

Hormones and Receptors

- Pairing between signal and receiver
- Synthesis and processing of Hs
- Regulation of Hs, Rs
- Many are closely related
- Questions???

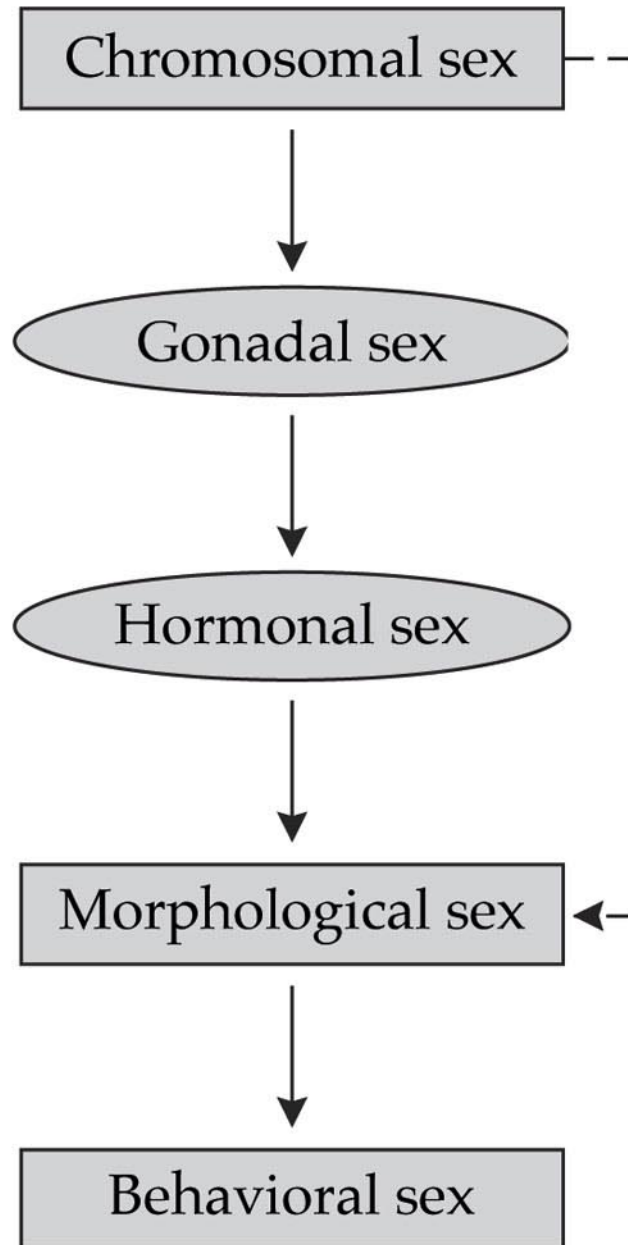
Assignment

- Textbook pages to reinforce today (pg. 109-130)
- Two extra credit assignments posted
- Nothing quizzable for Tuesday

BIG questions

- Why do organisms pair up to reproduce?
- Why should this pairing up mean that they take 2 distinct forms?
- How do they come to take these distinct forms -- female and male?

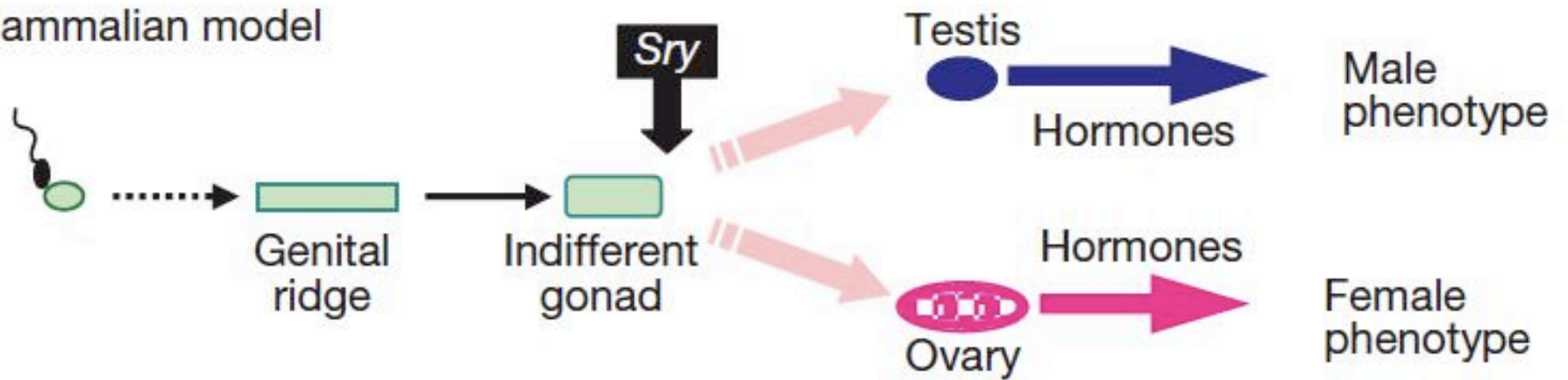
- Sexual Dimorphism -- different forms for female, male; how far does this extend?
- Sexual Differentiation -- process of becoming different
- Developmental program



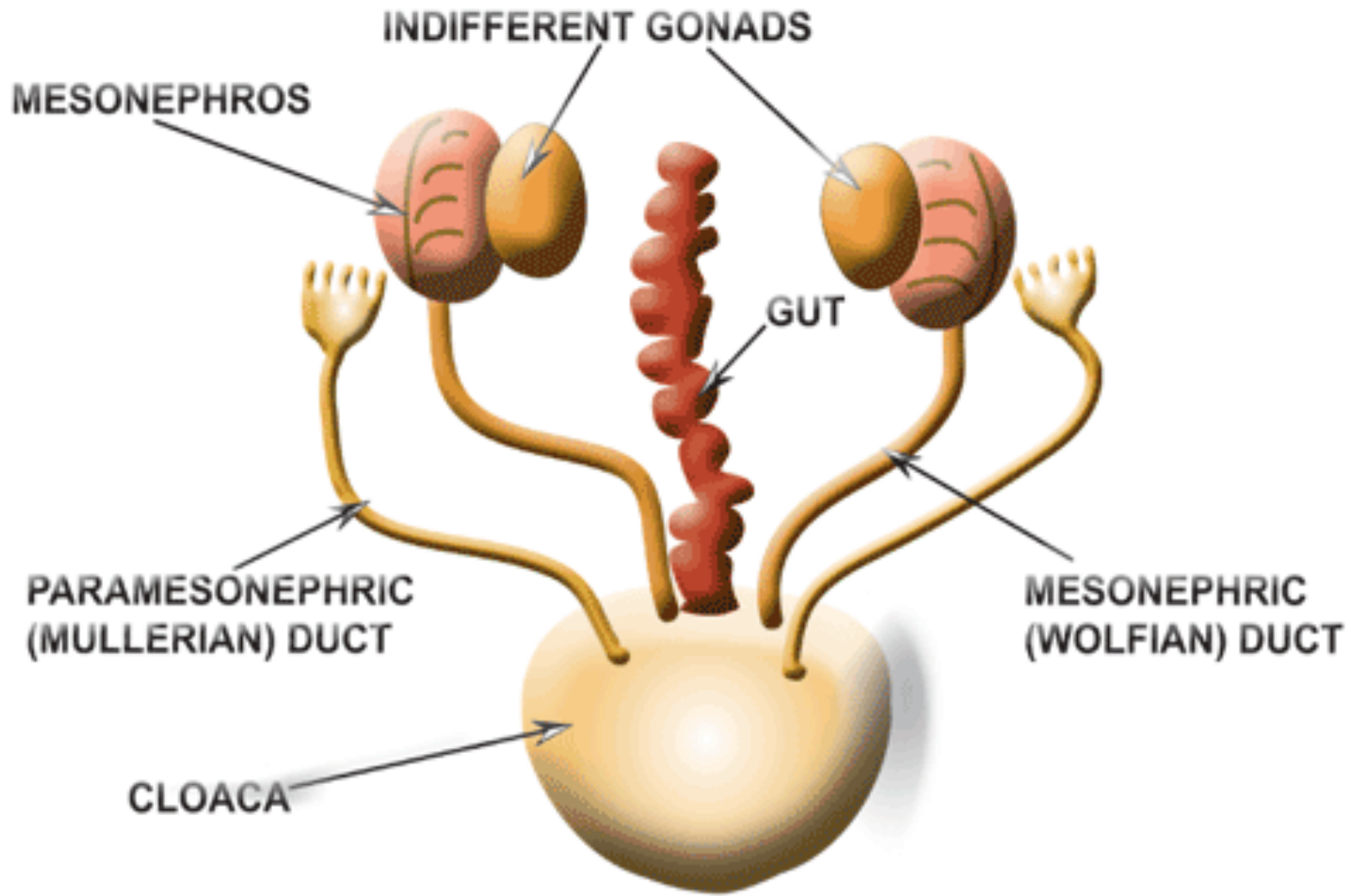
sex determination

- Temperature in turtles
- Social factors in fish
- For mammals, genetic determination (XX or XY)

Mammalian model



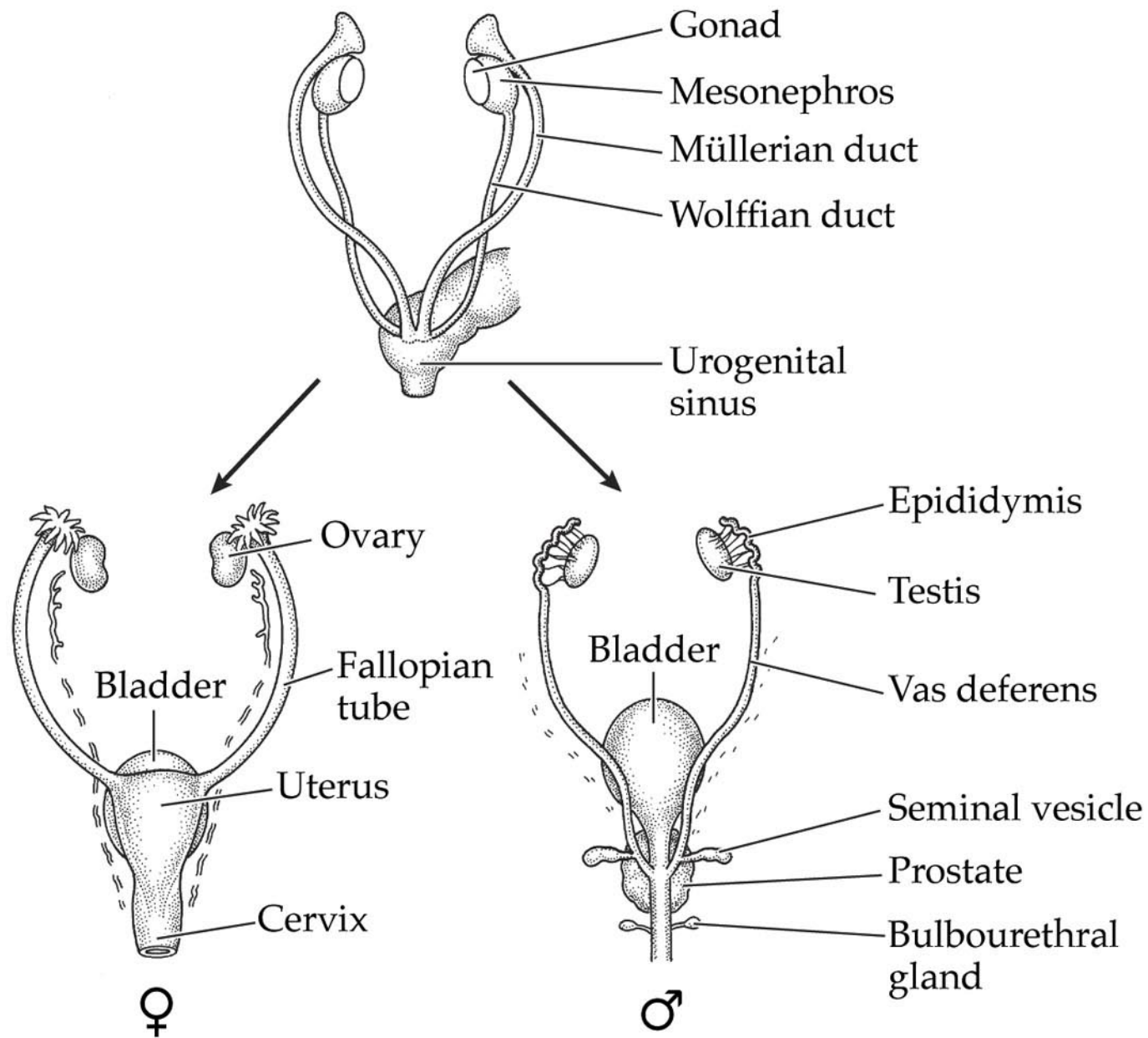
INDIFFERENT STAGE



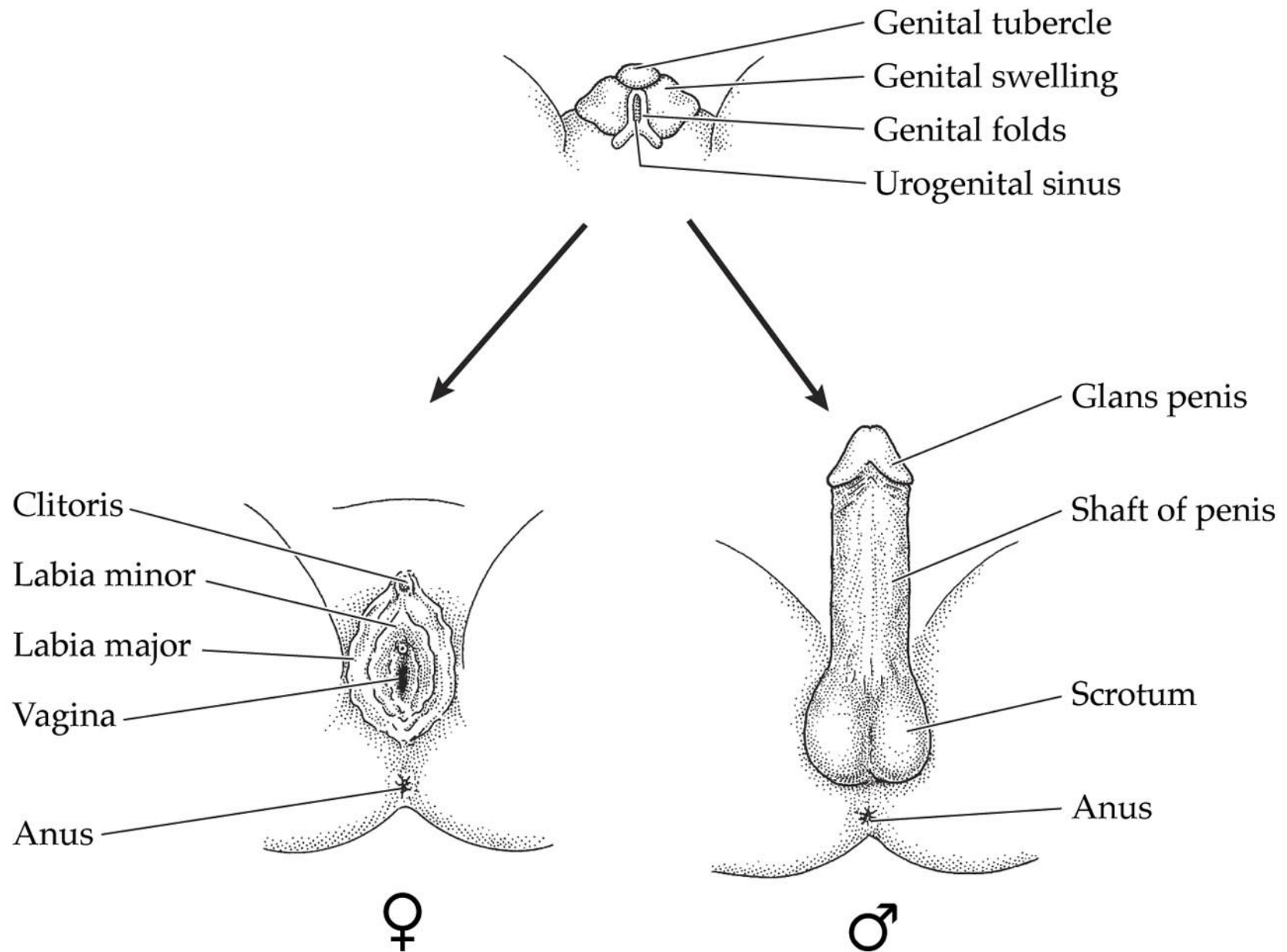
המחיר הממוצע של המכשיר הוא 1,200 ש"ח, ויש לו מחיר מינימלי של 1,000 ש"ח. המחיר הממוצע של המכשיר הוא 1,200 ש"ח, ויש לו מחיר מינימלי של 1,000 ש"ח.

- **Until 1 month, no differences = indifferent gonad**
Sry gene makes Sry protein
→ indifferent gonad to be testis.
- **Absence of Sry protein allows gonad to hang out**
later becomes ovary
- **Pattern is called single anlage - the F/M organ**
derives from same structure

- **If testis is present, it secretes**
 - **Testosterone (steroid)**
 - **Anti-Mullerian Factor/Hormone (= Mullerian Inhibiting Hormone) (protein)**



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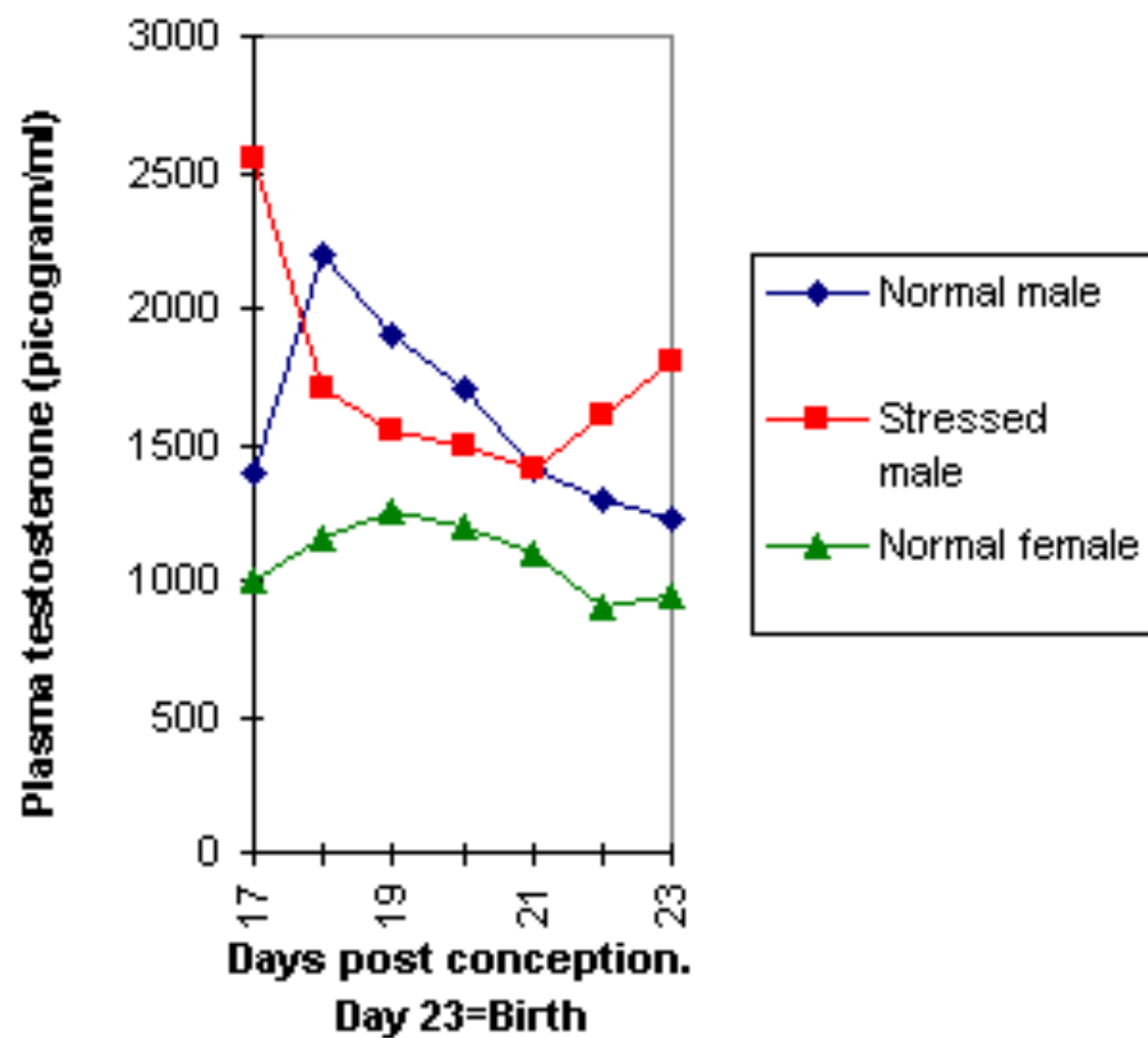
- **T \rightarrow DHT (by enzyme)**
 - **Growth of penis/maturation of scrotum**

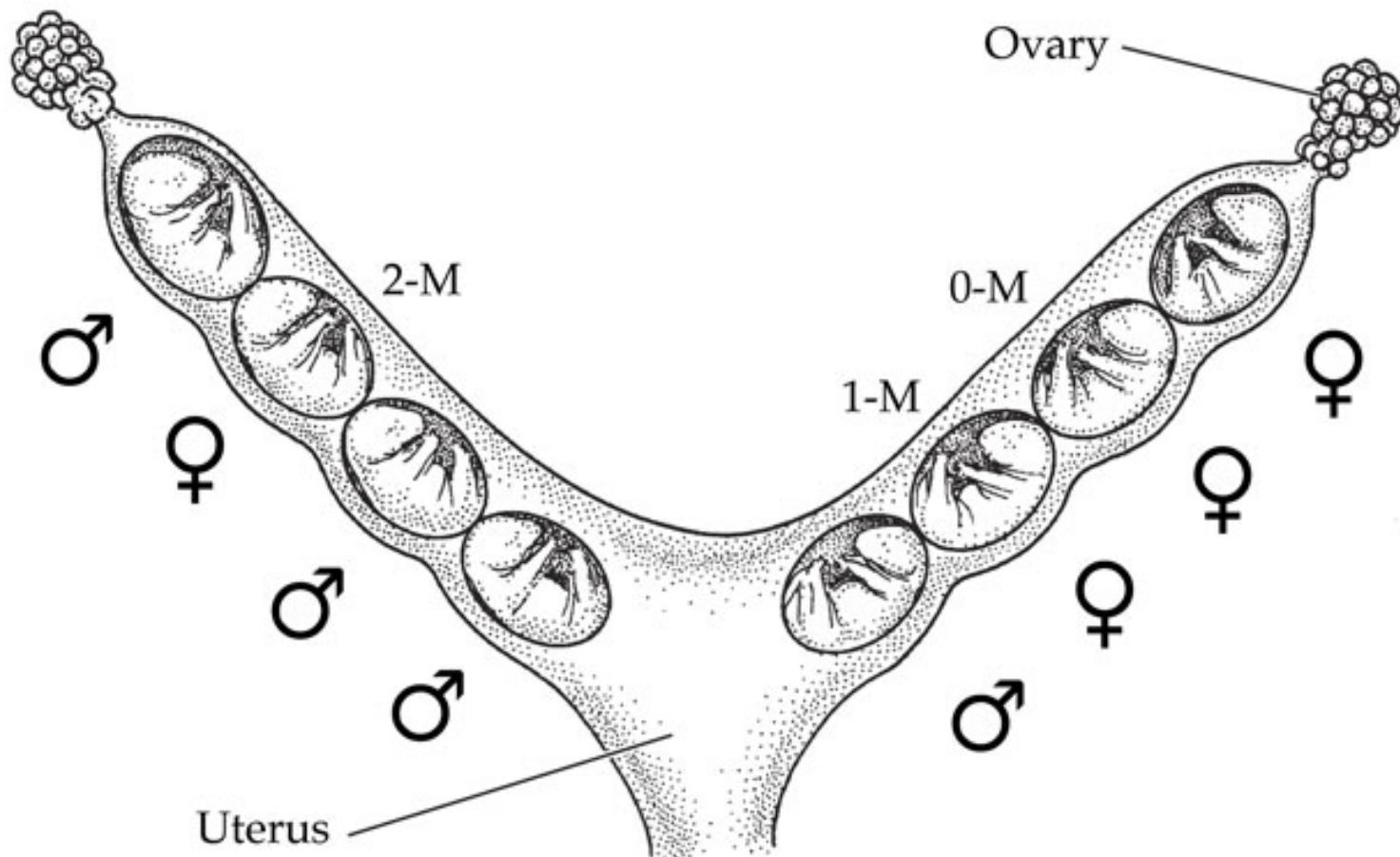
- **Dual anlagen:**
 - **Wolffian ducts - epididymis etc.**
 - **Mullerian ducts - uterus, vagina, fallopian tubes**
- **Single anlage:**
 - **Genital tubercle – clitoris OR penis**
 - **Genital folds – labia OR scrotum**

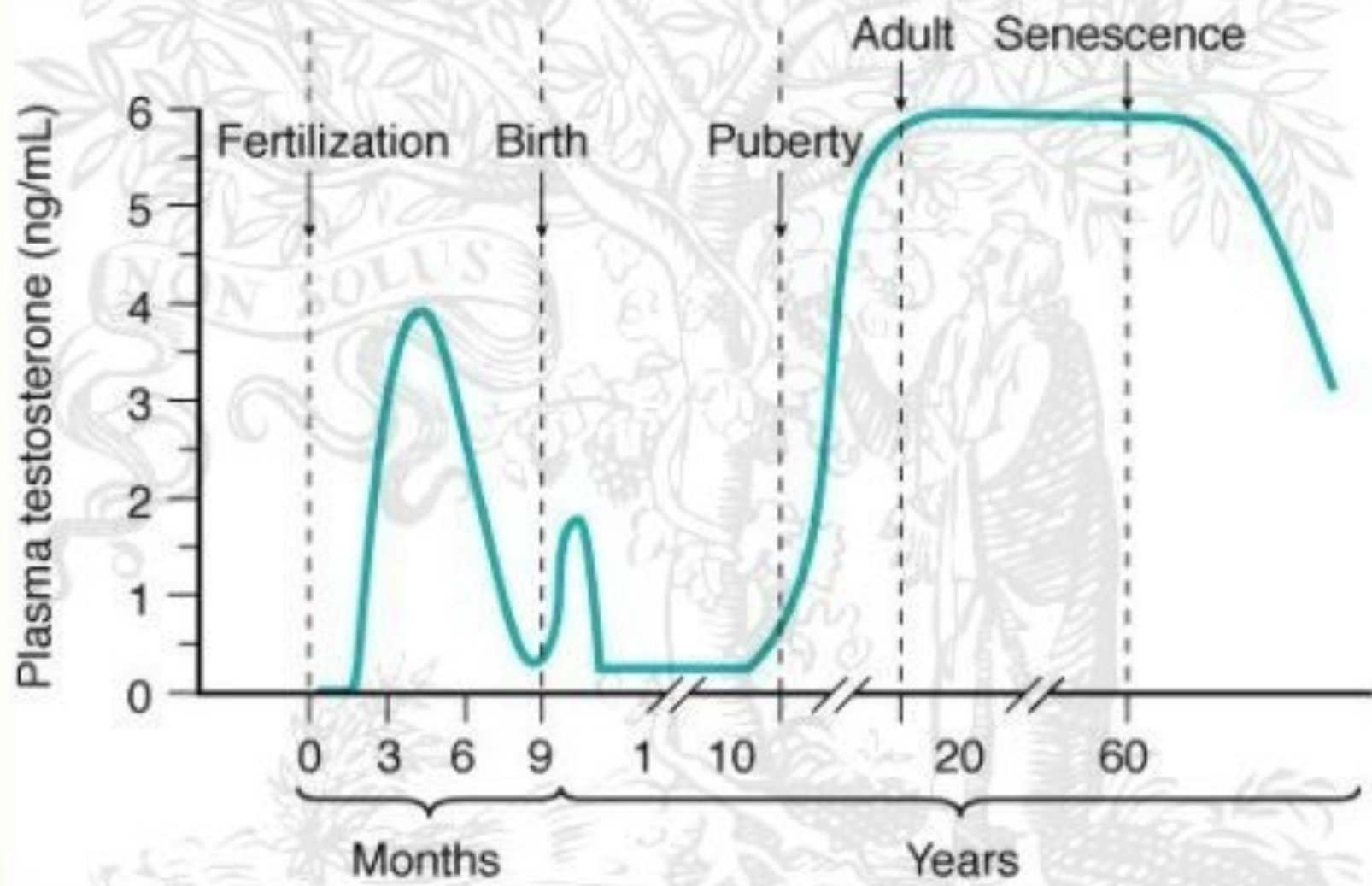
Environmental influences

- Red deer
 - High status ==> more males
 - Stress ==> more females

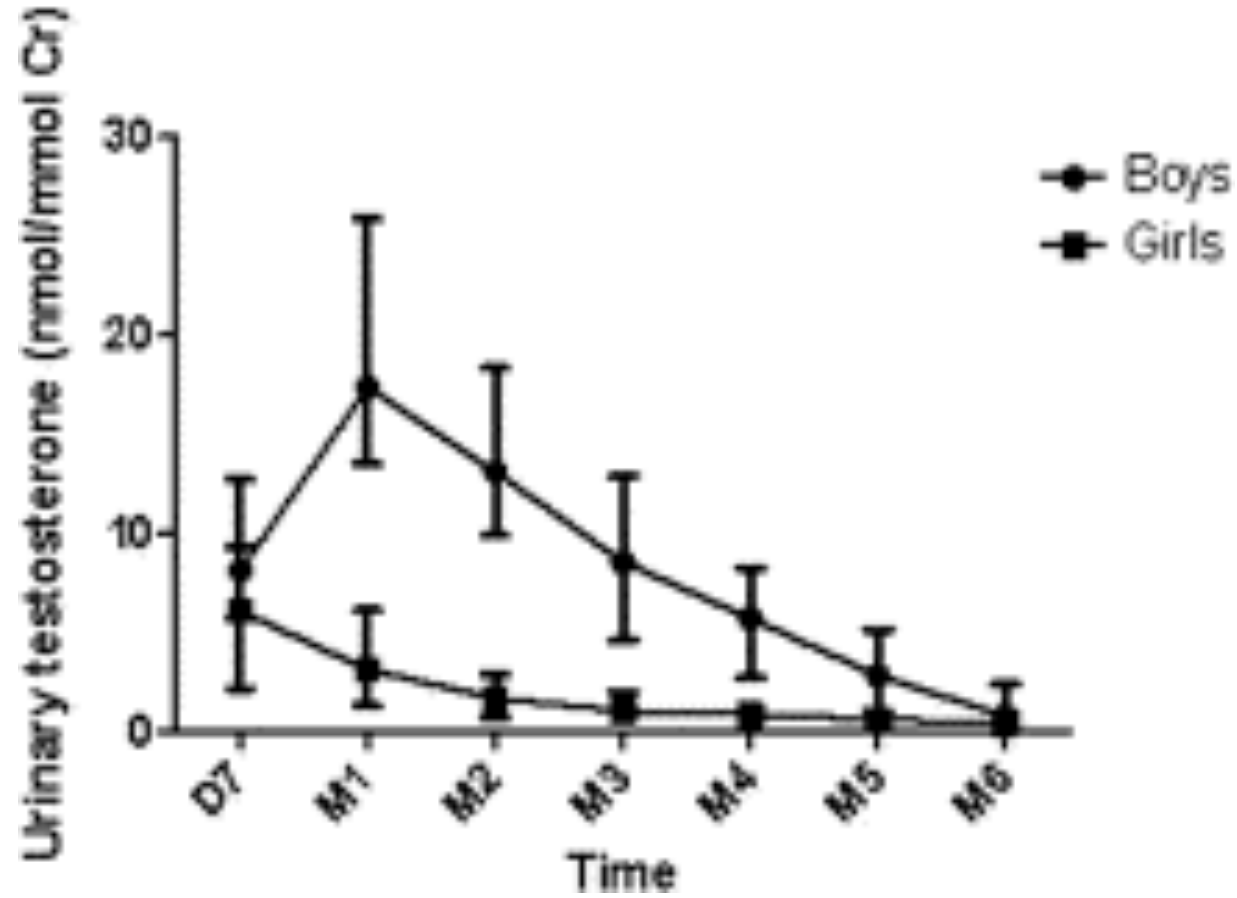
Effect of prenatal stress on testosterone levels







ET SEVTE



<http://www.sciencedirect.com/science/article/pii/S0018506X1200044X>

Small predictor of toy choices at 14 months???

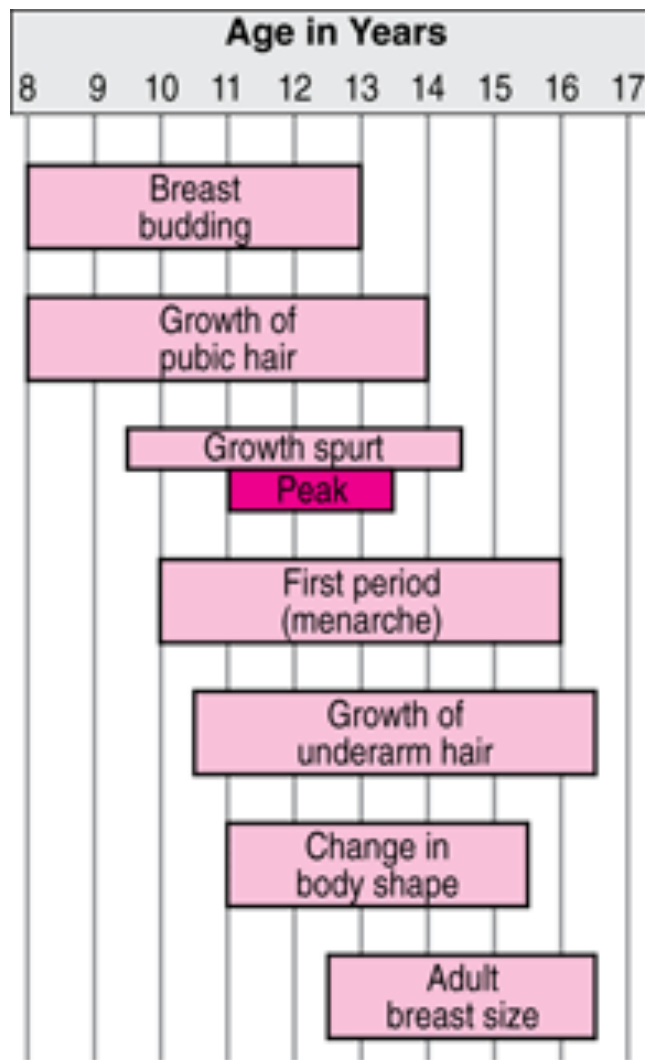
Puberty

Body changes

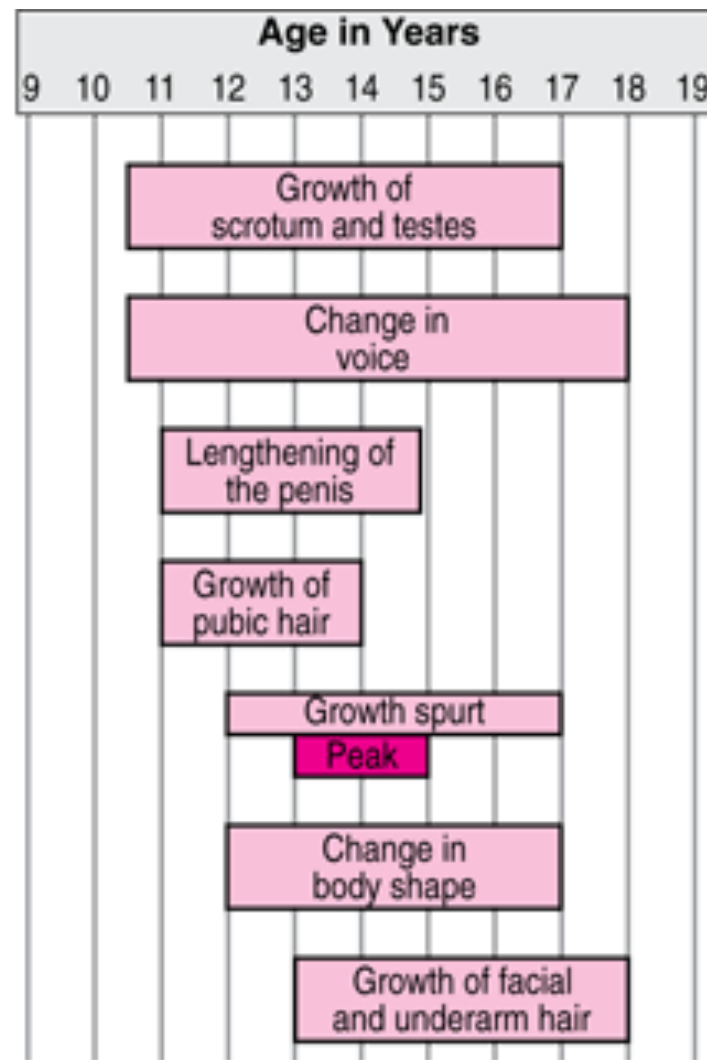
Hormonal changes

Behavioral changes

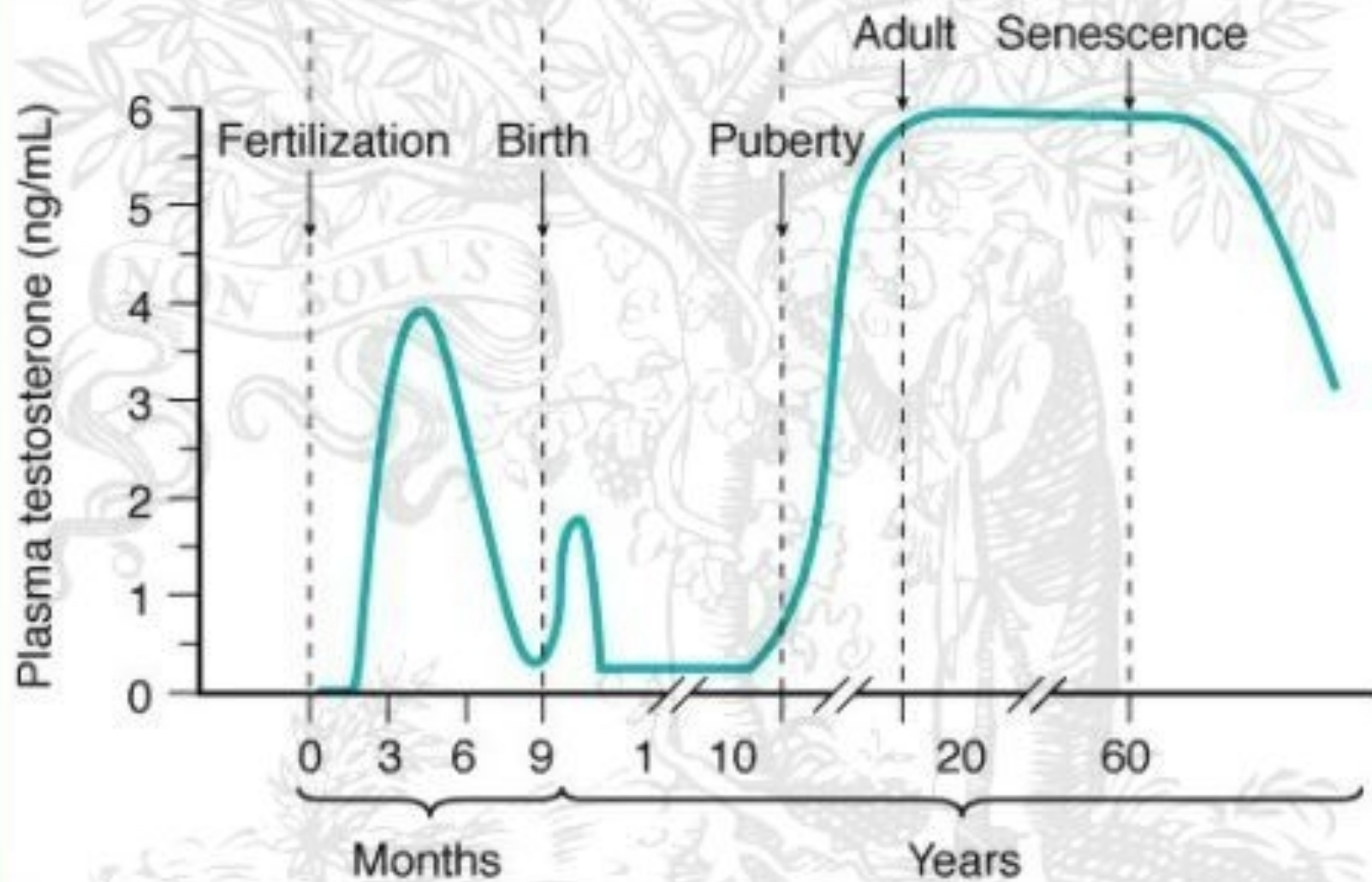
Puberty



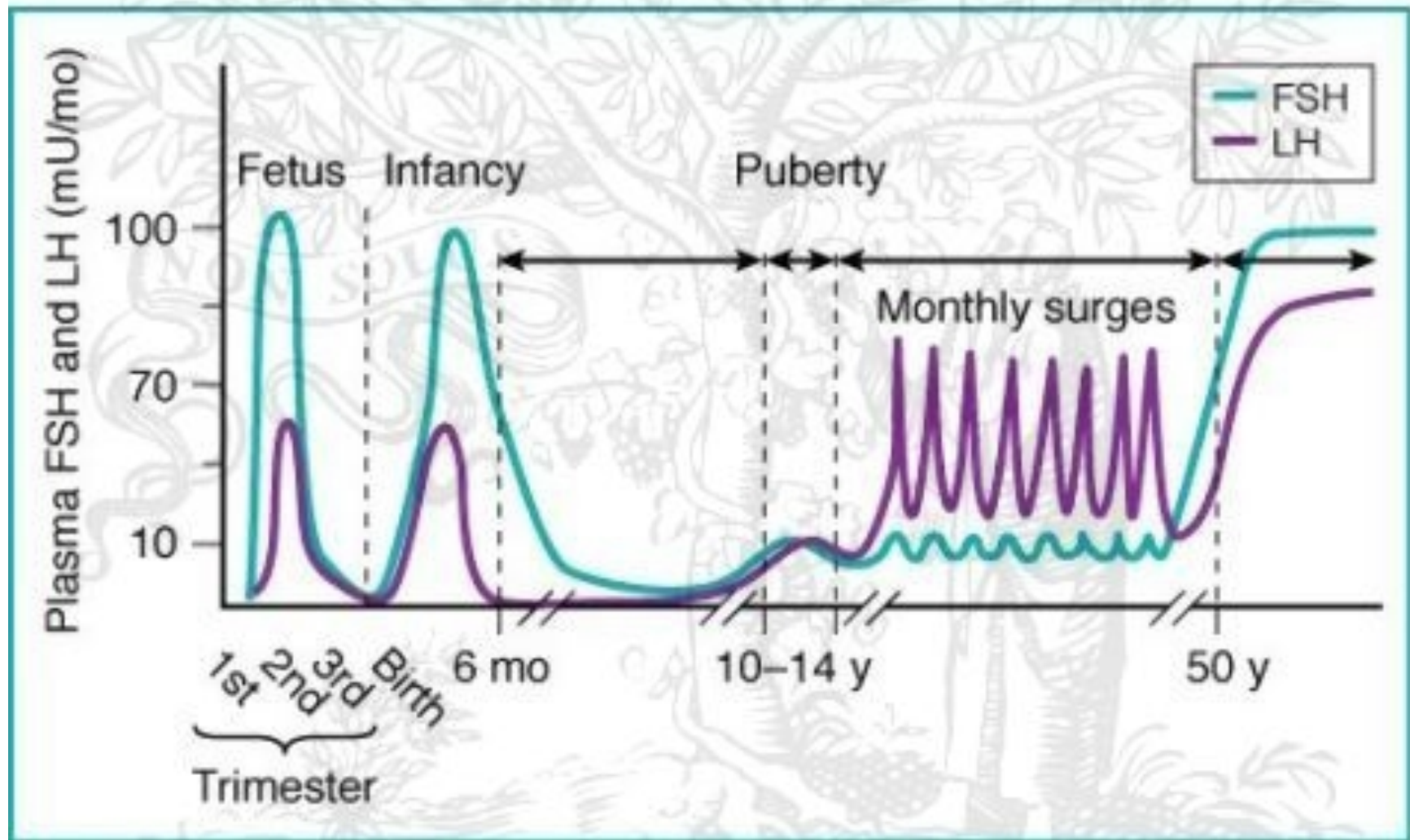
Girls

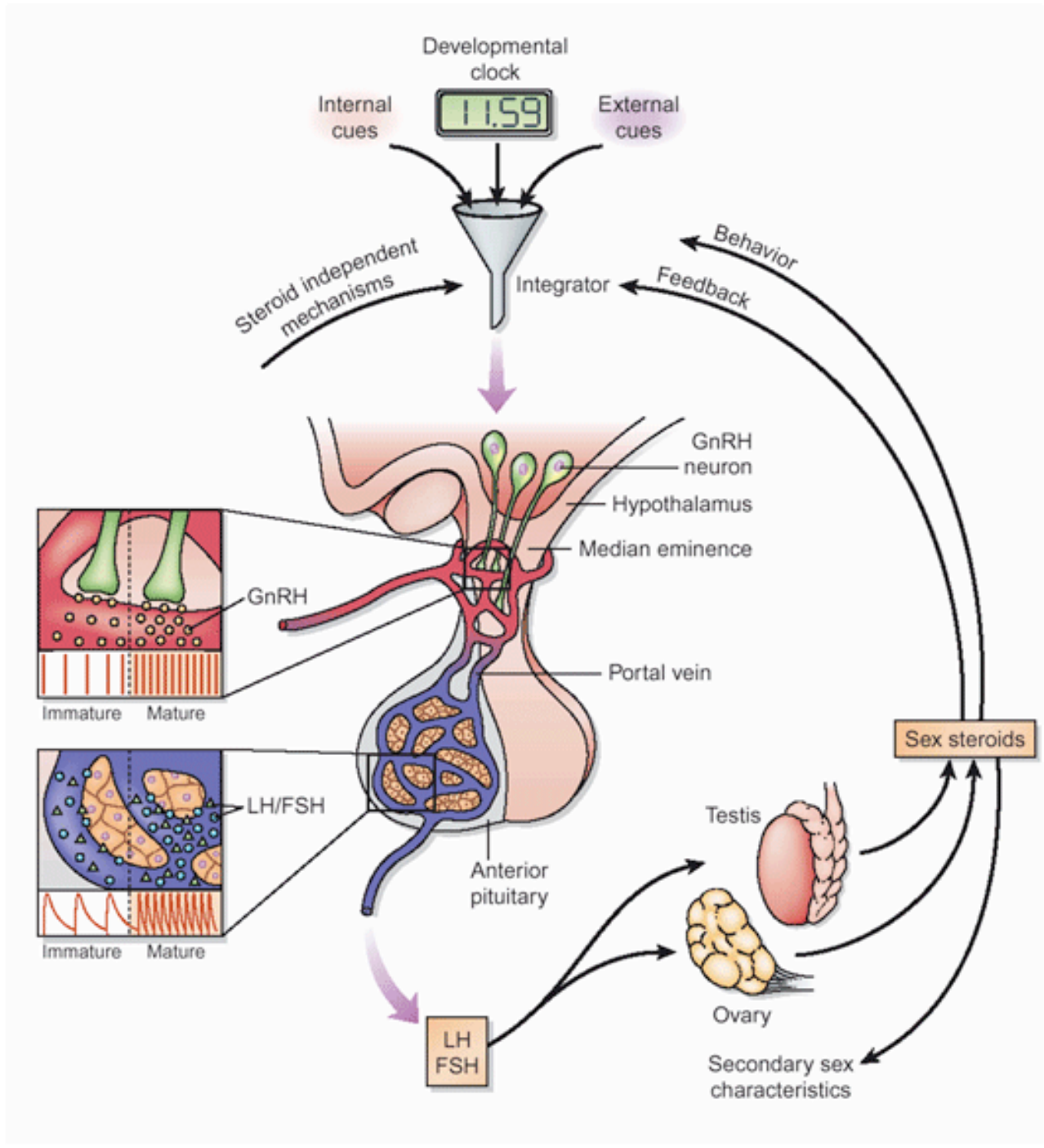


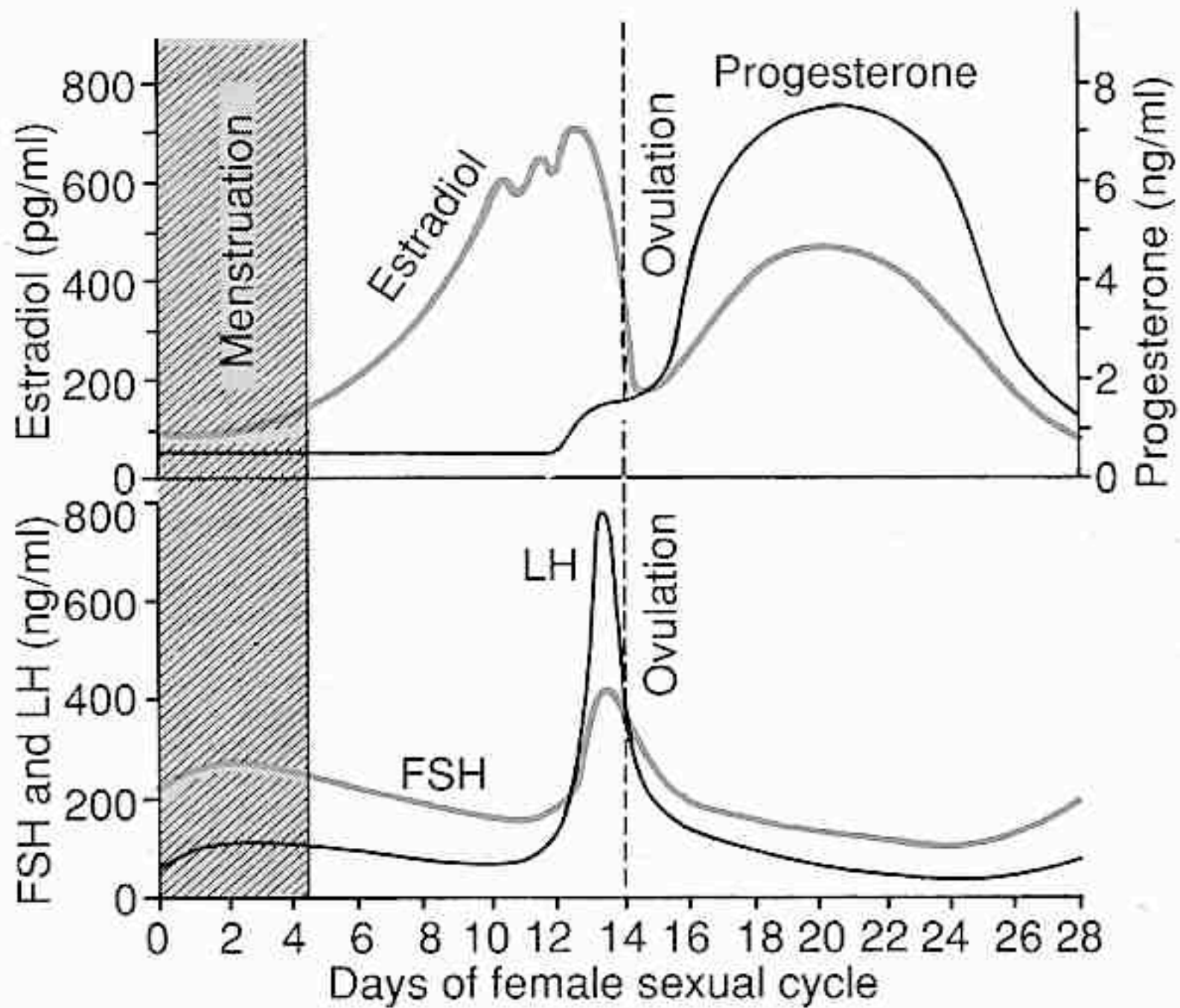
Boys

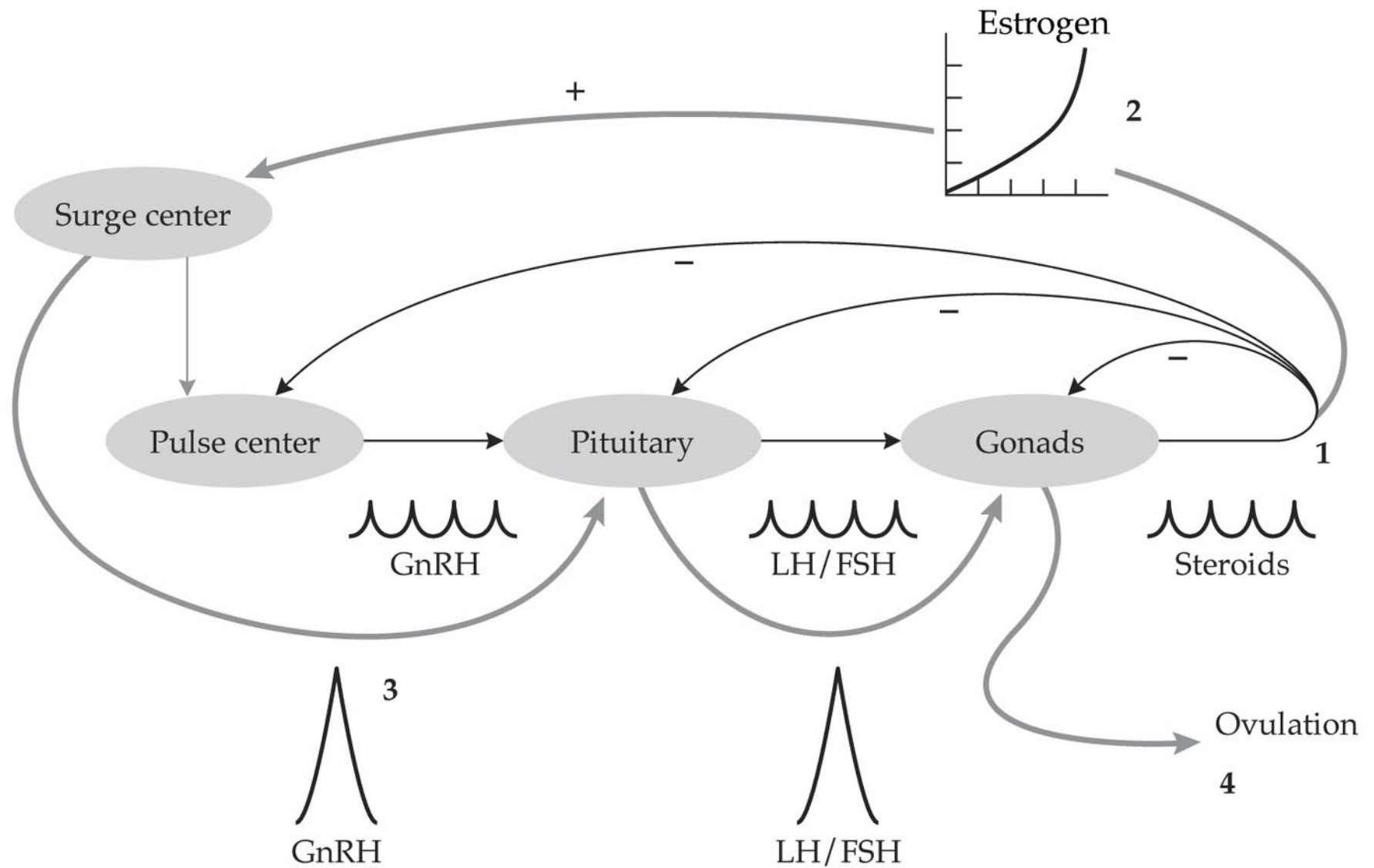


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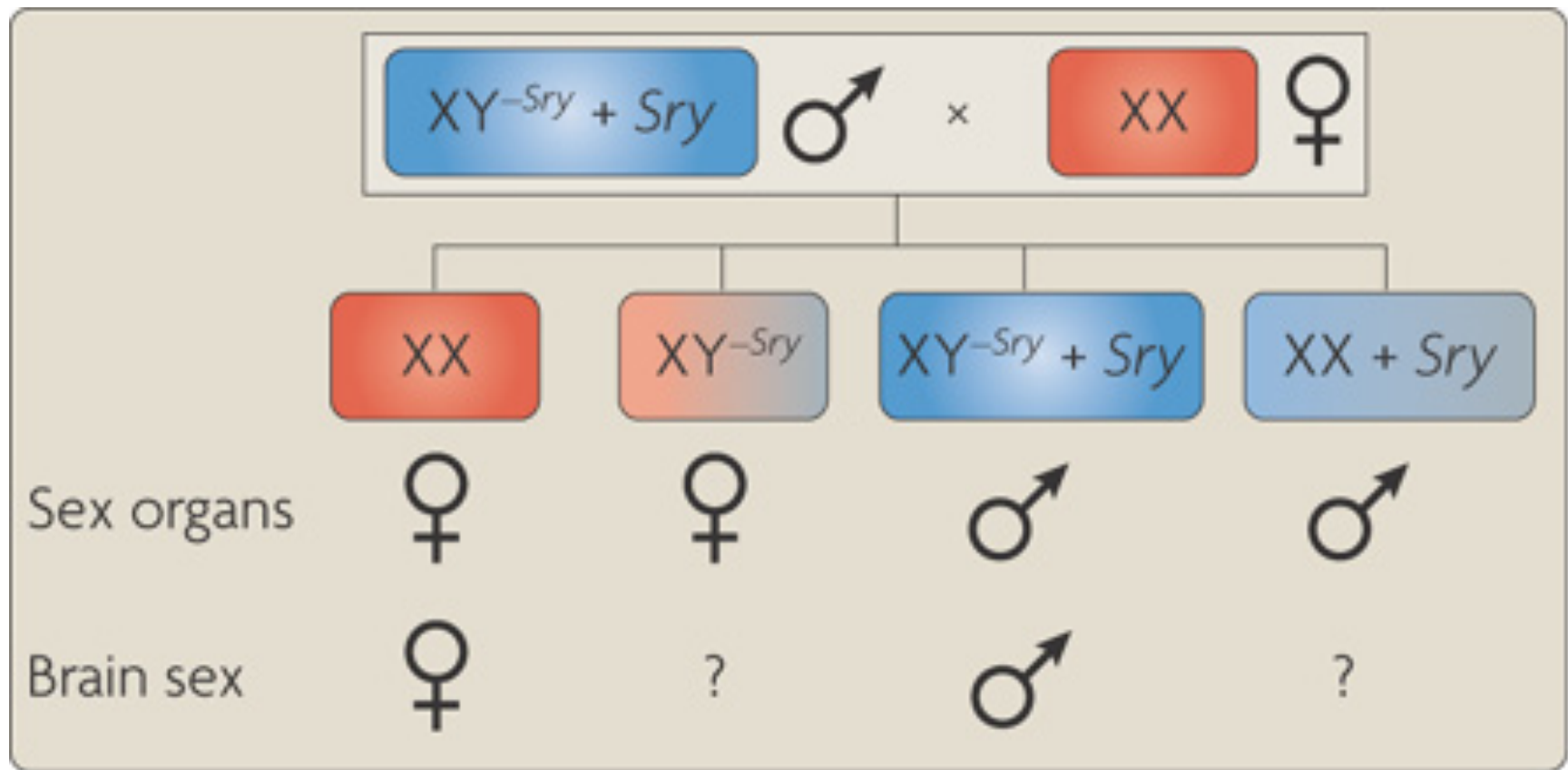




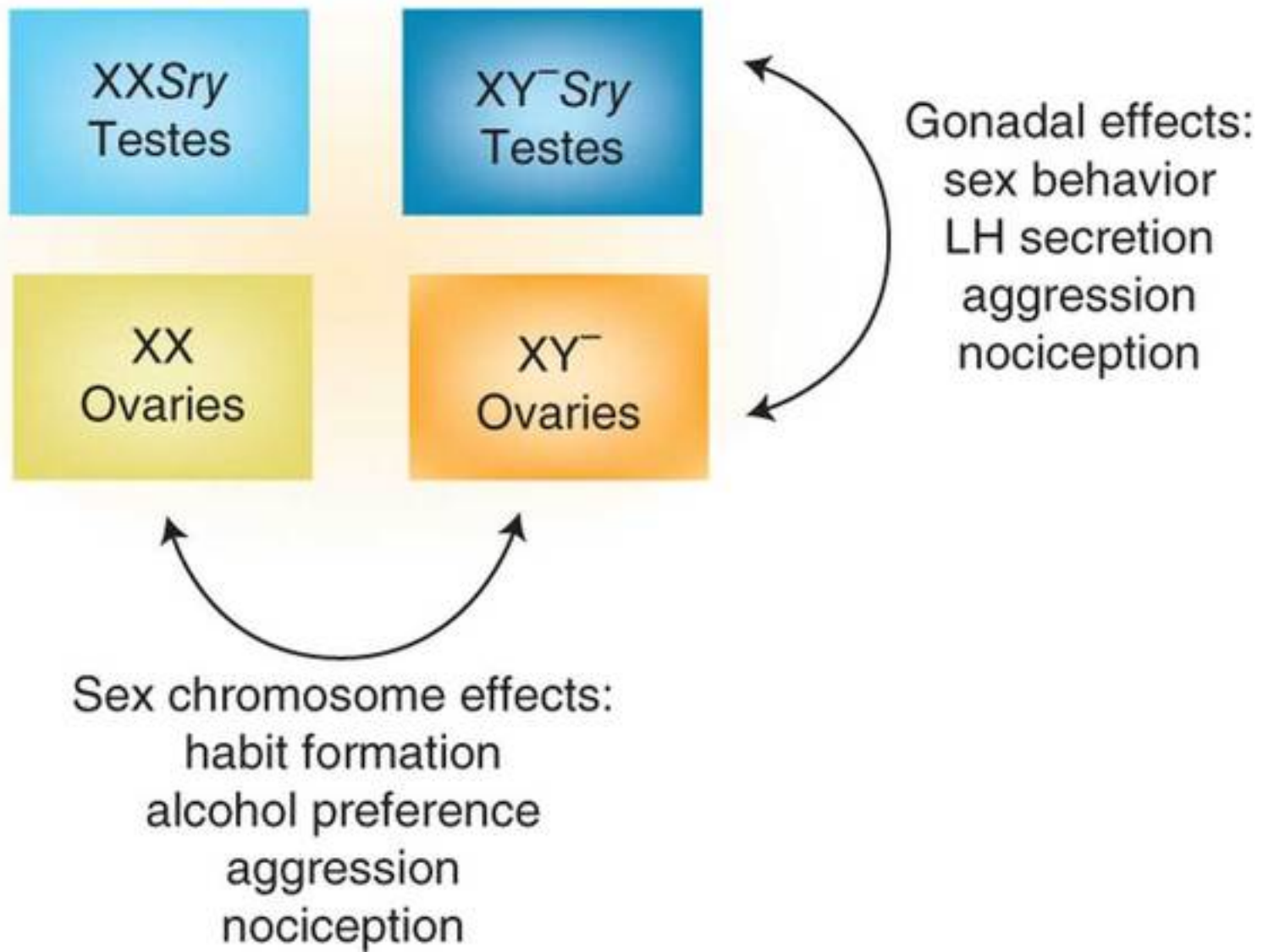


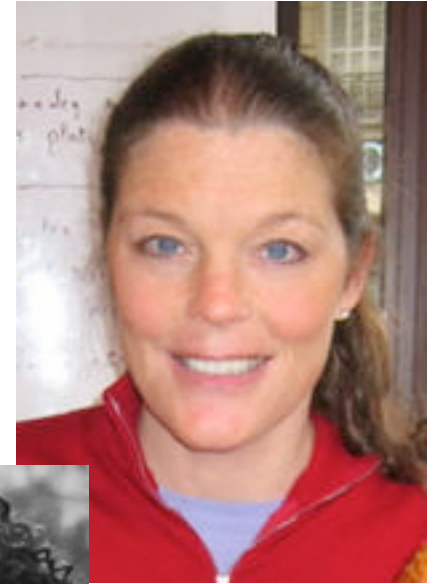
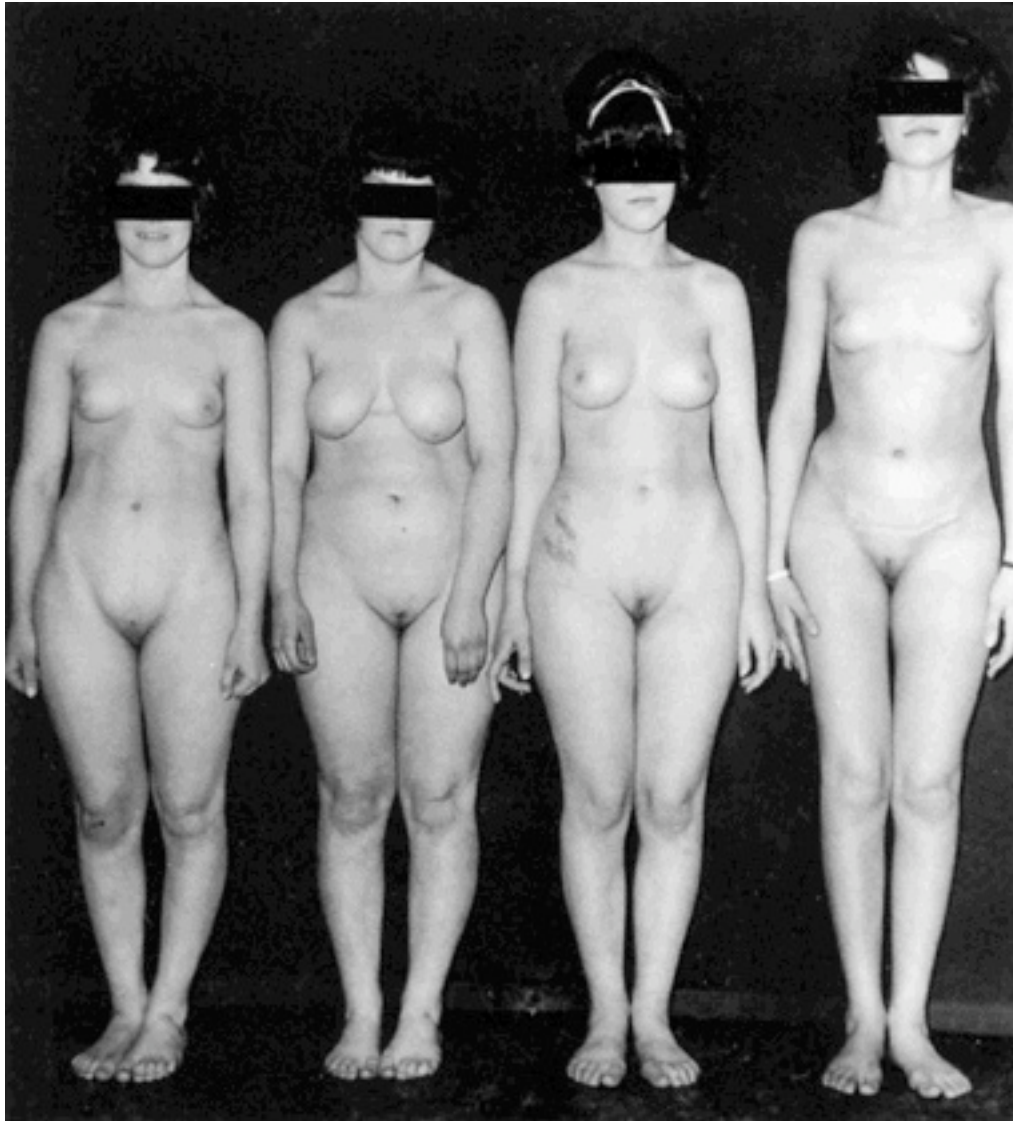


Is SRY responsible for everything?



Four core genotypes





Variations

- **Androgen Insensitivity Syndrome**
 - Mutation on X chromosome
 - Affects males only
- **Gonad?**
- **Sex steroids?**
- **Ducts?**
- **Genitals?**
- **Gender Identity?**

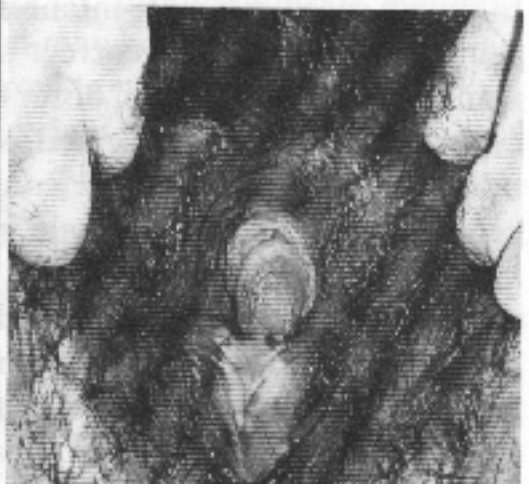
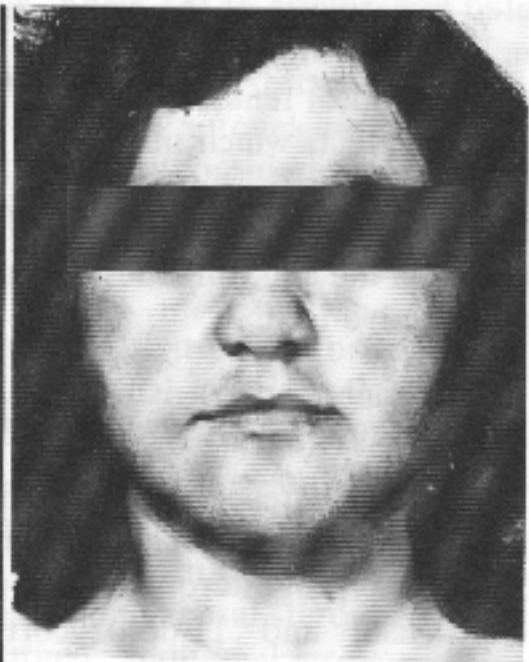
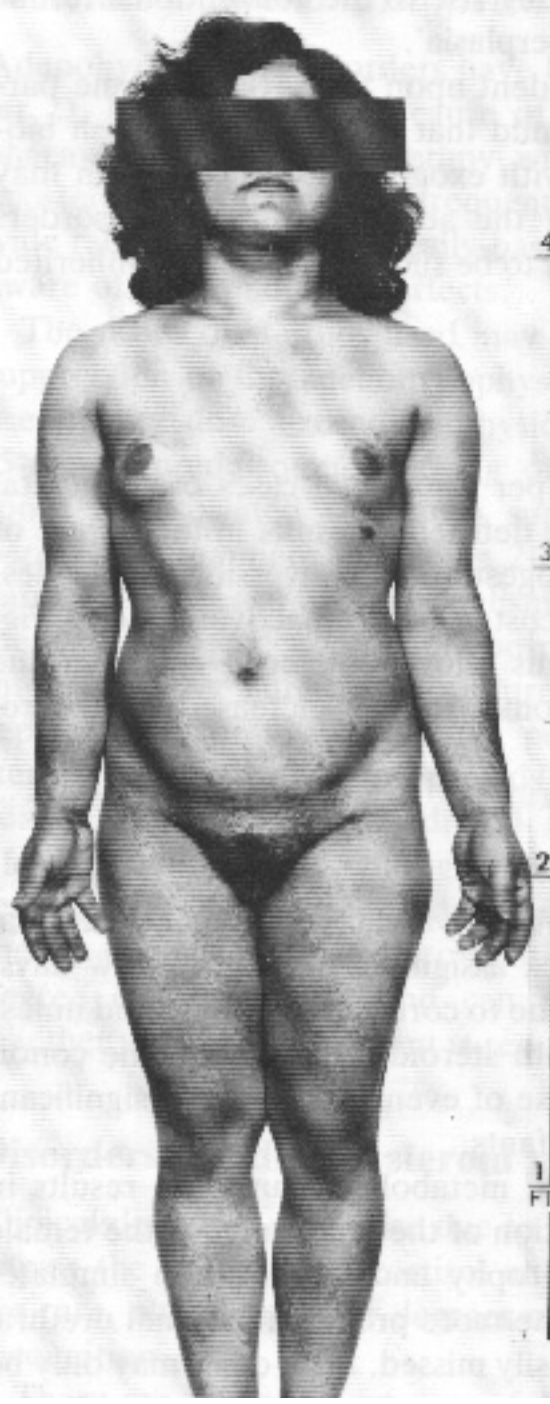
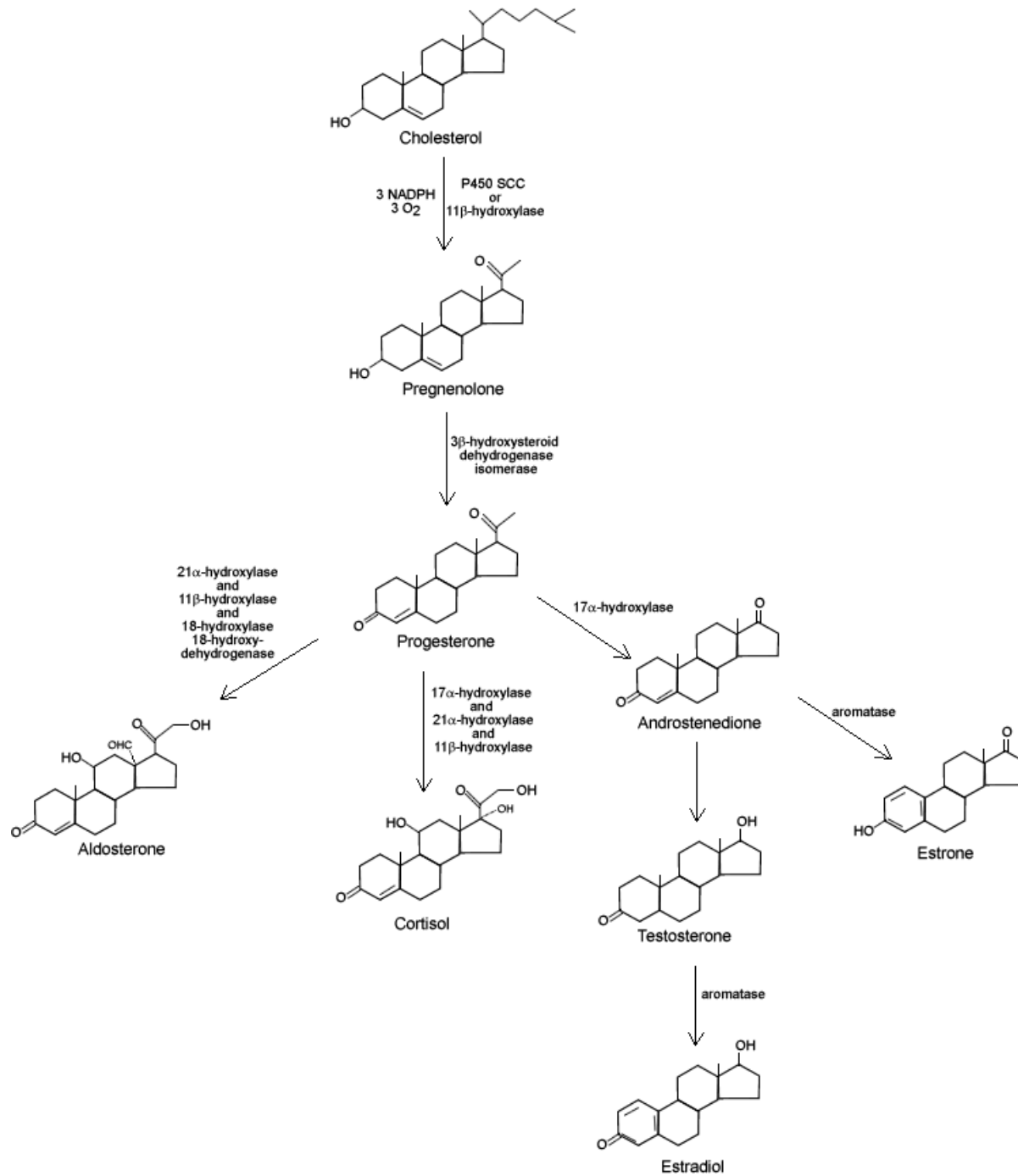
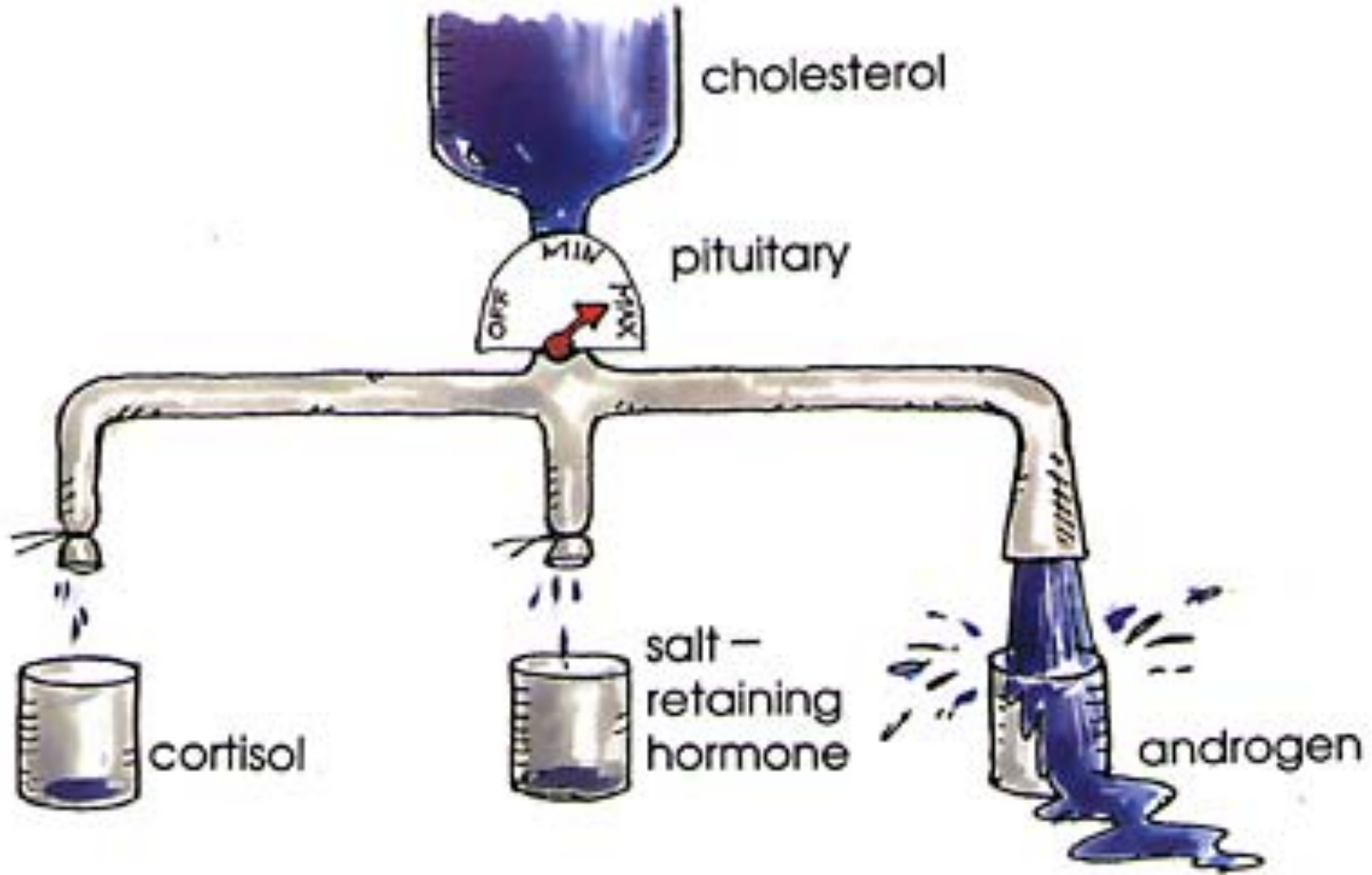


Figure 3 Newborn genetic female (46XX) with congenital adrenal hyperplasia due to complete 21-hydroxylase deficiency



Nelson CP and Gearhart JP (2004) Current views on evaluation, management, and gender assignment of the intersex infant. *Nat Clin Pract Urol* 1: 38–43 doi:10.1038/ncpuro0028



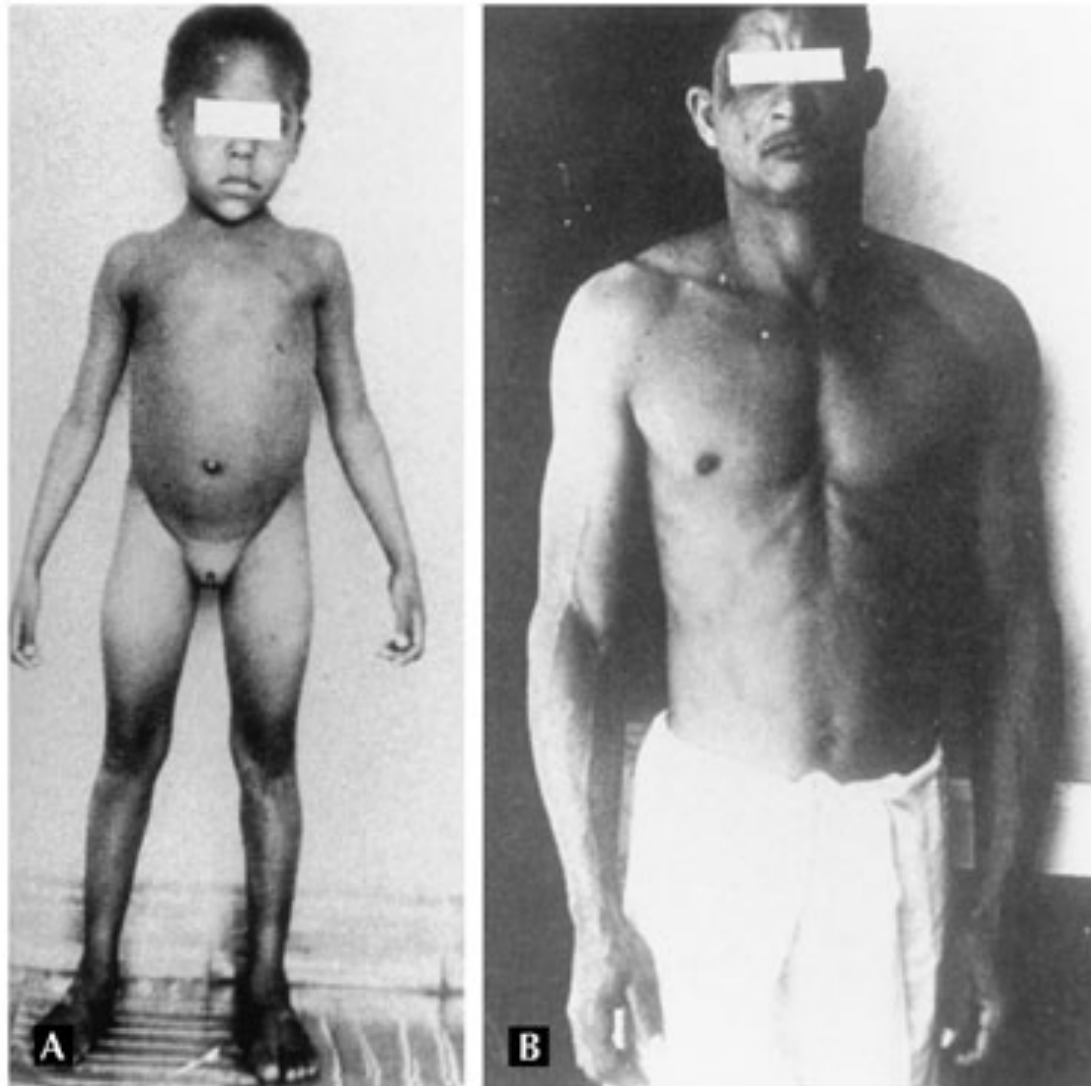


Variations

- Congenital Adrenal Hyperplasia
 - Significant for females
- Gonad?
- Sex steroids?
- Ducts?
- Genitals?
- Gender Identity?

Figure 4. Two patients with 5 α -reductase deficiencies.

Two patients with 5 α -reductase deficiencies. A, Before puberty, the patient presents as a phenol



Variations

- 5 α reductase deficiency
 - What does this do?
- Gonad?
- Sex steroids?
- Ducts?
- Genitals?
- Gender Identity?



Figure 1. Patient with Klinefelters syndrome (XXY karyotype).

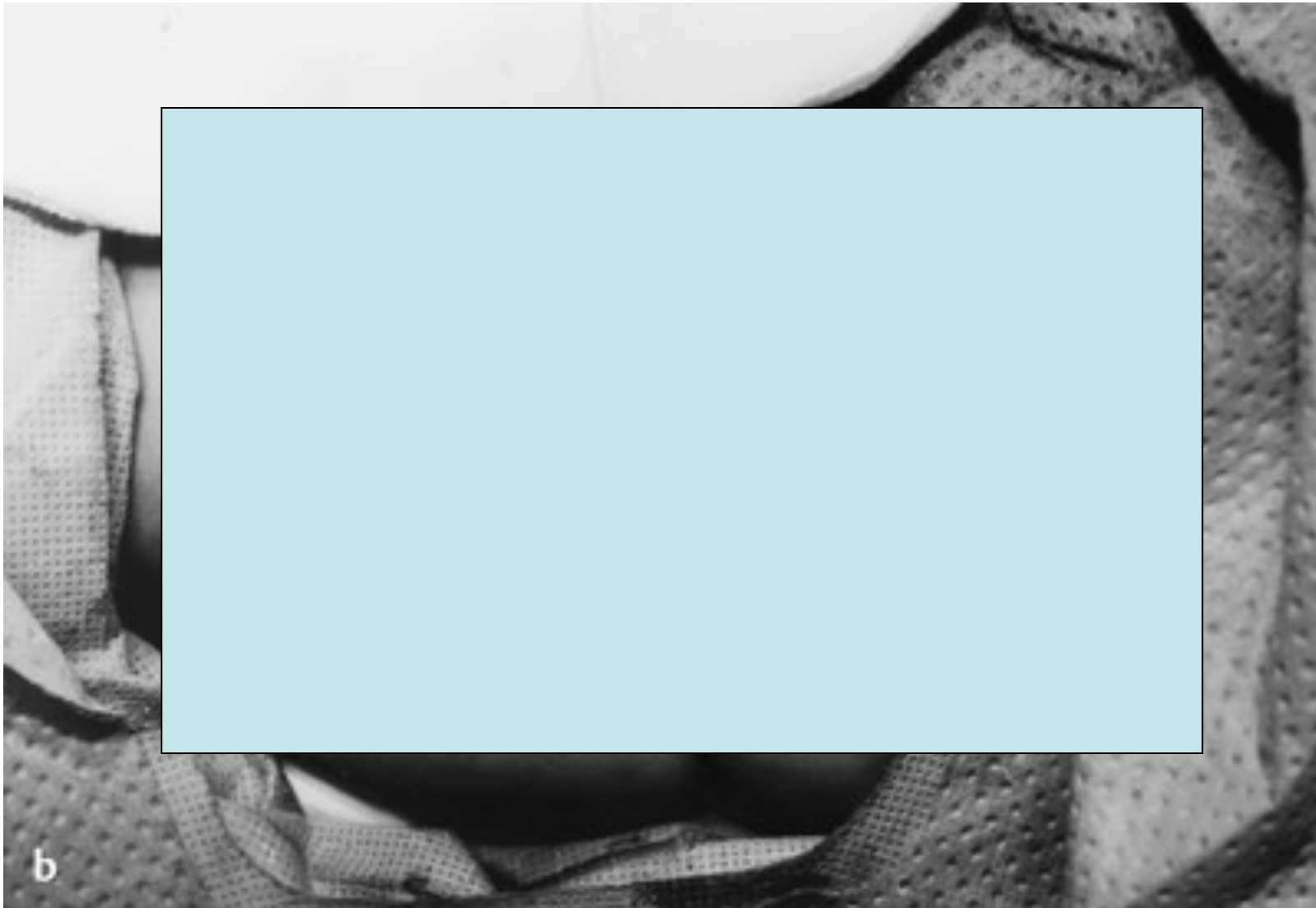
Patient with Klinefelters syndrome (XXY karyotype). Note the relatively normal masculine appearan

Variations

- Klinefelter's syndrome
 - Extra X chromosome
- Gonad?
- Sex steroids?
- Ducts?
- Genitals?
- Gender Identity?

Variations

- Persistent Mullerian Duct Syndrome (PMDS)



Feminizing Genital Reconstruction: Experience with 52 Cases of Ambiguous Genitalia

A. Al-Bassam¹, A. Gado¹

¹ Division of Pediatric Surgery, Department of Surgery, King Khalid University Hospital, Riyadh, Saudi Arabia

Timeframe

- Will hormones reverse your sex in adulthood? Any part of it?
- Permanent effects (organizational)
- Reversible effects (activational)