Transmission ratio distortion in nature

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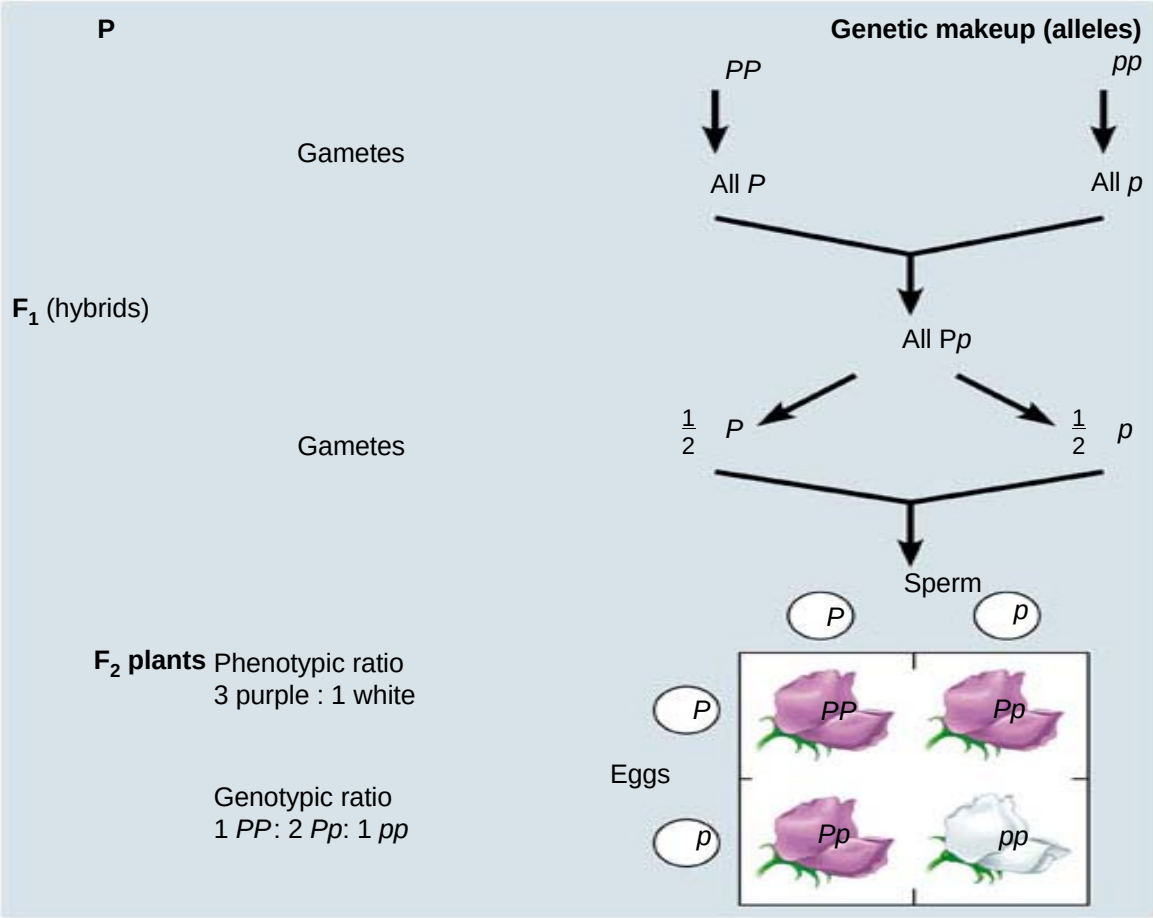
Outline

- Introduction
  - Mendel's law
  - Definition of TRD
  - Possible reasons
- Cases
  - t-haplotype in mouse
  - Toxin-antitoxin complex in nematode
- Potential applications

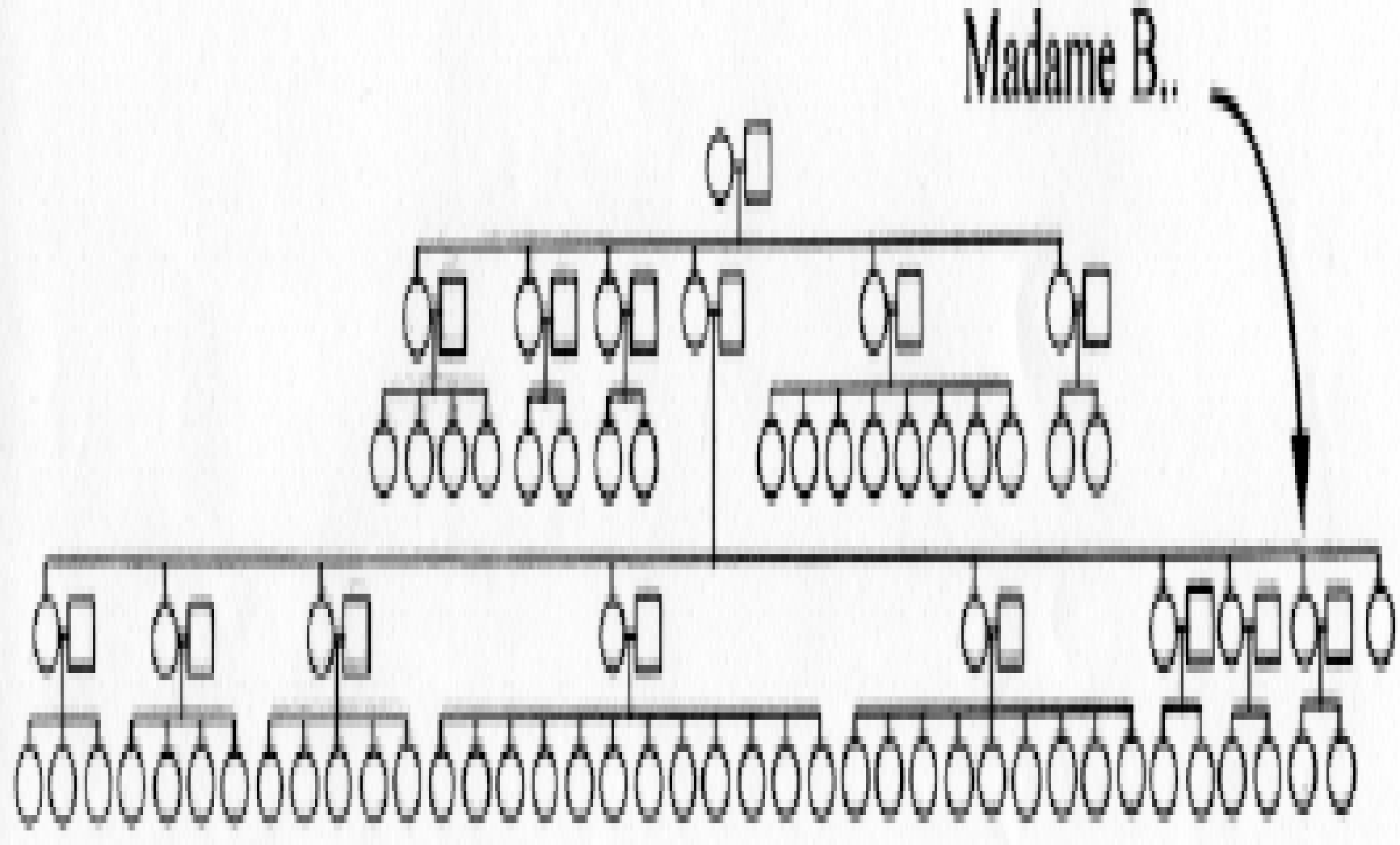
Mendel's law

– Law of segregation

– Law of independent assortment



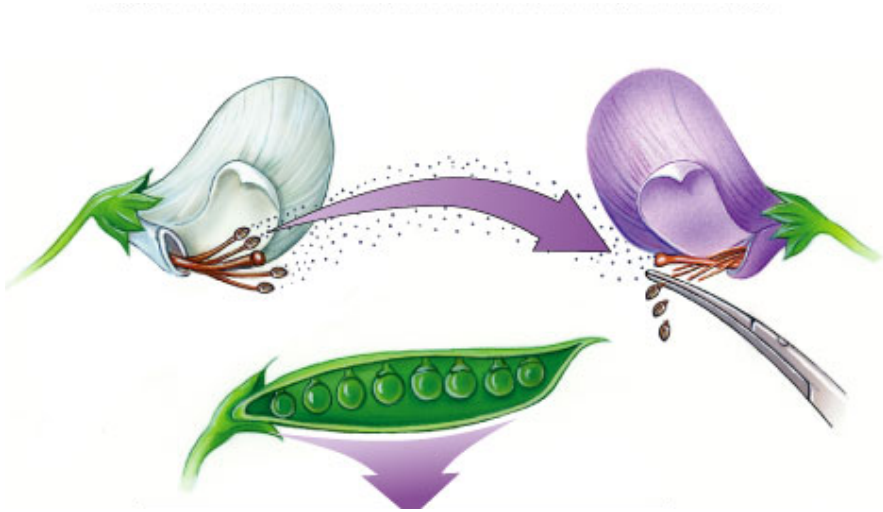
Sex ratio distortion in a family



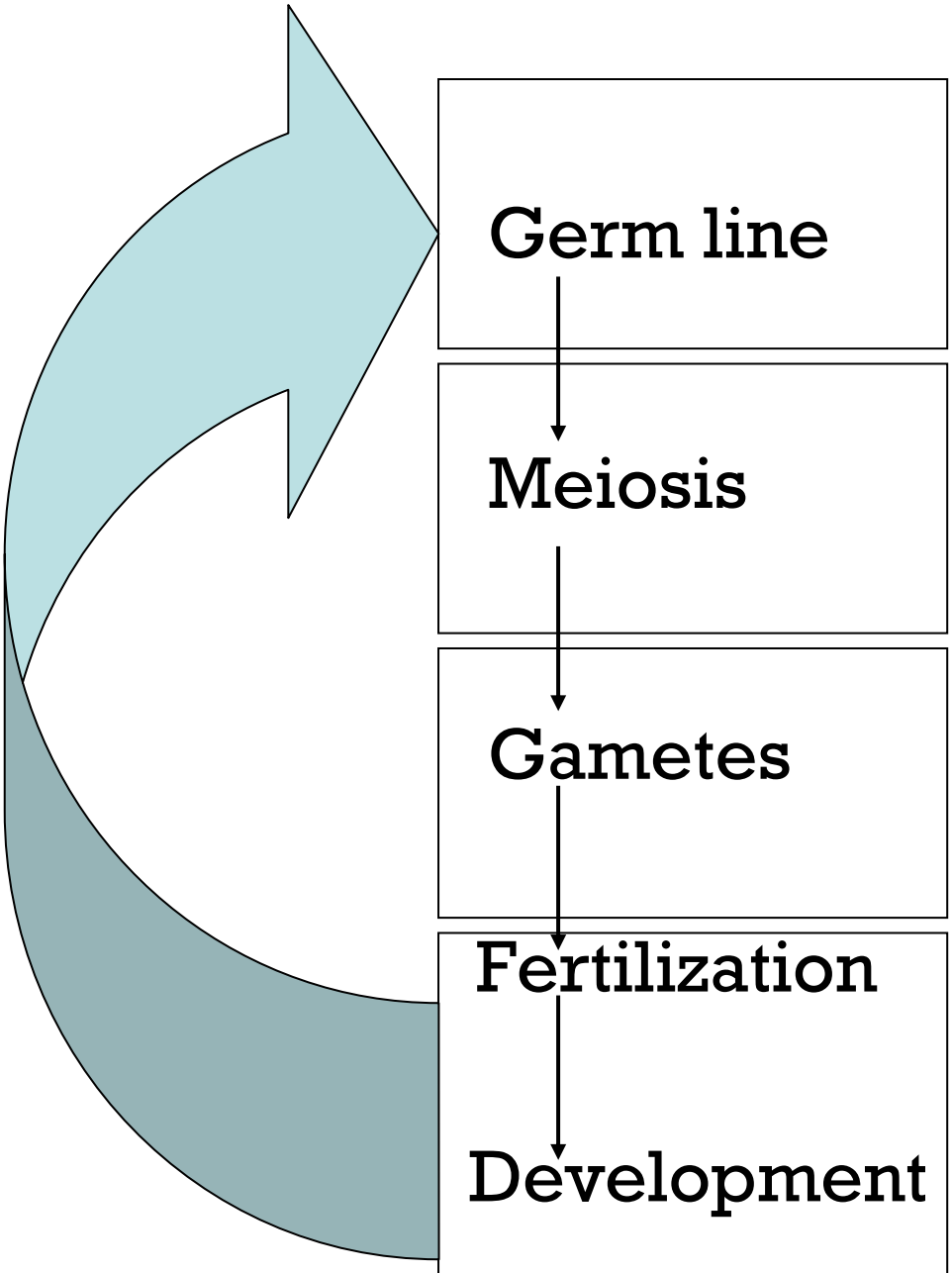
Lienhart and Vermelin 1946

Description of TRD

- A statistically significant departure from the expected ratio of Mendelian inheritance regardless of the cause



Multiple origins of TRD



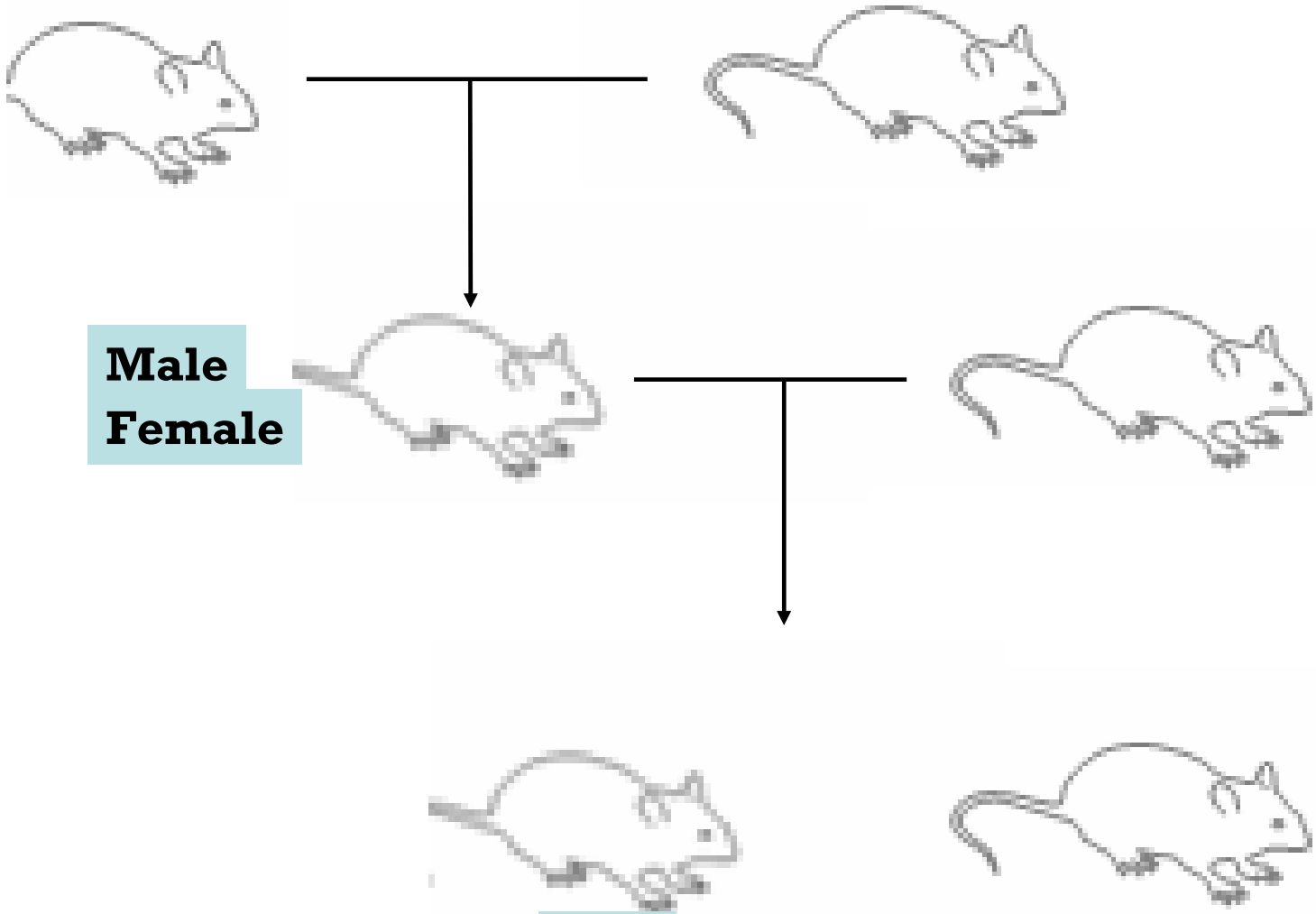
Mitotic selection

Non-random segregation

Gametic selection

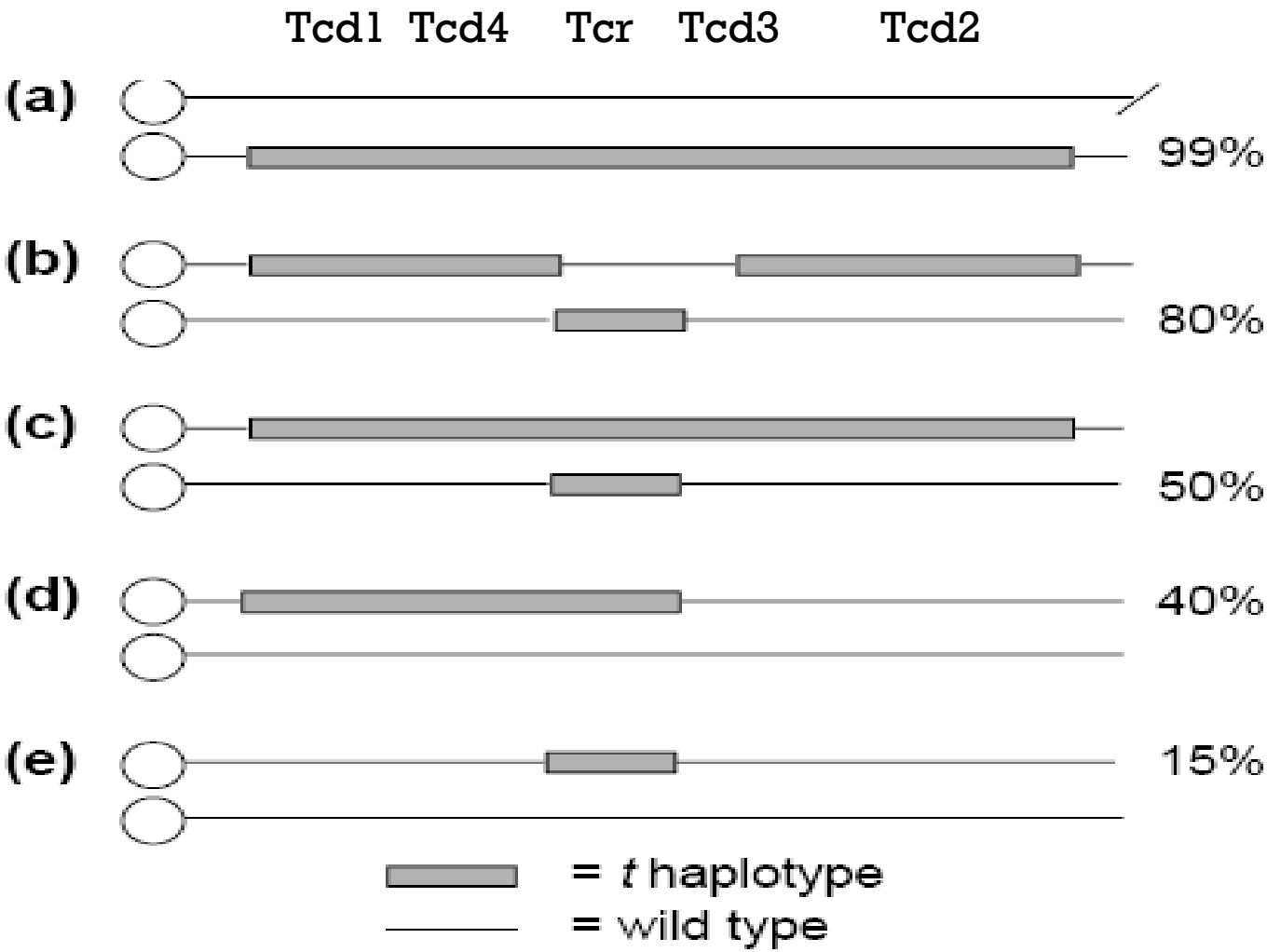
Embryonic lethality

Male-specific TRD in mouse



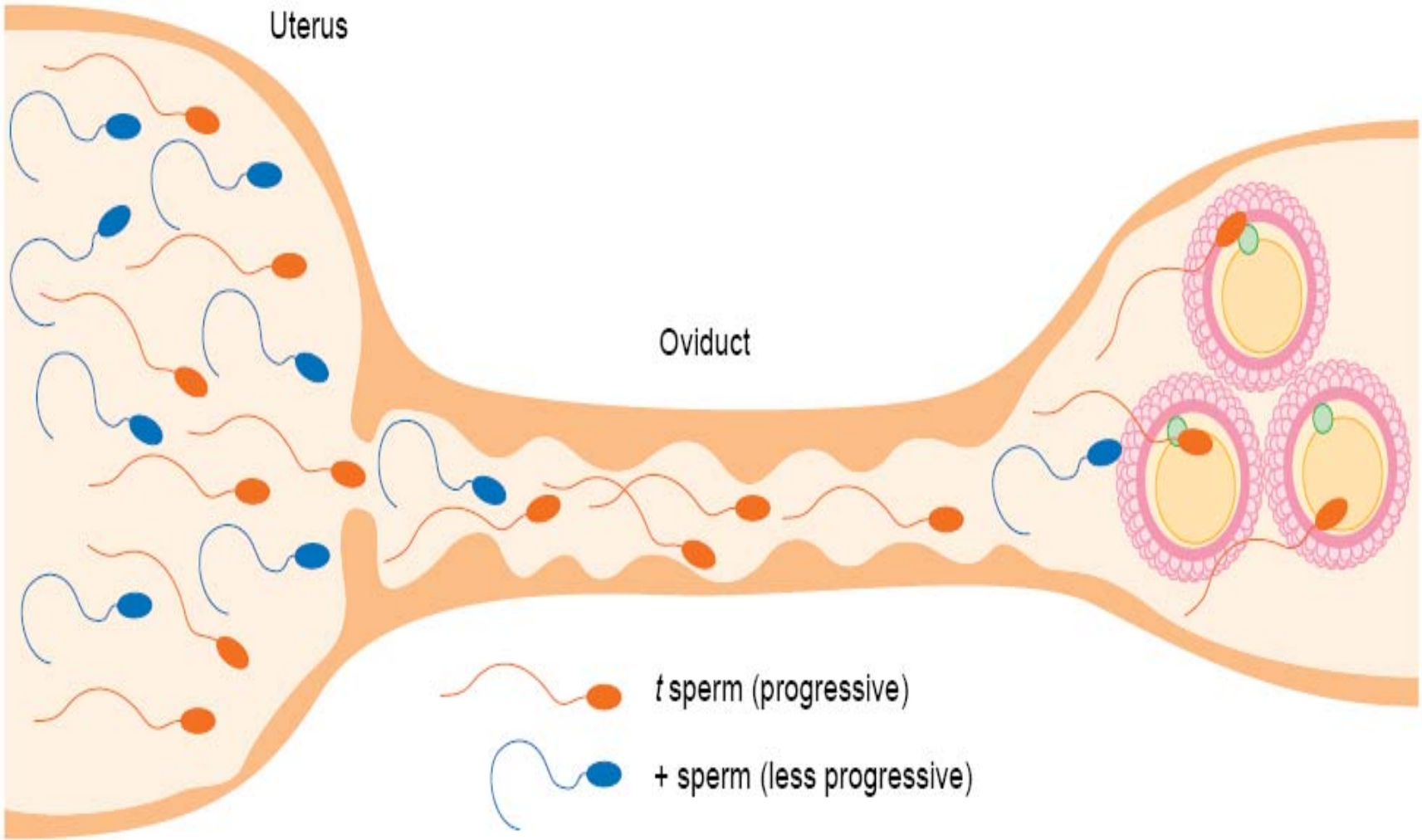
Dobrovolskaia-Zavadskaia 1932

Different effects of TRD loci



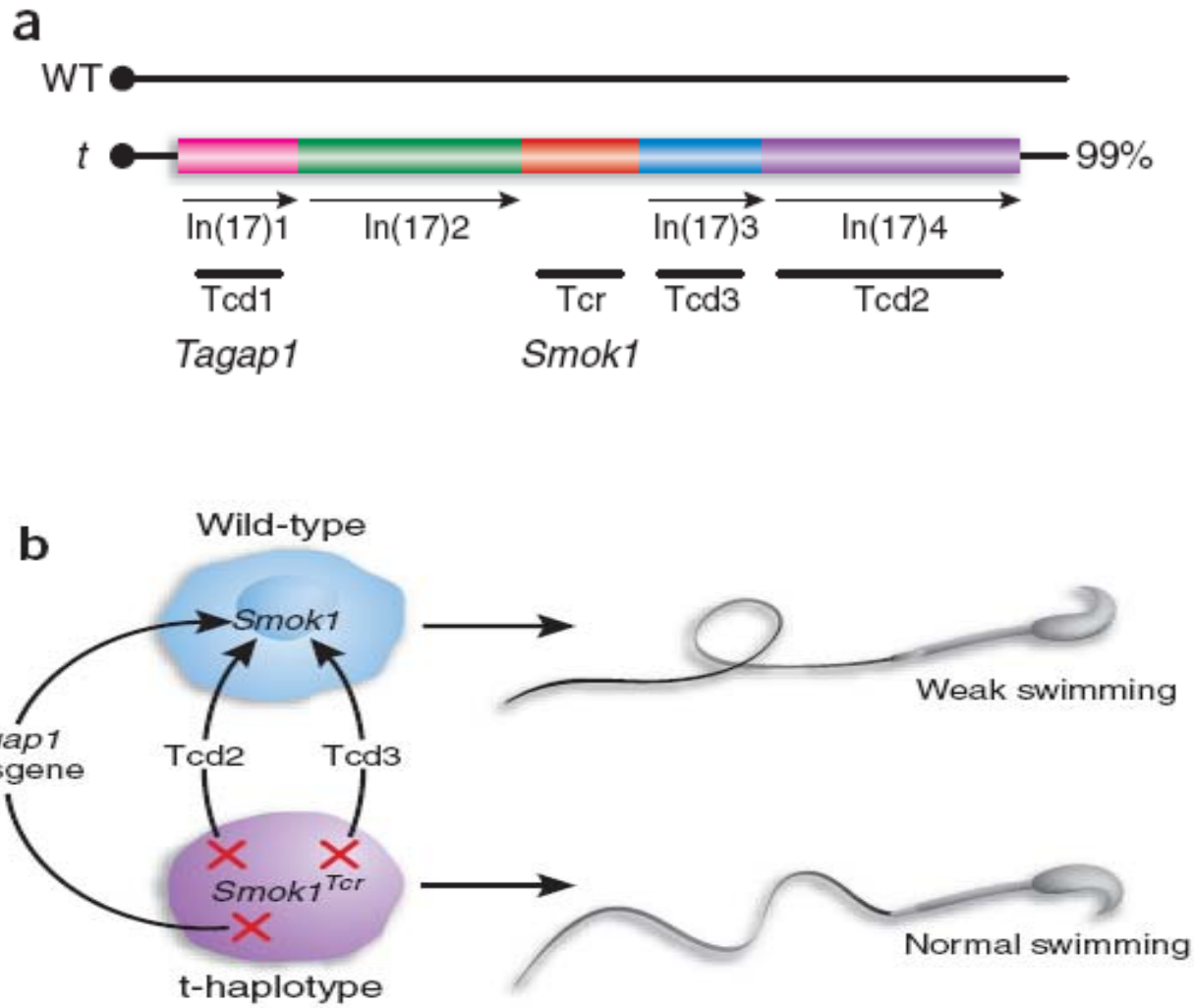
Schimenti 2000

Proposed action on sperm function



Patricia-Clarke *1997*

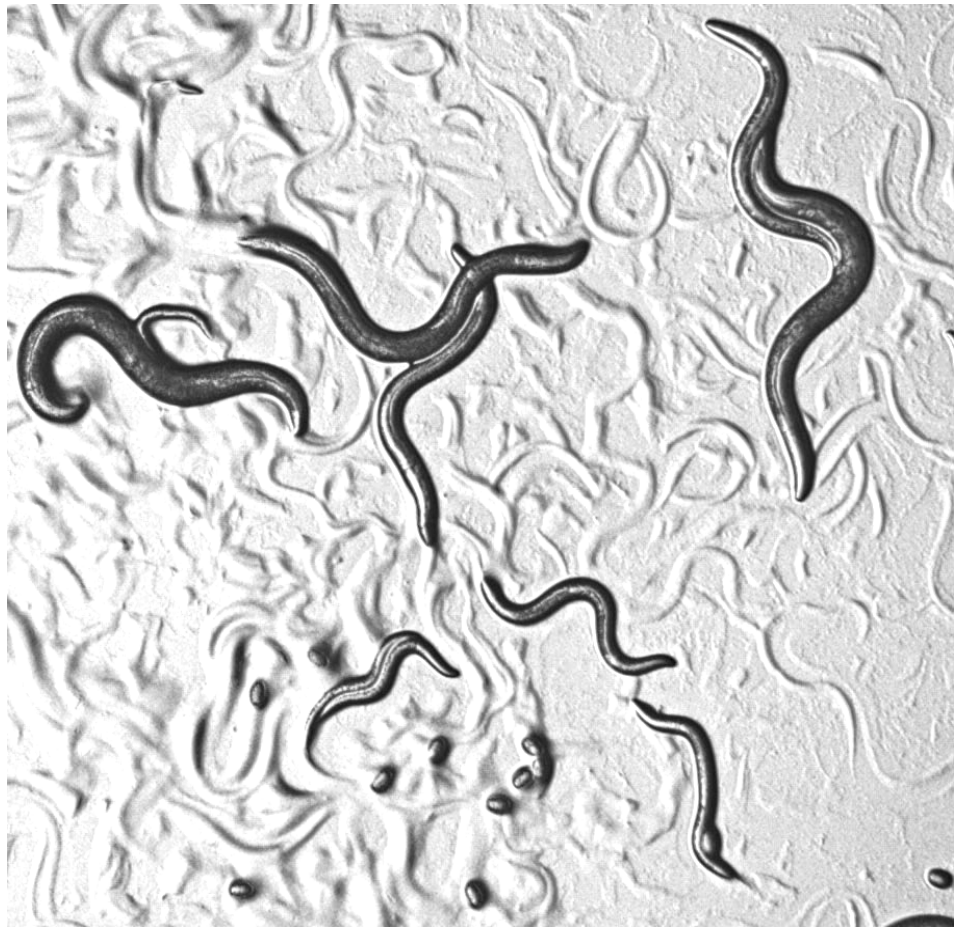
Proposed action on sperm function



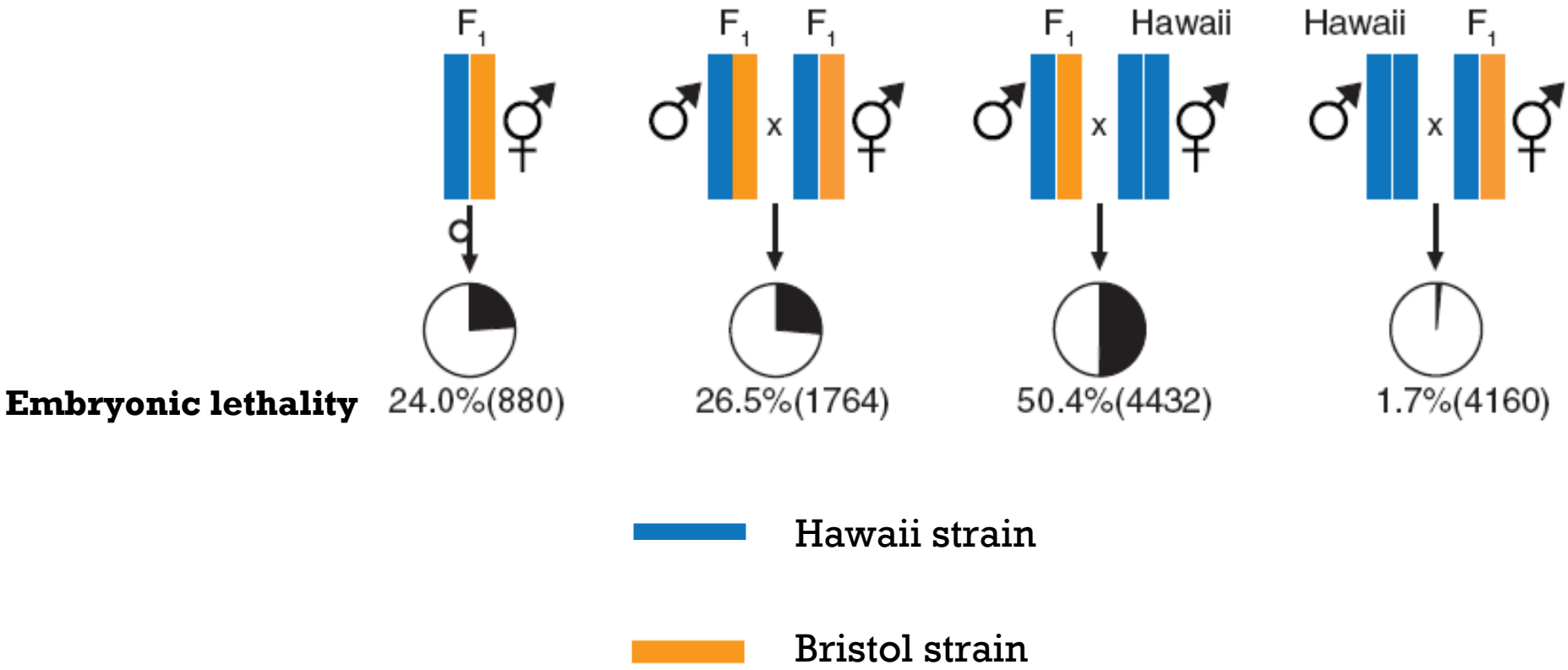
Lyon 2005

Caenorhabditis elegans

- Self-fertilizing hermaphrodites
- Males mate with hermaphrodites

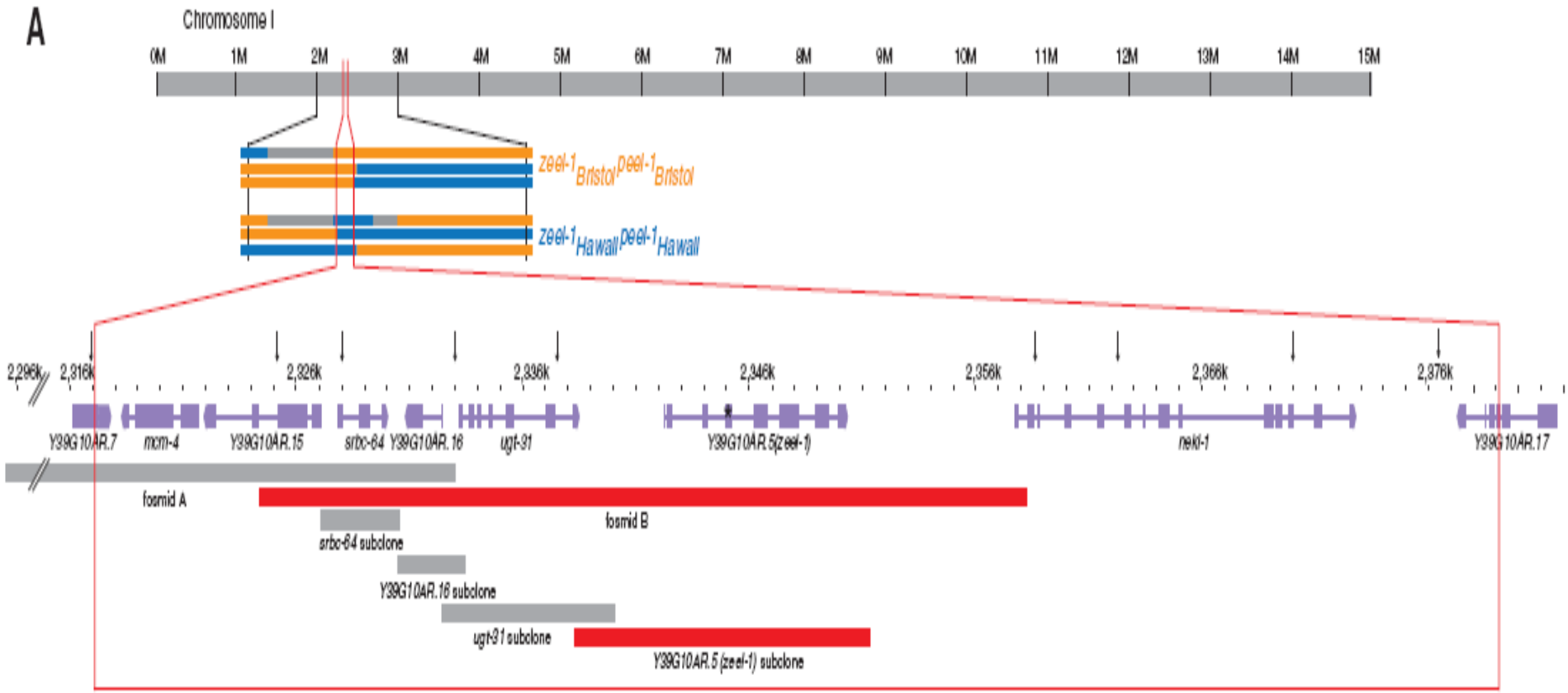


Paternal effect by zygotic lethality



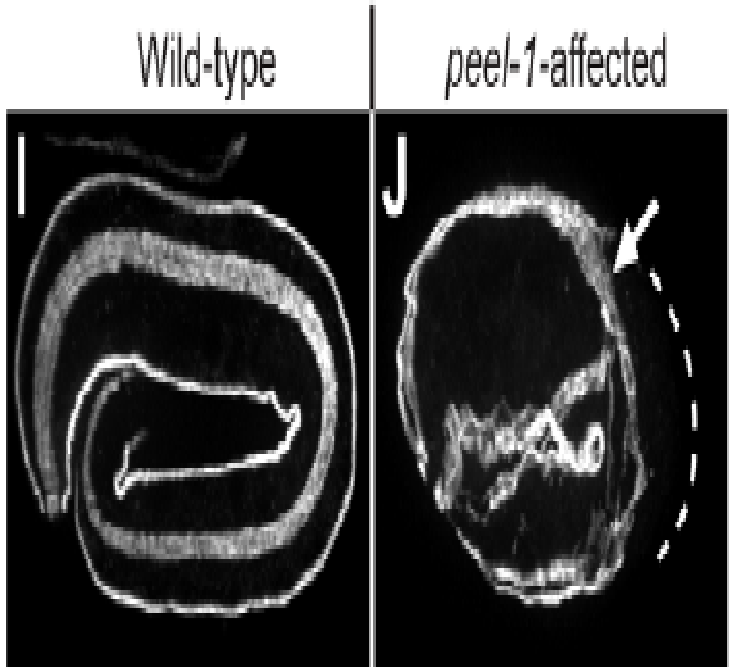
Seidel *2008*

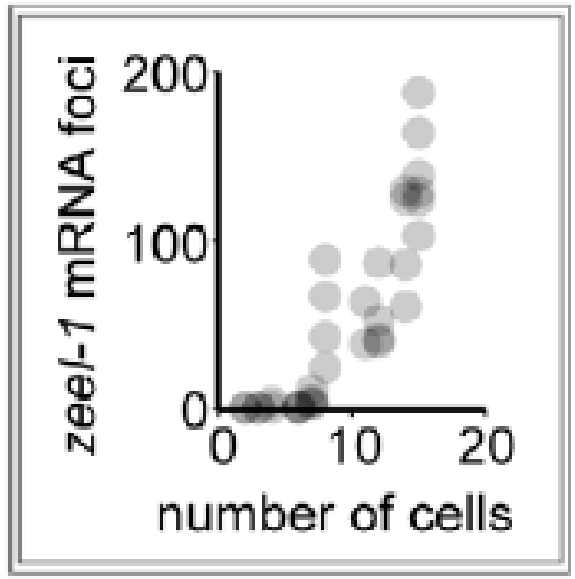
Mapping the related genes:
peel-1 and zeel-1



Seidel *2008*

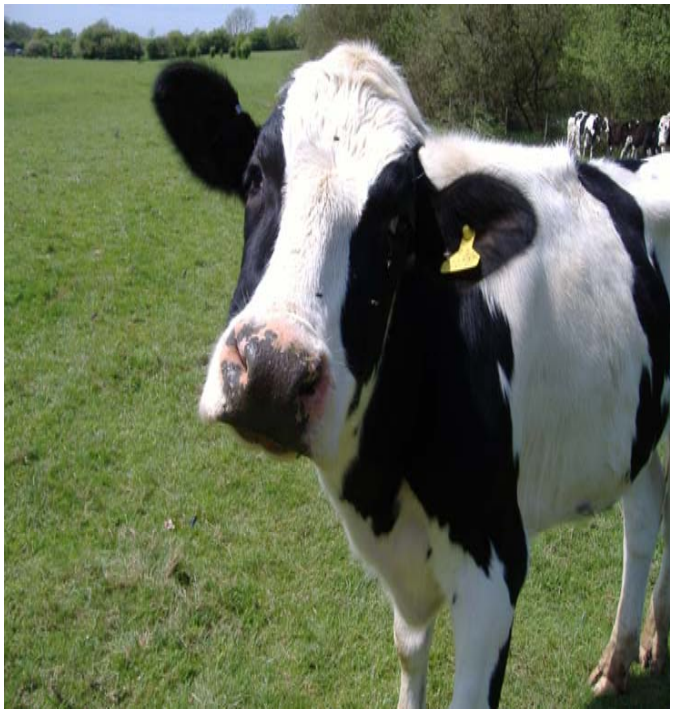
A complex of a sperm-delivered toxin and an embryo-expressed antidote



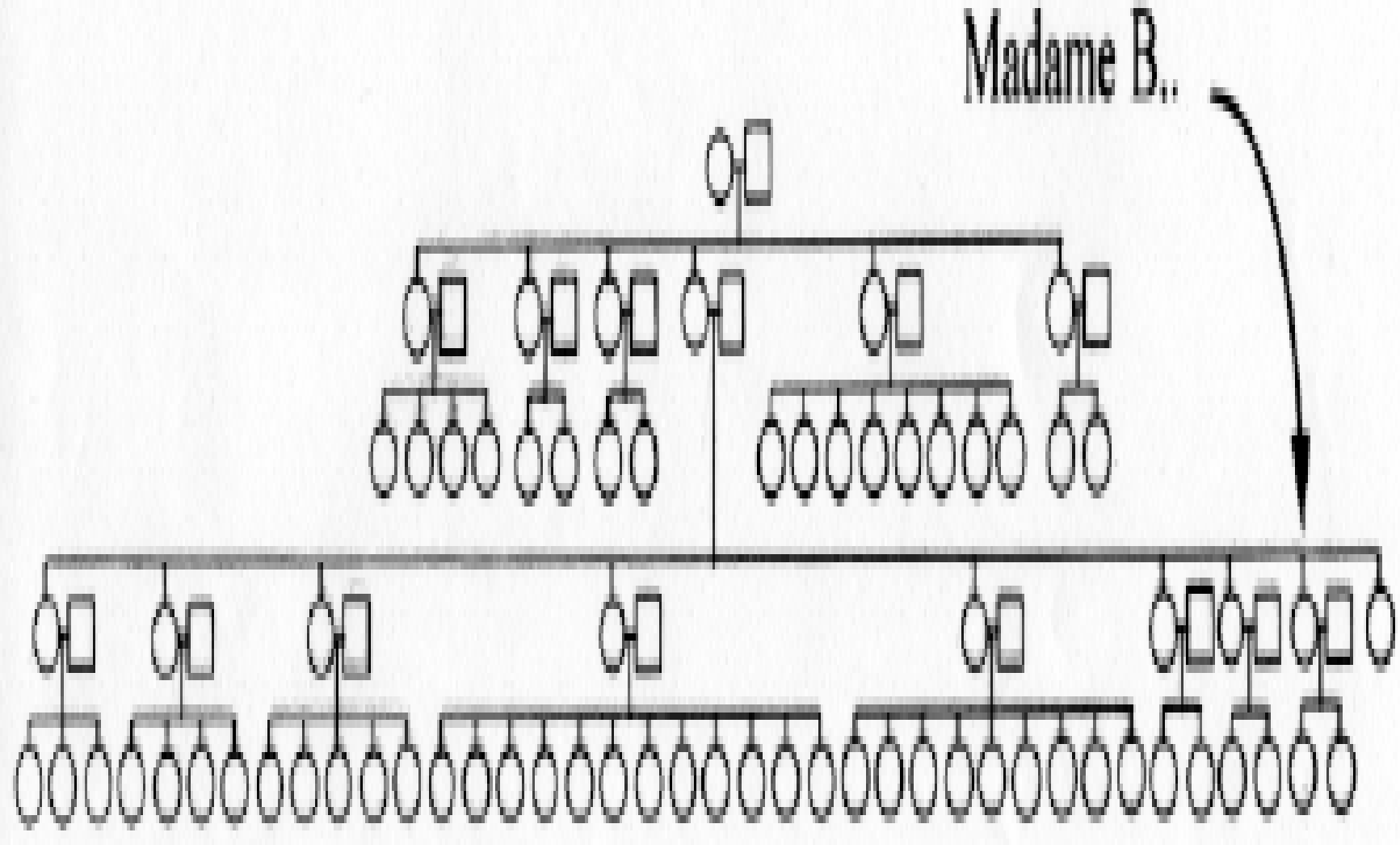


Seidel *2011*

Animal gender selection is a booming business



Sex ratio distortion in a family



Lienhart and Vermelin 1946

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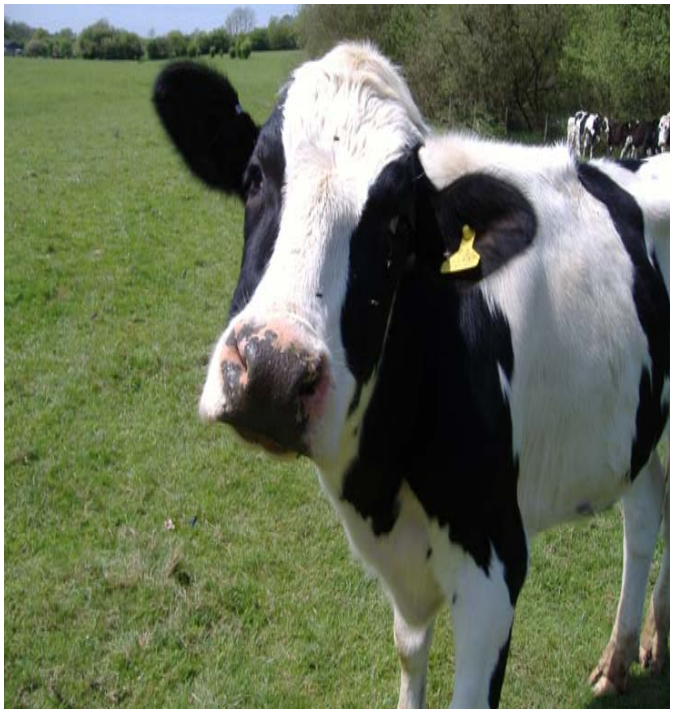

Gene conservation through TRD

- ATGAGTGGAGAGGAGAACCCAGC
  CAGCAAGCCCACGCCGGTGCAGG
  ACGTACAGGGCGACGGGCGCTGG
  ATGTCCCTGCACCATCGGTTCGTG
  GCTGACAGCAAAGATAAGGAACC
  CGAAGTCGTCTTCATCGGGGACTC
  CTTGGTCCAGCTCATGCACCAGTG
  CGAGATCTGGCGCGAGCTCTTCTC
  TCCTCTGCATGCACTTAACTTTGGC
  ATTGGTGGTGACGGCACACAGCAT
  GTACTGTGGCGGCTGGAGAATGG
  GGAGCTGGAACACATCCGGCCCA
  AGATTGTGGTGGTCTGGGTGGGCA
  CCAACAACCACGGACACACAGCA
  GAGCAGGTGACTGGTGGCATCAA
  GGCCATTGTGCAACTGGTGAATGA
  GCGACAGCCCCAGGCCCGGGTTG
  TGGTGCTGGGCCTGCTTCCGCGAG
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Thanks!!!