The Y chromosome determines maleness in humans

- XO (Turner) → female
- XXY (Klinefelter) → male

Figure not in textbook
Turner Syndrome (45, X)

Female dev. but no eggs. 1 in 3000 female births
Klinefelter Syndrome (47, XXY)

- Male but no sperm;
- Some female characteristics

2 in 1000 male births
Development of the Gonads and their Ducts in Mammals

FIGURE 17.3
Development of the Gonads and their Ducts in Mammals

FIGURE 17.3

7 weeks
Development of the Gonads and their Ducts in Mammals

**FIGURE 17.3**

- **MALE**
  - Epididymis
  - Testes
  - Degenerated Müllerian duct
  - Wolffian duct
  - Urethra
  - Urinary bladder
  - Degenerated Wolffian duct

- **FEMALE**
  - Ovaries
  - Oviduct
  - Müllerian duct
  - Uterus
  - Vagina

- **Male Genital System**
  - Testes
  - Epididymis
  - Wolffian duct

- **Female Genital System**
  - Ovaries
  - Oviduct
SRY = sex determining region of the Y chromosome:

- XY but loss of SRY ➞ female
- XX with translocation of SRY ➞ male
- transgenic XX mice with SRY on autosome ➞ male

SRY encodes testis-determining factor

SOX9 on autosome

- XX with extra SOX9 copy ➞ male

Figure not in textbook; similar: 17.7
Migration of the Mesonephric Cells into Sry+ Gonadal Rudiments

(A) 12-Day mouse embryos

Remove urogenital rudiment
Separate gonads from mesonephros
Recombine and culture 48 hours

1. + Sry: Allows migration of mesonephric cells
2. − Sry: No mesonephric cell migration

FIGURE 17.6
Migration of the Mesonephric Cells into Sry$^+$ Gonadal Rudiments

(B) 12-Day mouse embryos

- Remove urogenital rudiment
- Separate gonads from mesonephros
- Recombine and culture 48 hours

1. No mesonephric cell migration
2. fGf9: Allows migration of mesonephric cells

FIGURE 17.6
An XY Individual with Androgen Insensitivity Syndrome

FIGURE 17.10
**Sex hormones**

**Androgens**
- (Testosterone, Dihydrotestosterone)
- Male
- Secondary male sexual characteristics:
  - Epididymis
  - Vas deferens
  - Genitals: penis, scrotum
  - Hair pattern
  - Pitch of the voice etc.
  - Spermatogenesis
- Female
  - General physiological effects:
    - Bone density
    - Muscle mass etc.
    - ("the more testosterone, the more masculine")

**Estrogens**
- (Estradiol; derived from testosterone!)
- Female
  - Secondary female sexual characteristics:
    - Mammary gland development
    - Subcutaneous adipose tissue etc.
  - Menstrual cycles:
    - Proliferation of endometrium etc.
- Male
  - Spermatogenesis
    - (males that cannot respond to estrogens are infertile)
  - Wolffian duct development