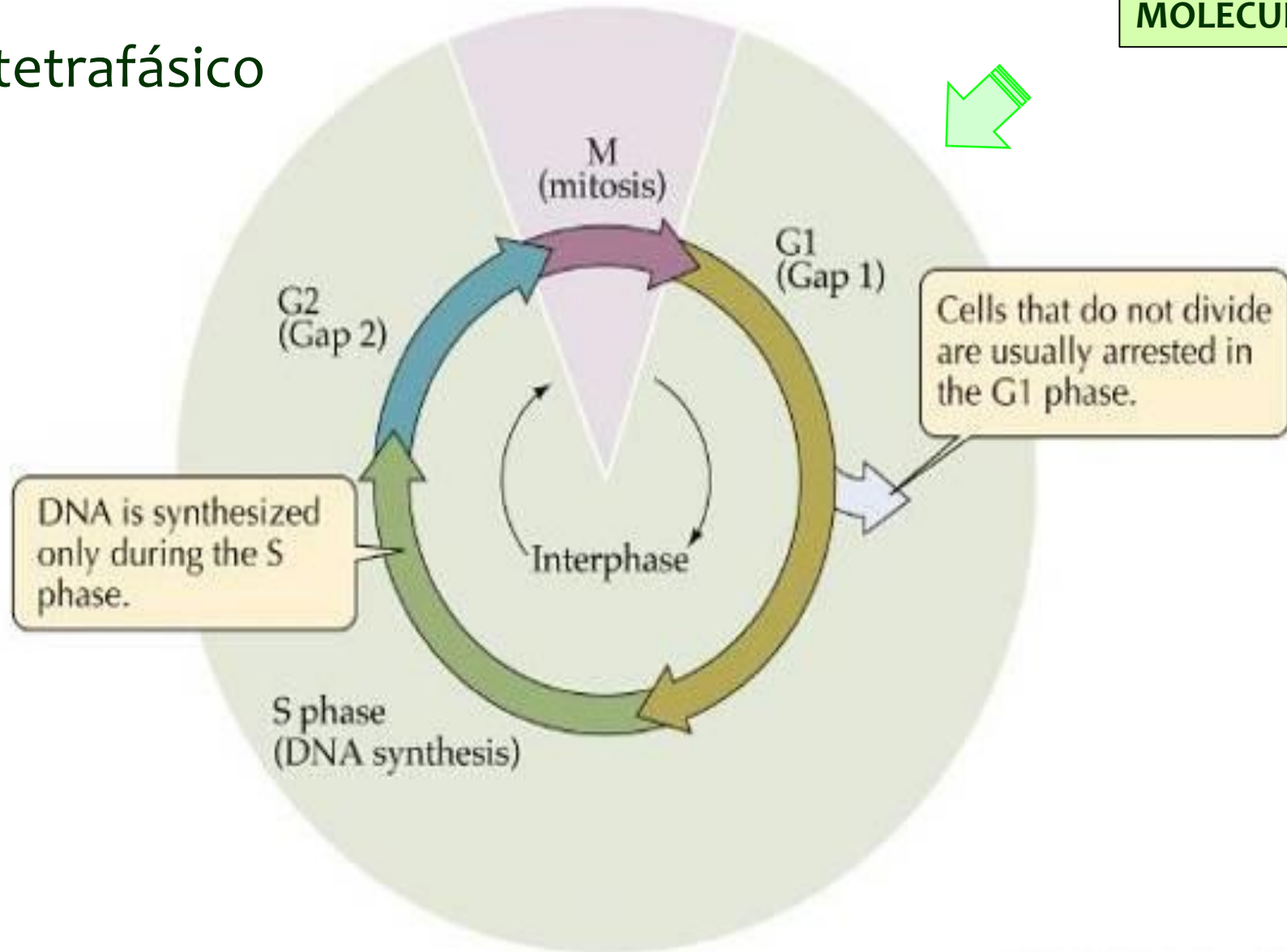
Empleo de factores de  
crecimiento para  
obtener células y tejidos



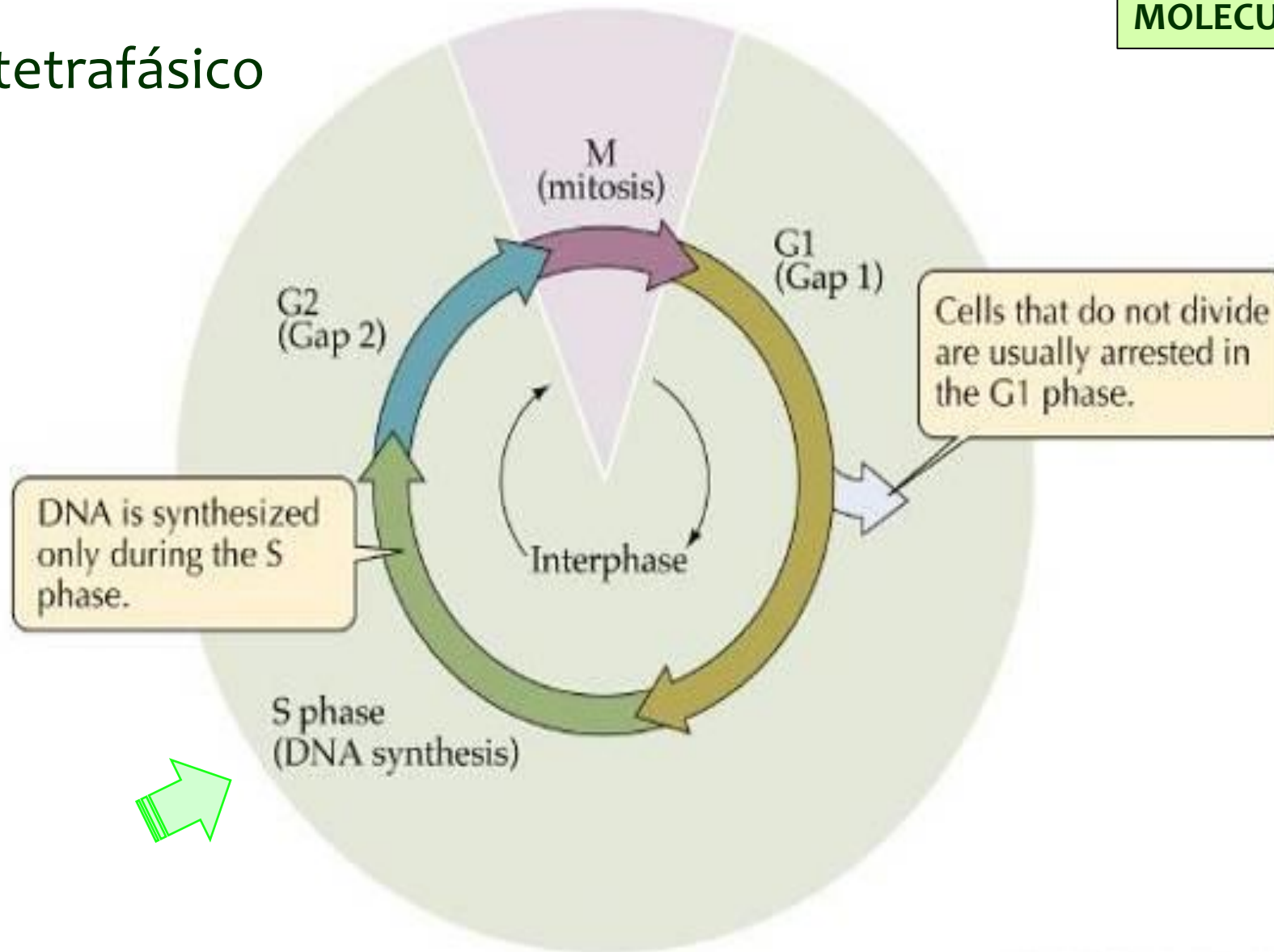
# Ciclo celular tetrafásico



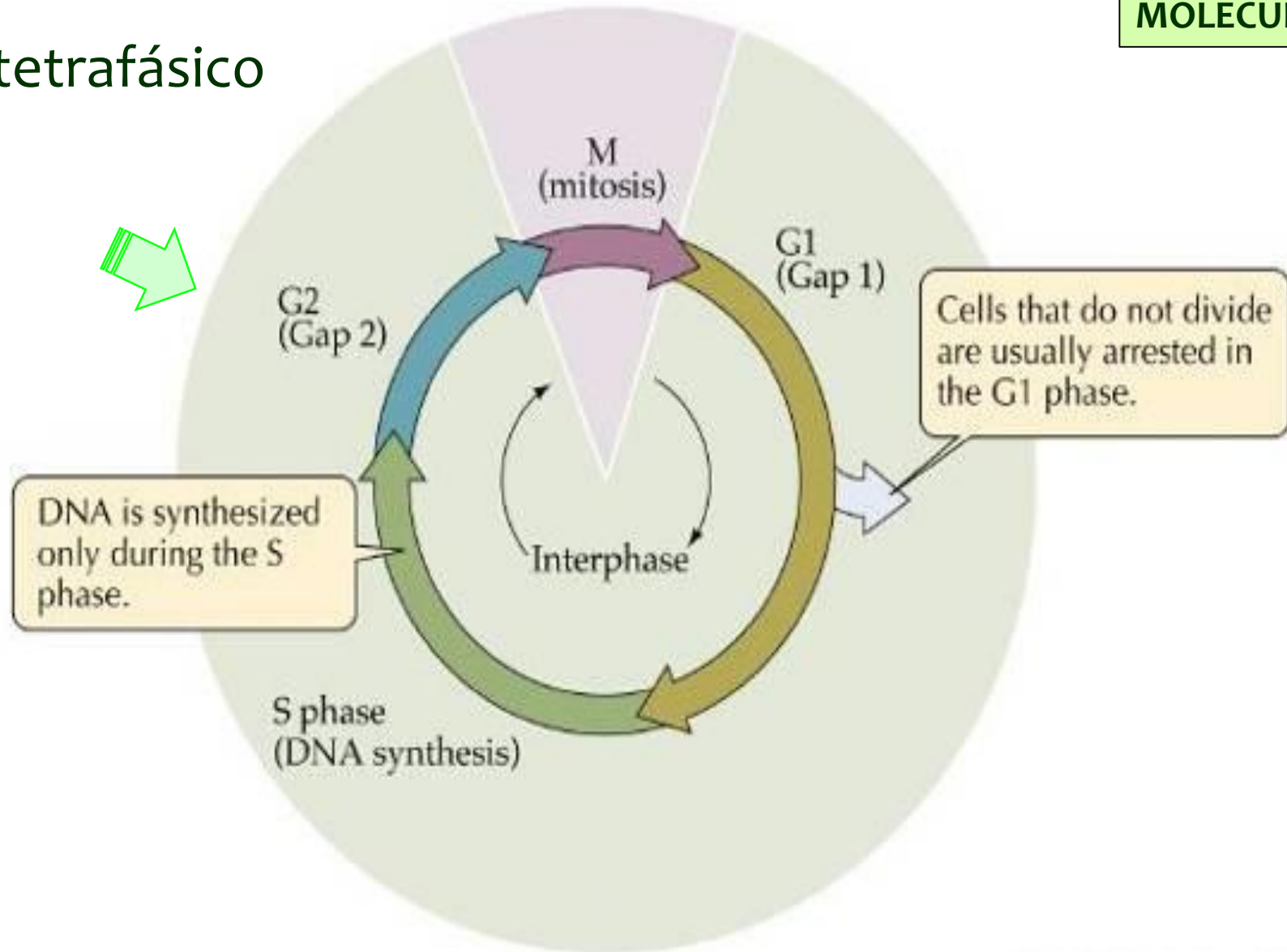
# Ciclo celular tetrafásico



# Ciclo celular tetrafásico



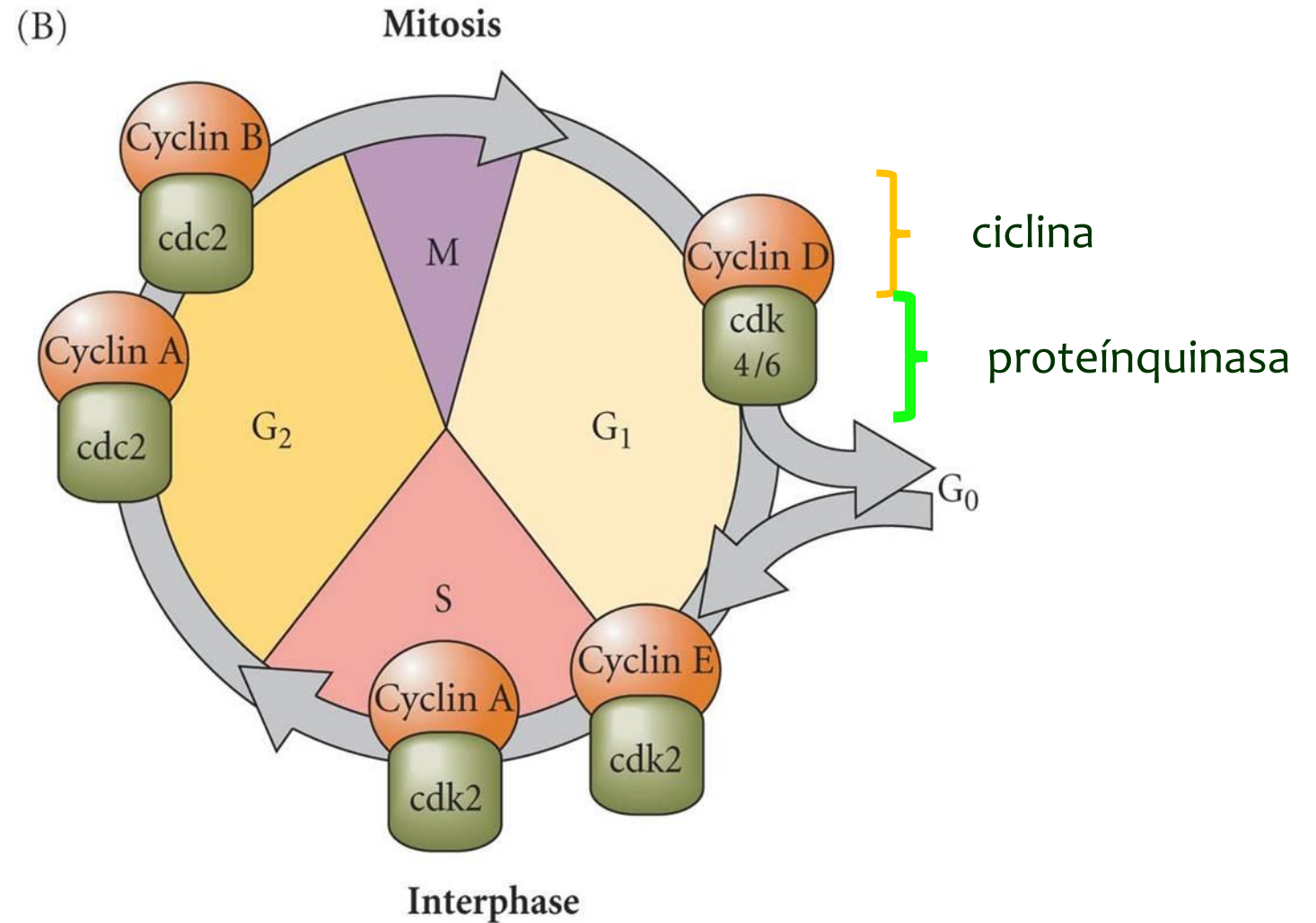
# Ciclo celular tetrafásico



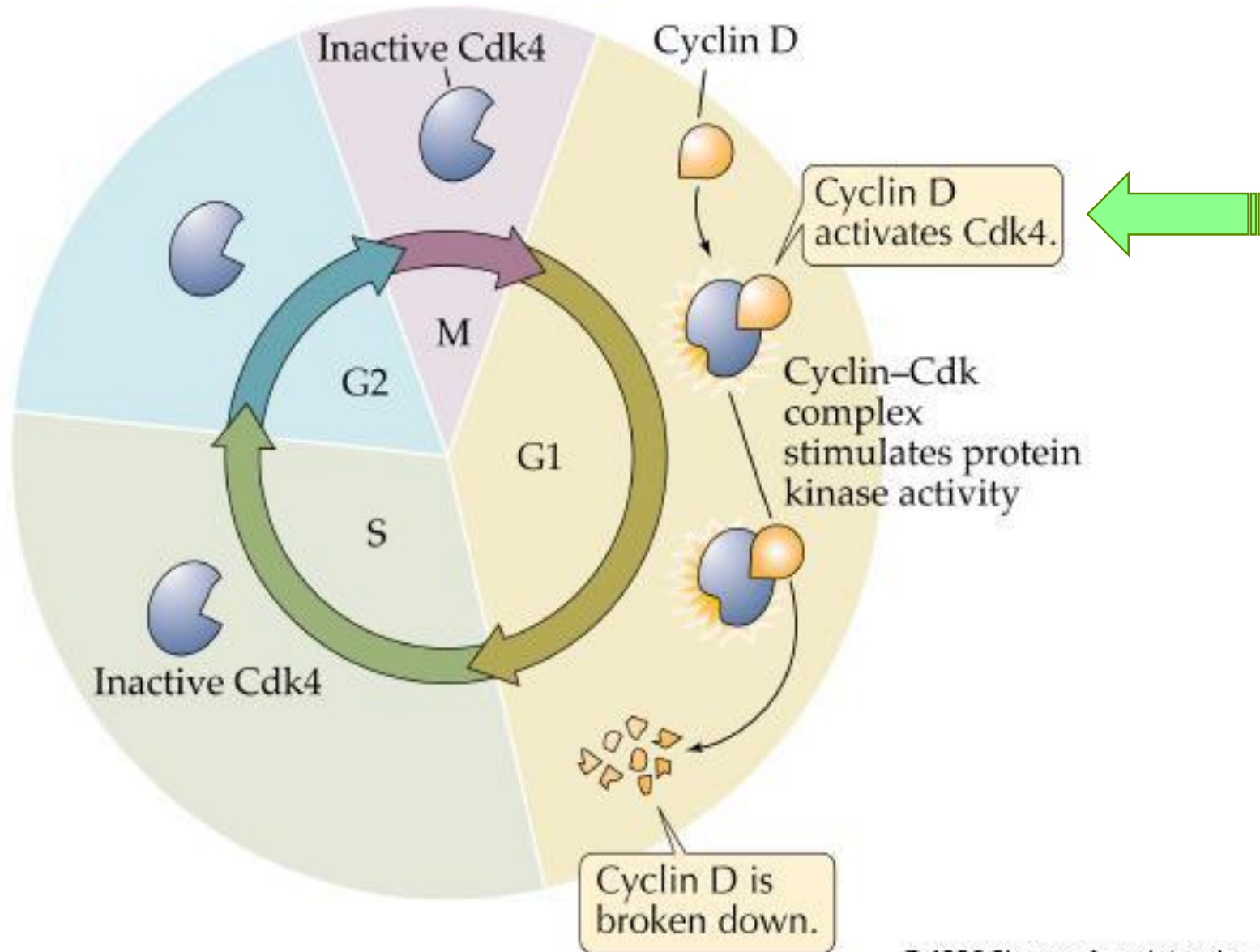
# Ciclo celular tetrafásico

Ciclo celular de una célula somática típica.

Las ciclinas responsables de cada una de las cuatro fases de la división celular y sus kinasas correspondientes

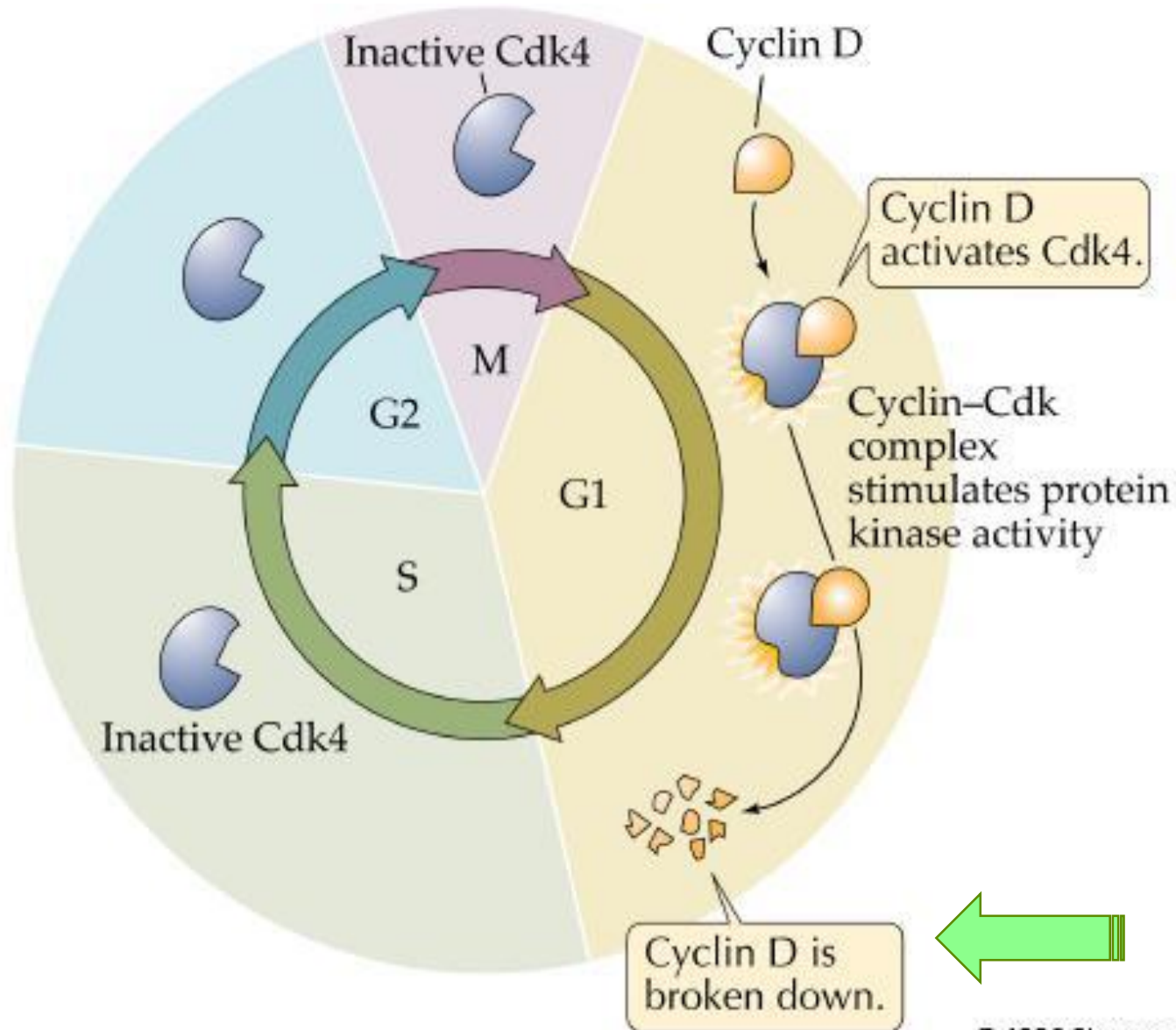


# Ciclo celular tetrafásico

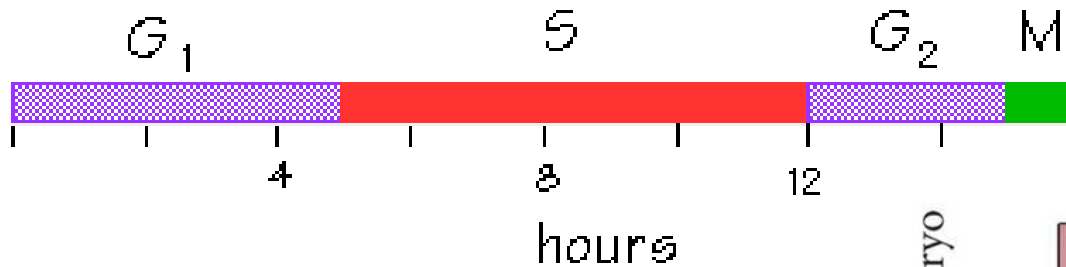




# Ciclo celular tetrafásico

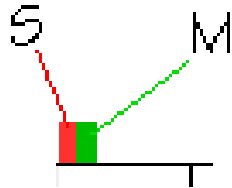


Somatic cycle

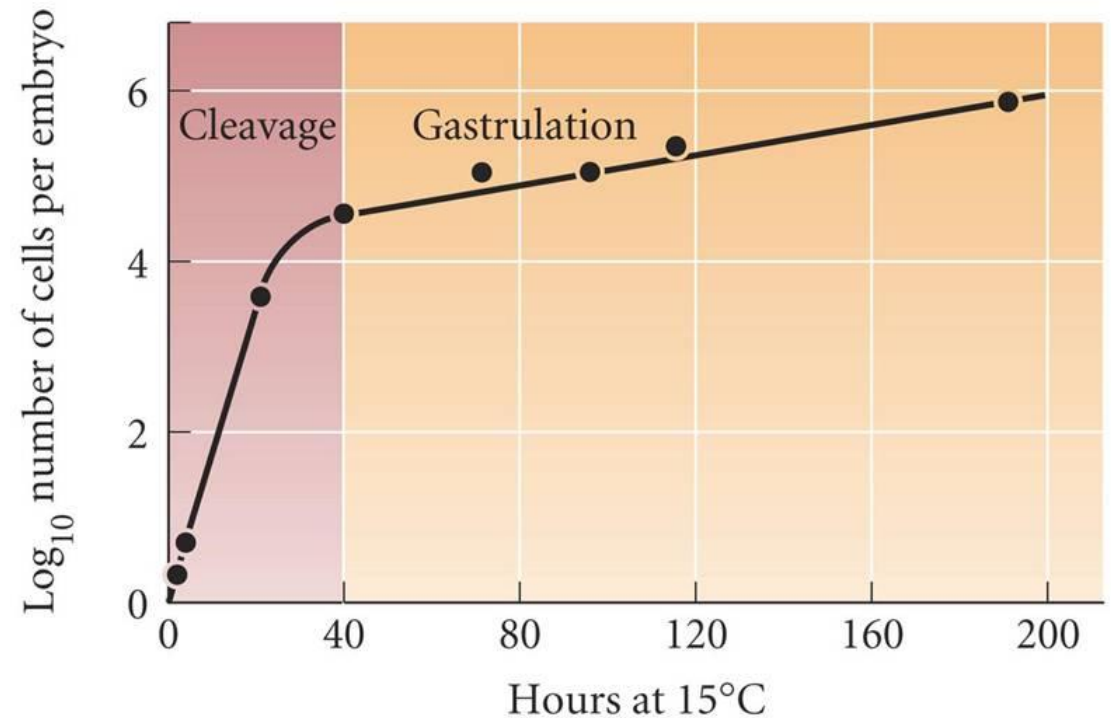


Ciclo celular tetrafásico

Cleavage cycle (30 min)



Ciclo celular bifásico



DEVELOPMENTAL BIOLOGY, Seventh Edition, Figure 8.1 Sinauer Associates, Inc. © 2003 All rights reserved.



El incremento en el número celular es máximo durante la segmentación

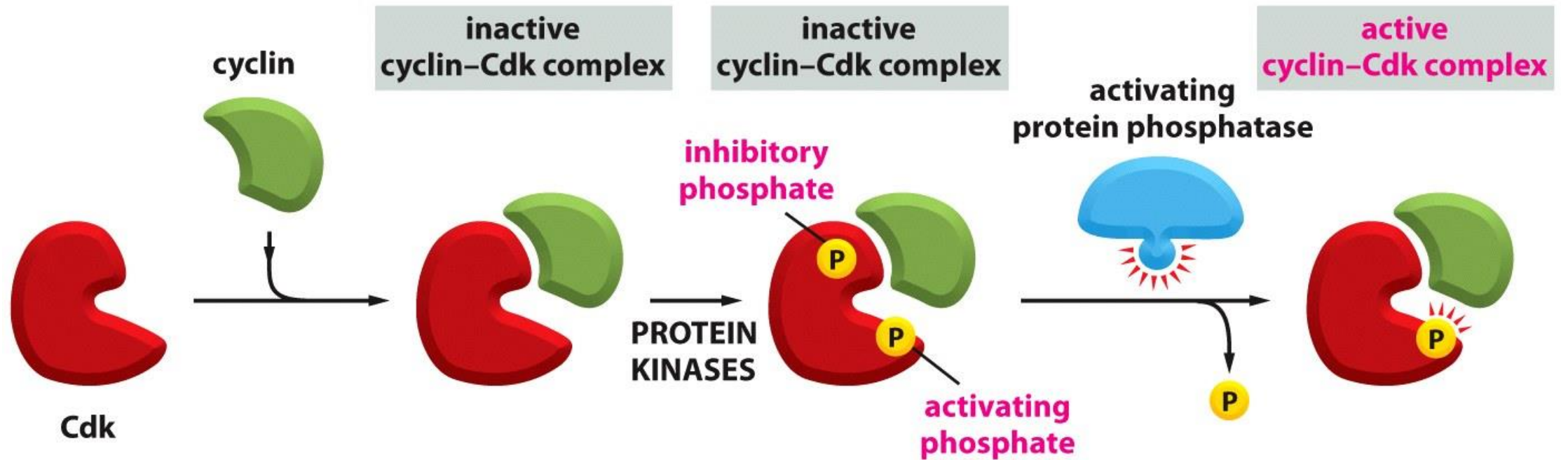
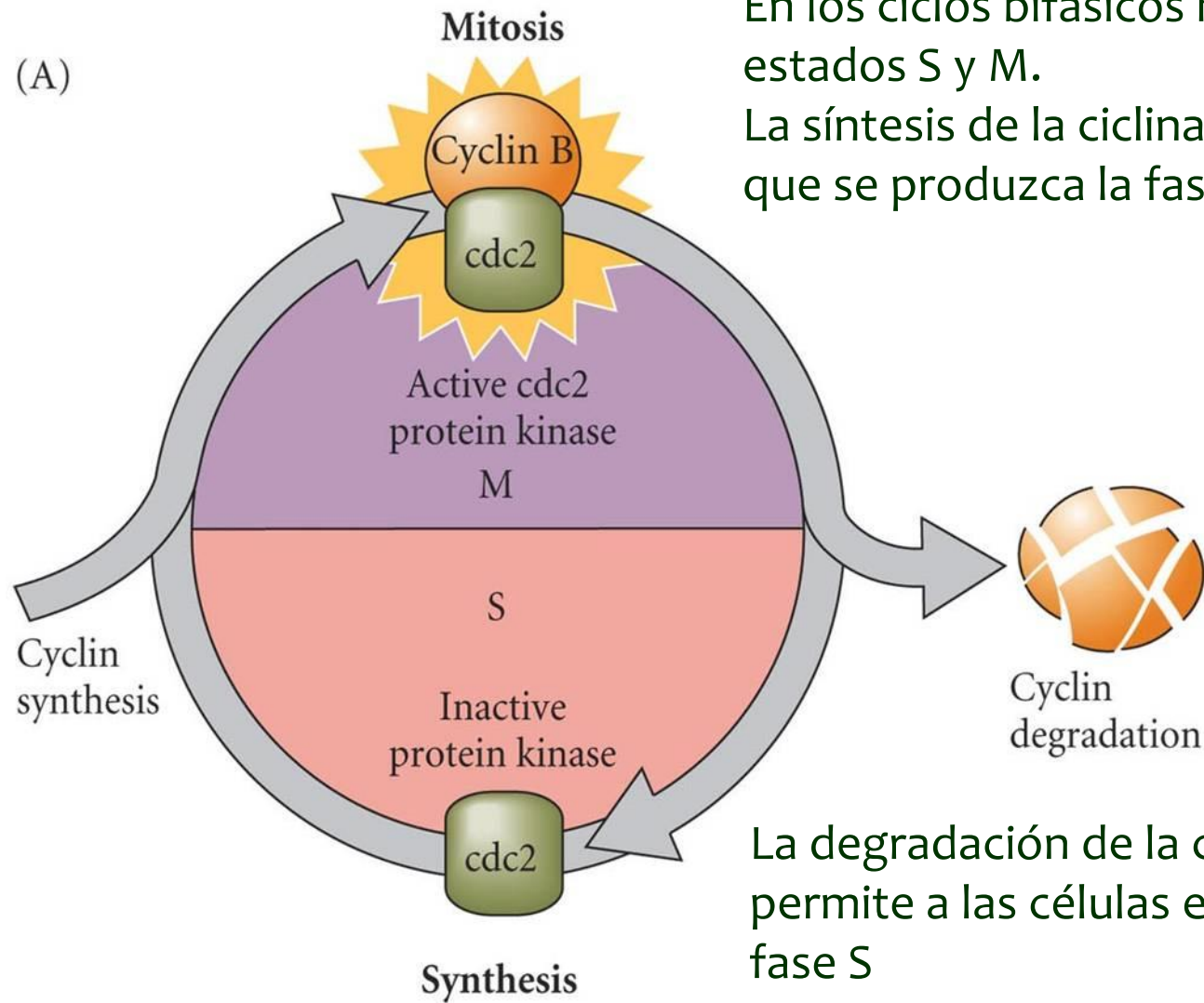


Figure 18-9 Essential Cell Biology 3/e (© Garland Science 2010)

**MPF (Maturation Promoting Factor / Mitosis Promoting Factor)**

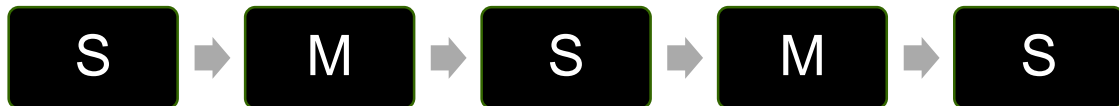


# Ciclo celular bifásico



En los ciclos bifásicos hay solo dos estados S y M.  
La síntesis de la ciclina B permite que se produzca la fase M (mitosis)

La degradación de la ciclina B permite a las células entrar a la fase S



## Histona H1

- Condensación de la cromatina

## Laminina

- Disolución de la envoltura nuclear

## RNA polimerasa

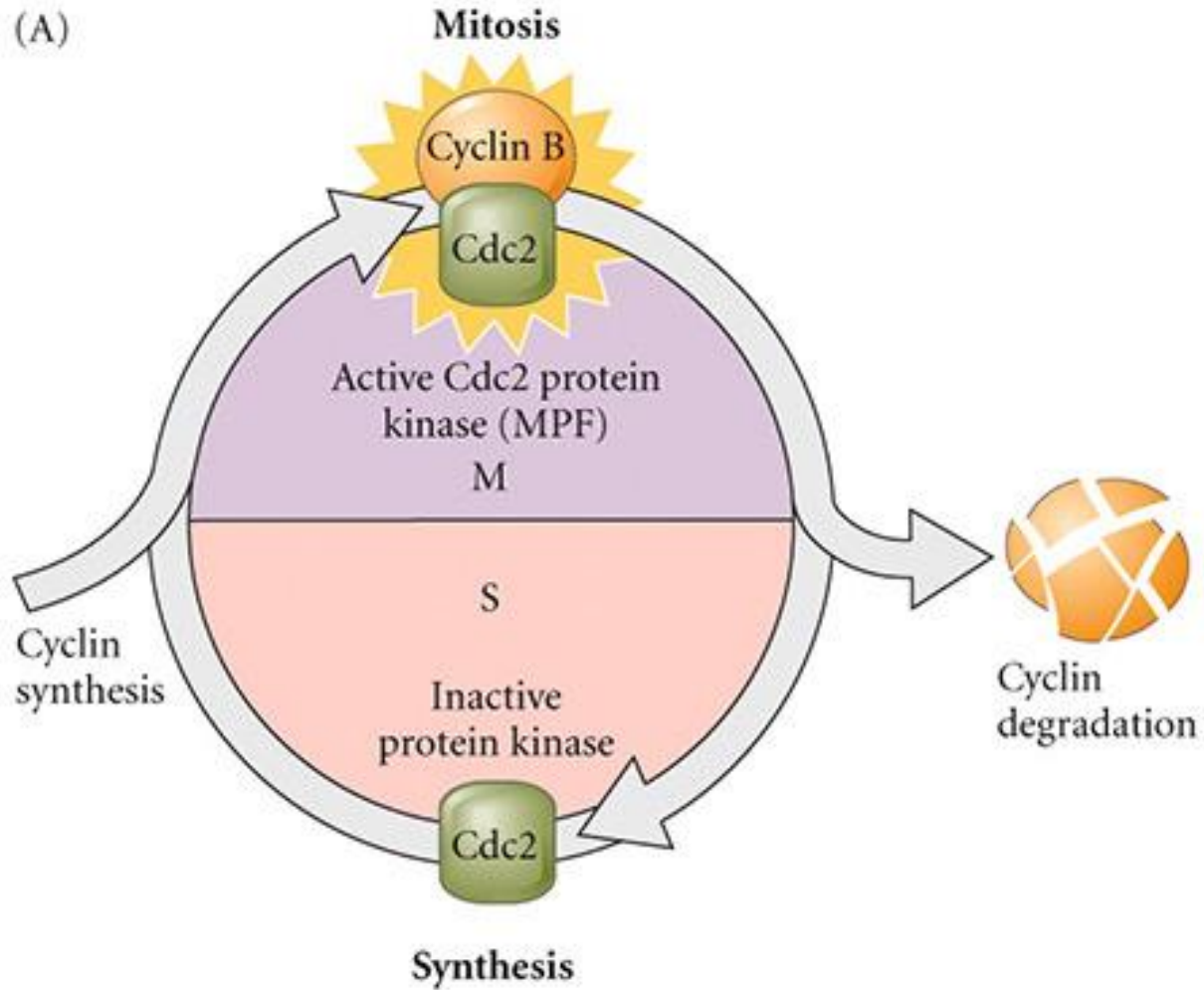
- Inhibición de la transcripción

## Miosina

- Control de la formación del anillo contráctil en la citoquinesis

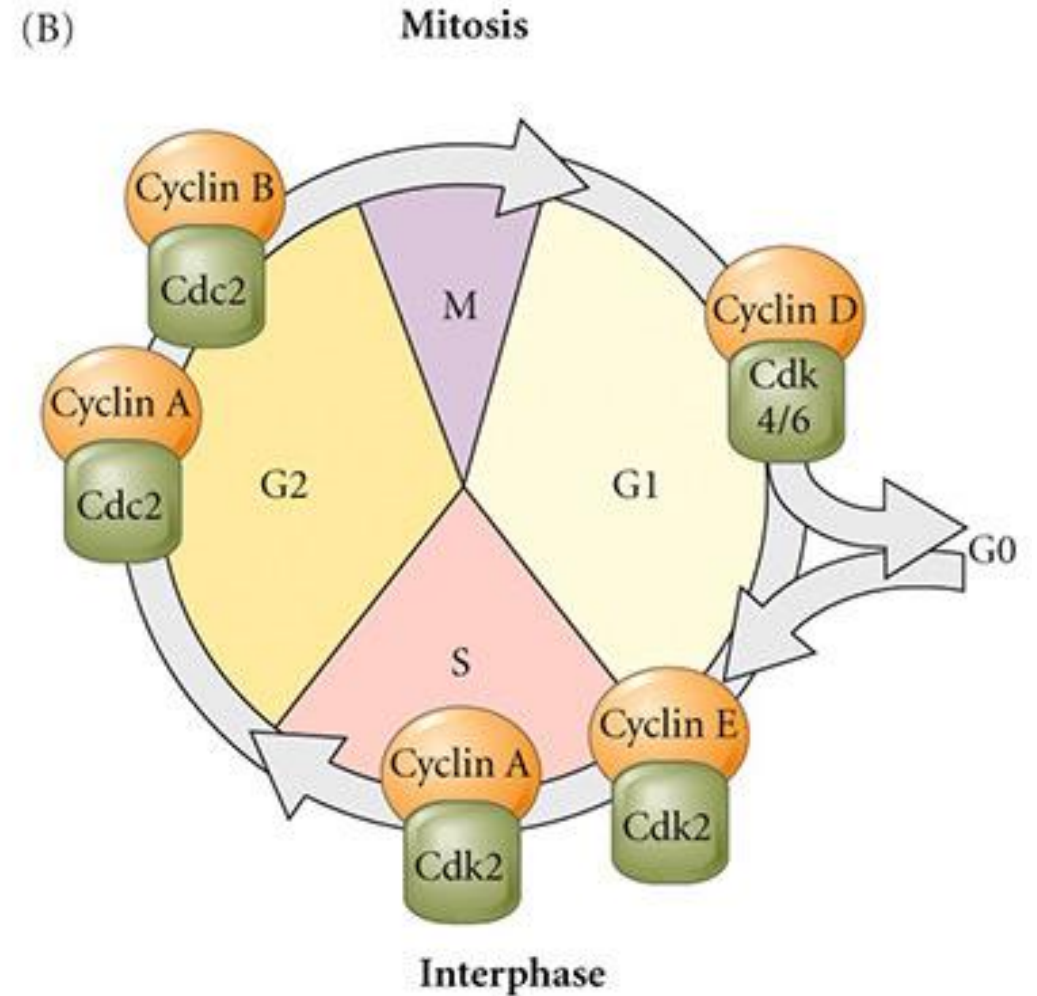


## Ciclo bifásico



Inicio de la segmentación

## Ciclo tetrafásico



blástula en adelante



**La bioquímica reguladora durante el clivaje es similar en todos los filos animales**

**La bioquímica de la división mitótica es similar en todos los eucariontes**



