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Aula 2: Origem da reprodução sexuada

Reprodução assexuada

- genótipo dos descendentes é cópia exata do “indivíduo original”
- Propagação vegetativa -
novo indivíduo formado a partir de células do corpo
- Partenogênese
reprodução via ovo sem a fecundação



Reprodução sexuada

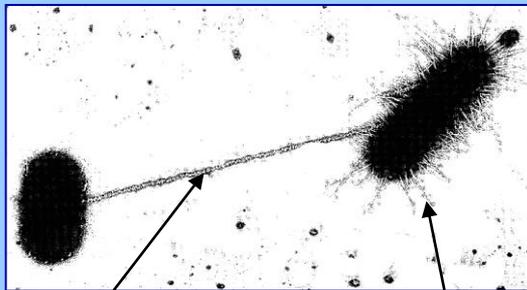
“Through the centuries, sex has had a variety of meanings in biological literature. For example, in two edited books on the evolution of sex, no two chapters or authors had exactly the same definition. In this paper, I follow the usage by Margulis and Sagan (1986) and define:

- sex in the broadest sense to include any natural process that combines genes from more than a single source in an individual cell.
- This definition of sex thus includes any horizontal transmission of genetic materials in natural environments and includes:
 - conventional sex in eukaryotes that involves cell fusion and meiosis;
 - genetic exchange among viral particles;
 - prokaryotic sex such as transformation, transduction, and conjugation.
- To avoid confusion, recombination is defined as breakage and reunion of genetic materials in genomes (DNA or RNA) and includes both crossing-over and independent assortment.
- Reproduction refers to processes that replace or increase the number of cells or organisms in populations.”

EVOLUÇÃO DOS SISTEMAS REPRODUTIVOS

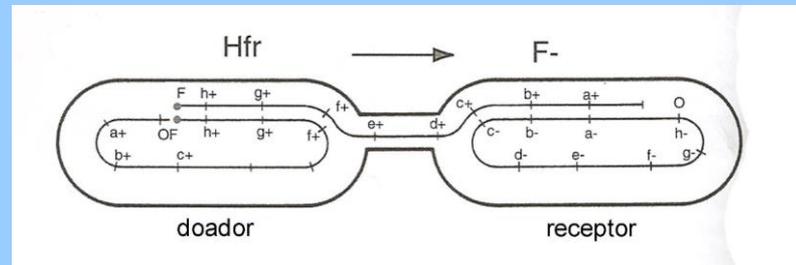
Mecanismo sexual nos procariotos: recombinação entre moléculas DNA ou RNA
“Pressupõe encontro de moléculas de indivíduos distintos”

- Transdução: inserção de DNA por vetores (ex. vírus, fagos)
- Transformação: inserção de DNA exógeno (ambiente)
- Conjugação: transferência de cromossomo célula-célula (ex. plasmídeo)



Pilli sexual

fimbria



Gilbert S, Developmental Biology, 7th Edition

EVOLUÇÃO DOS SISTEMAS REPRODUTIVOS

Processo sexual sem reprodução em microrganismo eucariótico

Paramecium

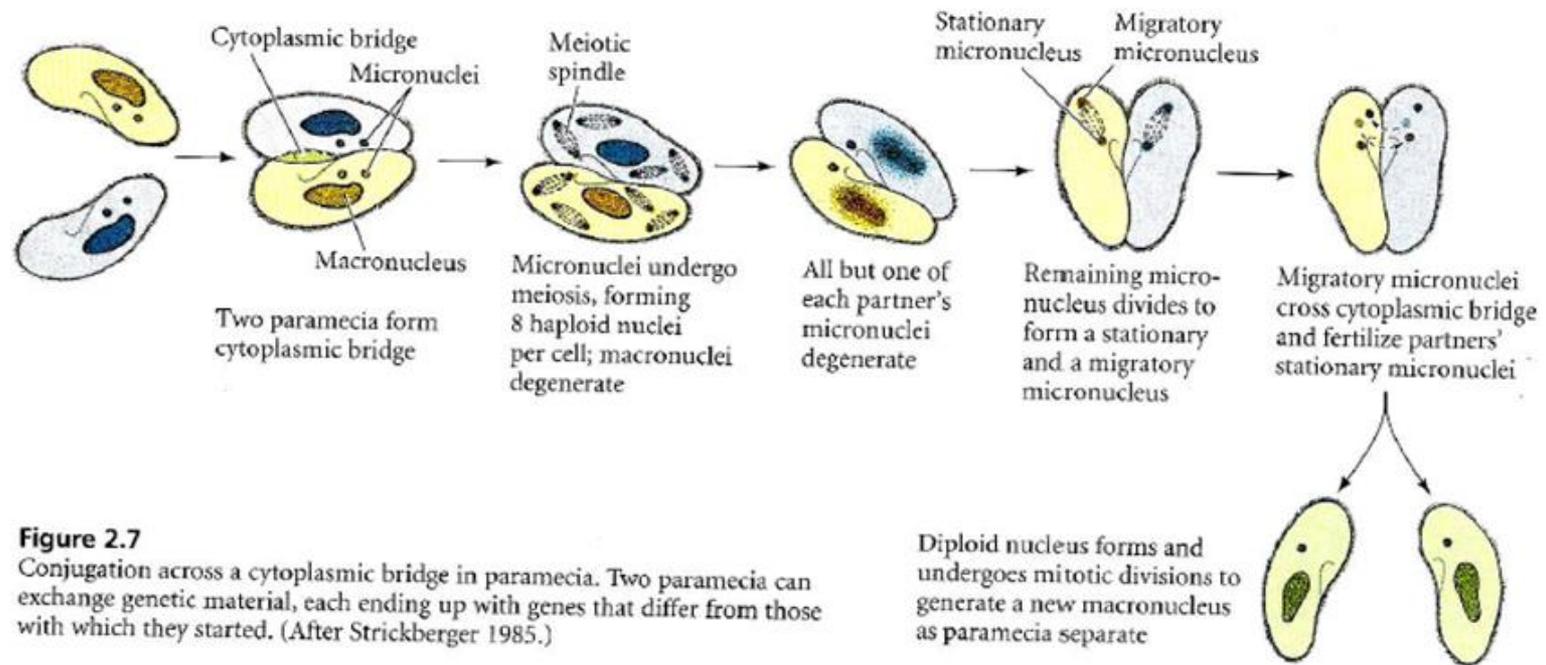
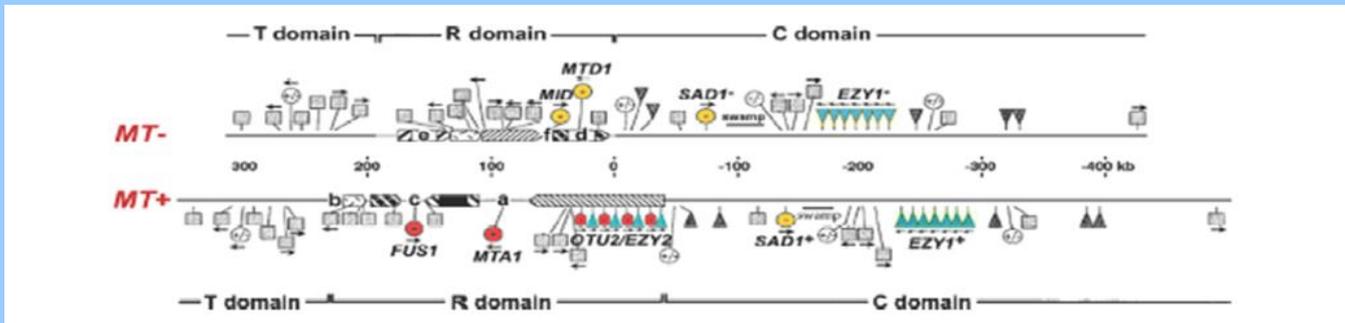
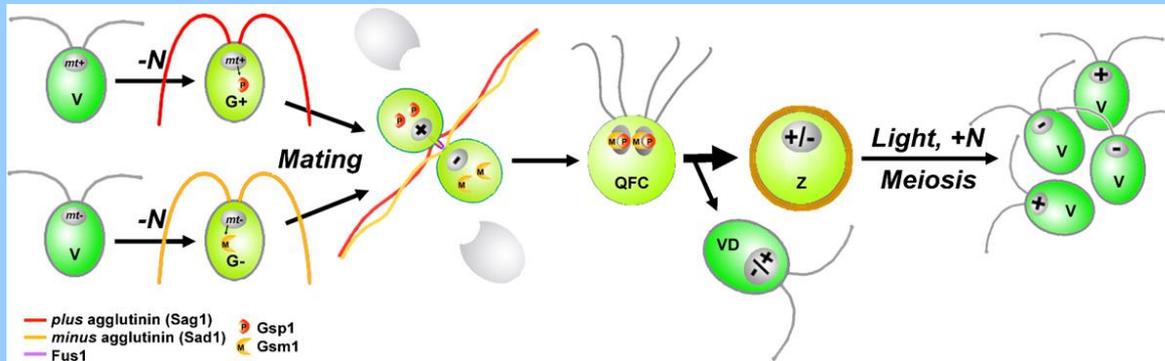
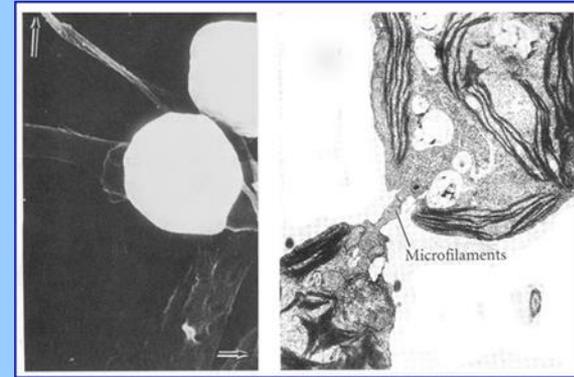
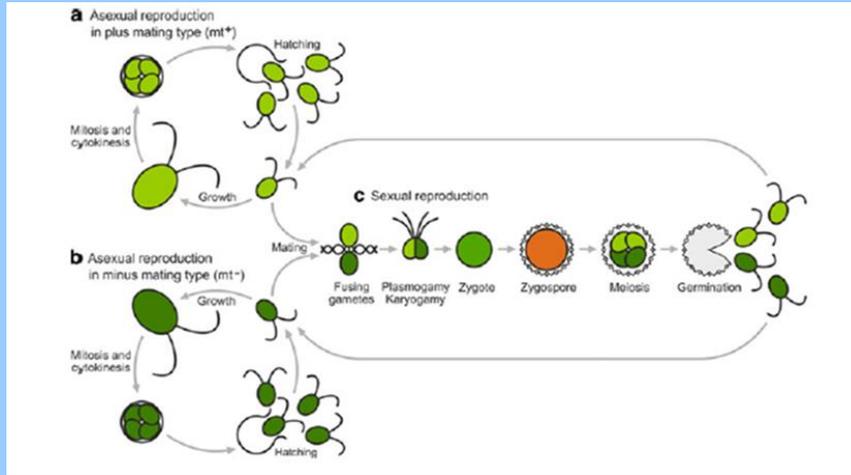


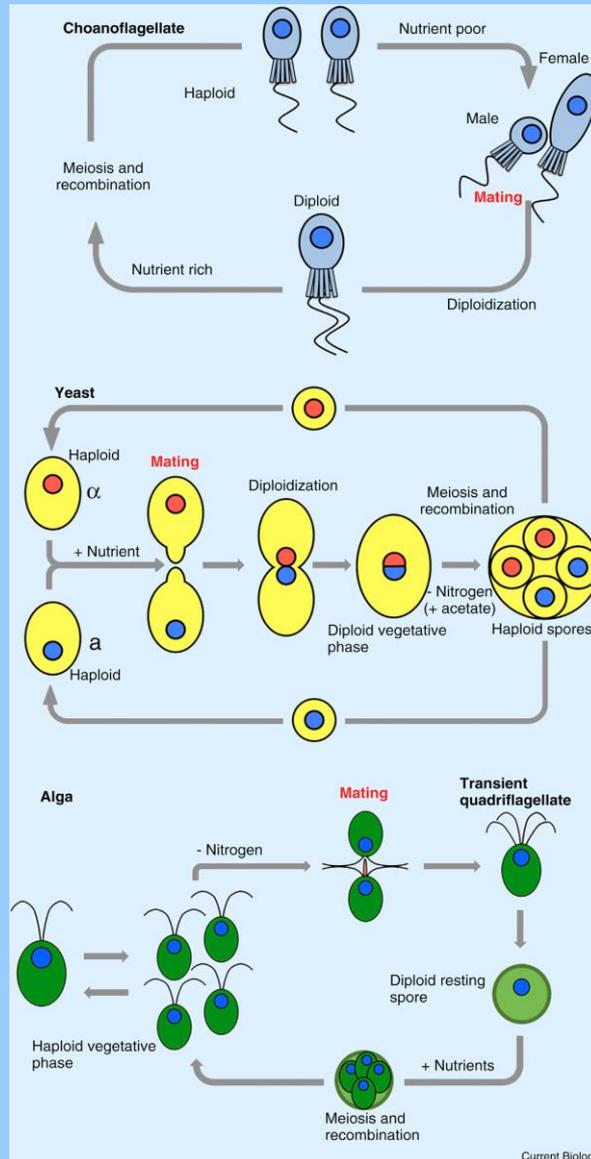
Figure 2.7
Conjugation across a cytoplasmic bridge in paramecia. Two paramecia can exchange genetic material, each ending up with genes that differ from those with which they started. (After Strickberger 1985.)

Chlamydomonas

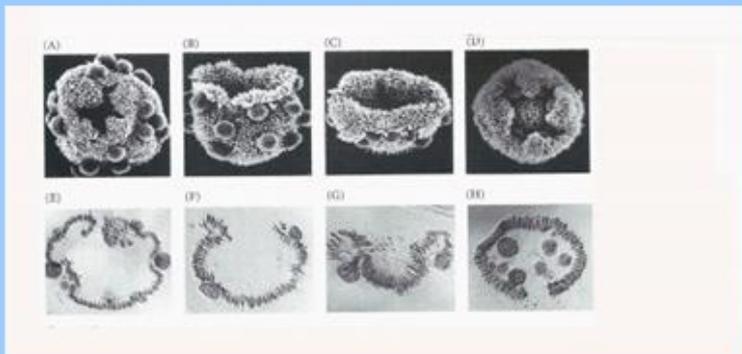
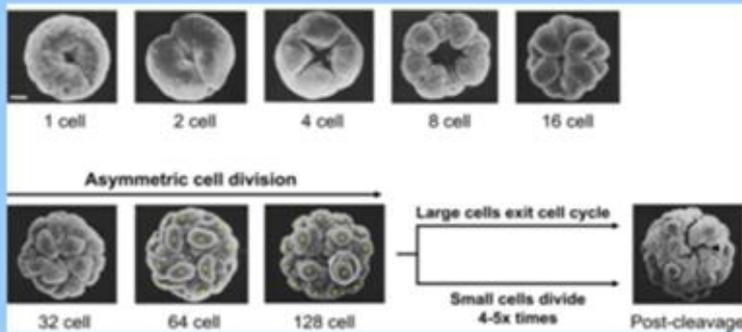
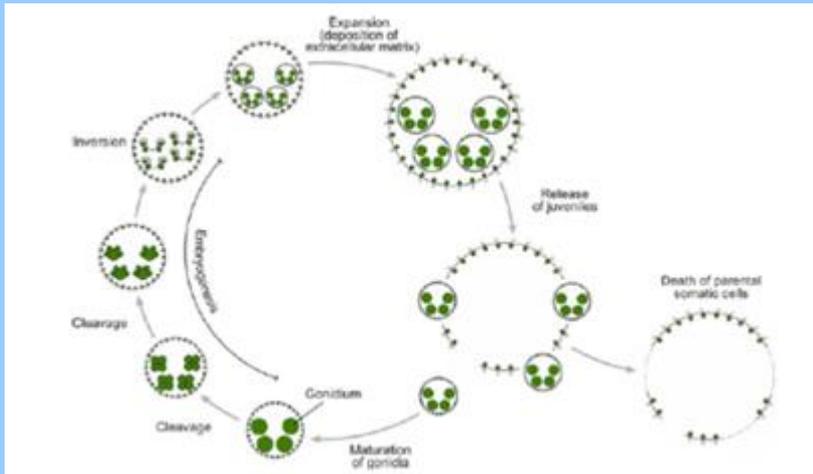


Goodenough et al 2007. Seminar Cell Dev Biol 18: 350-361

Reprodução sexuada em Choanoflagelados

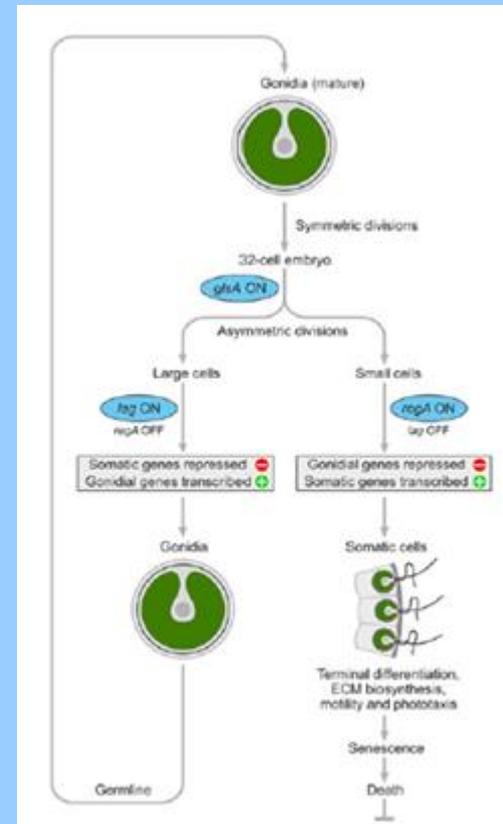


(Umen & Heitman, Cur. Biol. 23: R1006, 2013)



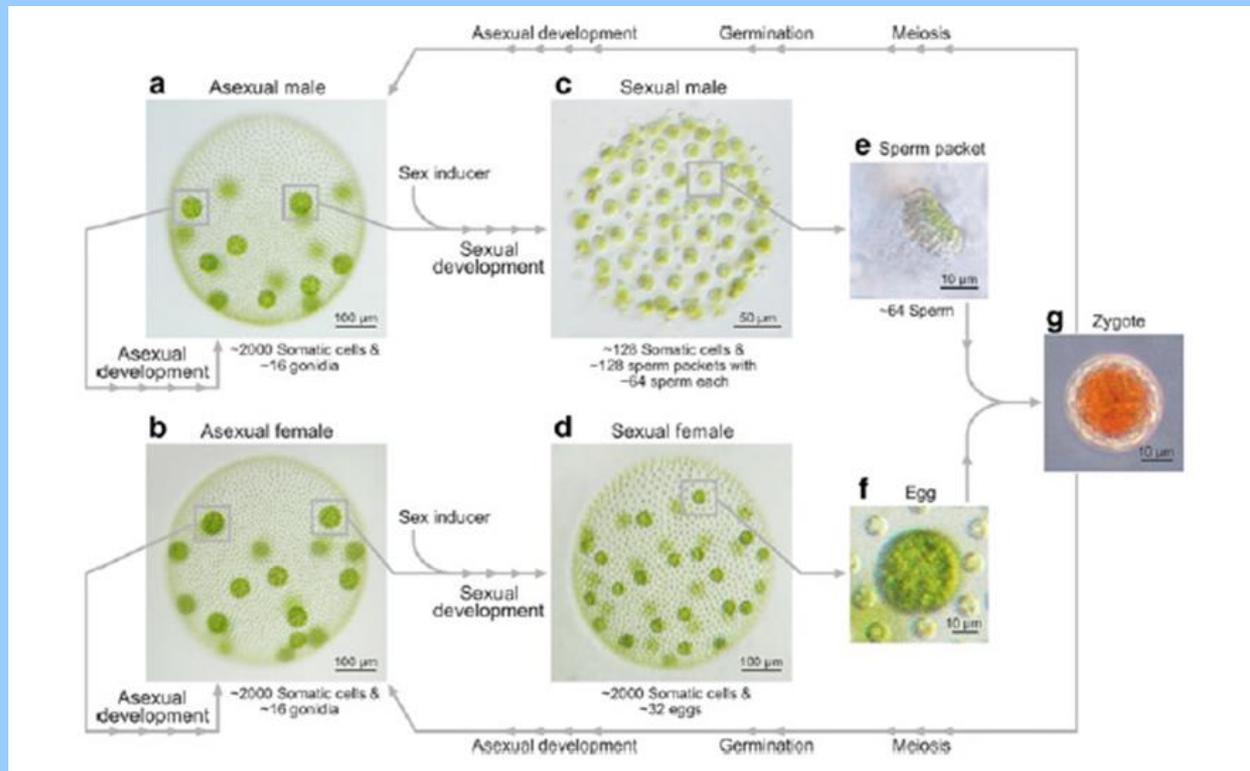
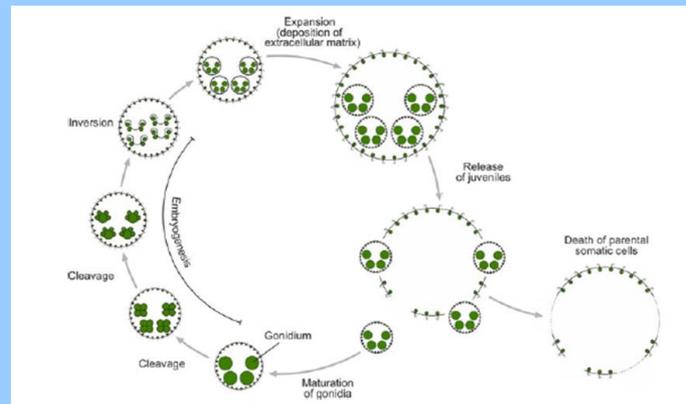
Gilbert, Developmental Biology, 3rd ed

Volvox carteri



Hallmann A., Sex Plant Reprod 24: 97-112, 2011.

Volvox carteri



Indutor sexual: células espermáticas → glicoproteína (6×10^{-17} M)

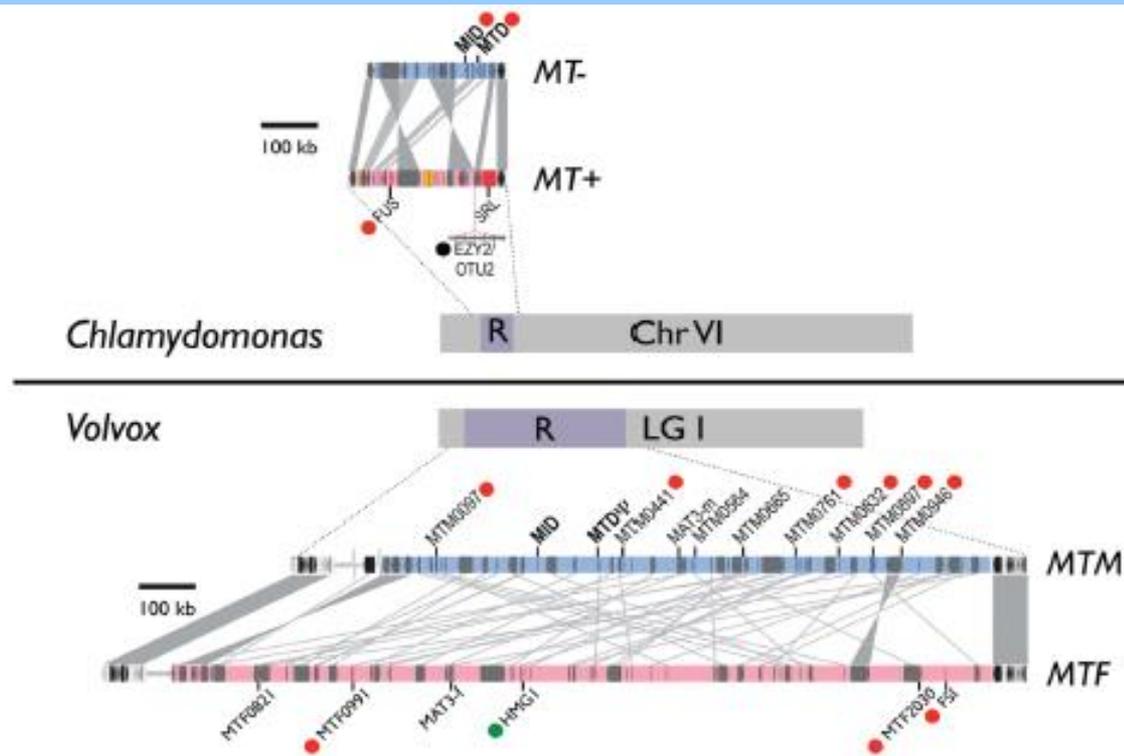
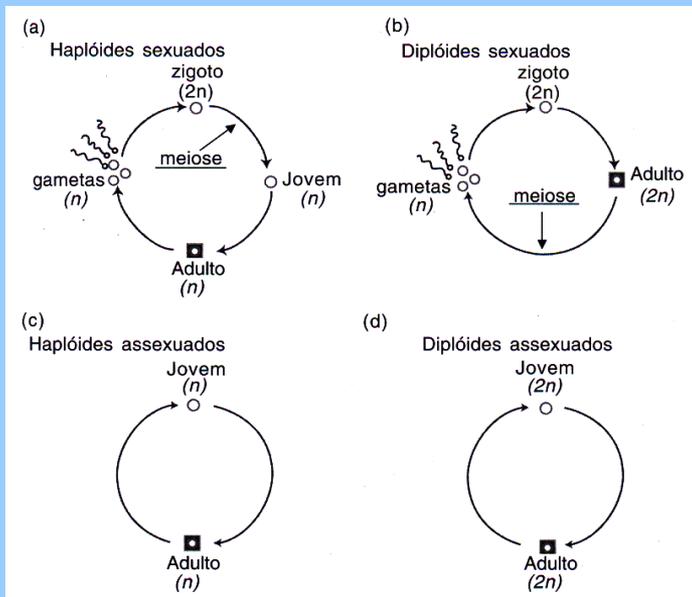


Figure 2. Schematic of the *Chlamydomonas* and *Volvox* mating type chromosomes and mating loci. The rearranged (R) domain and its relative location on each chromosome is labeled. Above and below the chromosomal schematics are expanded versions of *MT* from each species with the R domain for each haplotype shown in red or blue and genes overlaid in gray. *EZY2/OTU2* are in a tandem repeat region. Several sex-limited genes are shown for each species, with vegetative expression depicted by a green dot, sexual expression by a red dot, and zygotic expression by a black dot [18,19**].

Cromossomos sexuais

Quatro sistemas genéticos básicos



1. haplóides assexuados

(bactérias, algas, fungos, ~20 grandes grupos)

2. haplóides sexuados

(algas, maioria dos fungos, briófitas, ~10 grandes grupos)

3. diplóides assexuados

(dinoflagelados, mais de 10 grupos de protistas, algas multicelulares, rotíferos)

4. diplóides sexuados

(20 filos animais, maioria das plantas, algumas algas, protistas e fungos)

- Grupos mistos

6 grupos c/ alternância de haplo e diploidia (protistas, fungos)

8 filos c/ alternância de reprodução sexuada e assexuada

(p. ex., cnidários, anelídeos, insetos)