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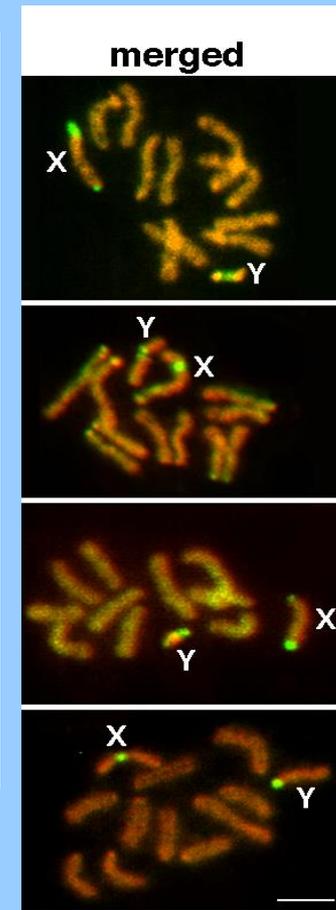
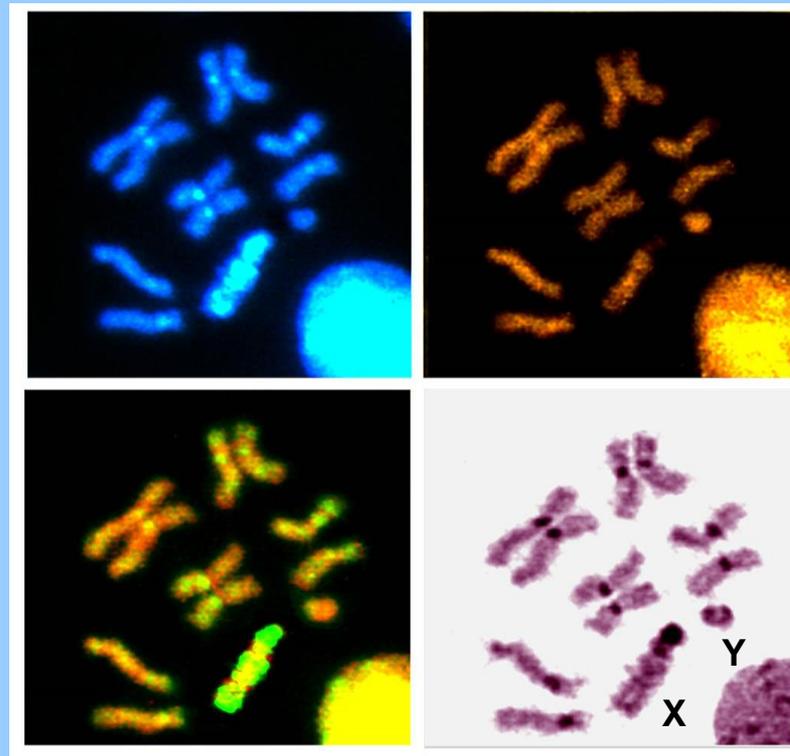
## Aula 5. Evolução dos cromossomos sexuais

### Cromossomos sexuais - heterocromatina

*Anastrepha fraterculus*

*Ceratitis capitata*

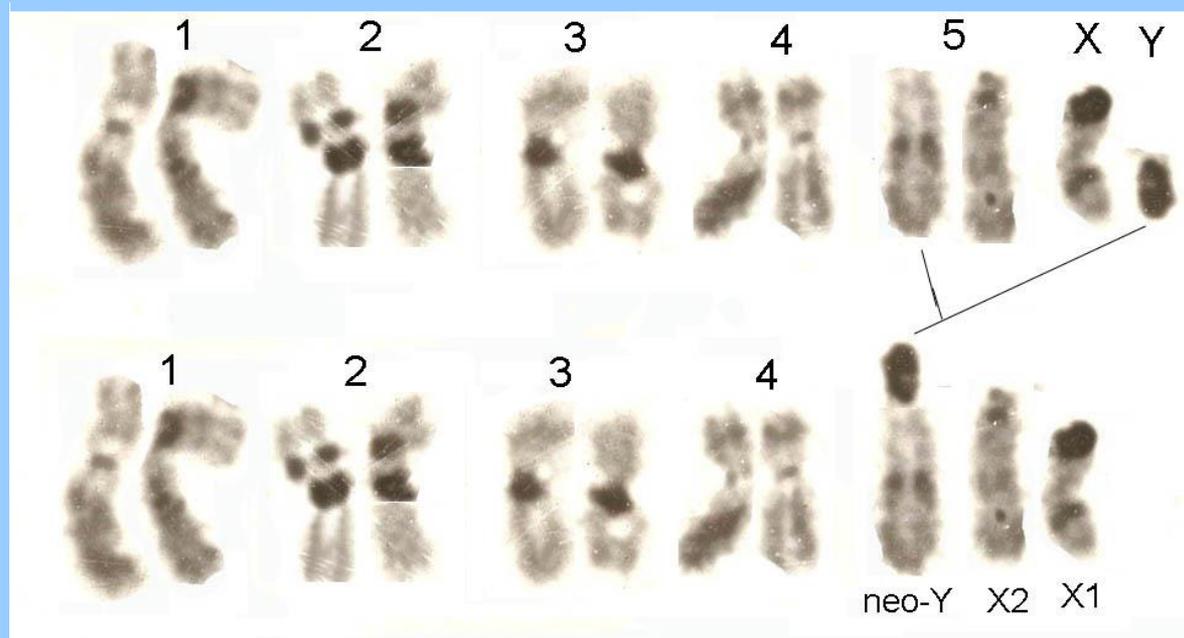
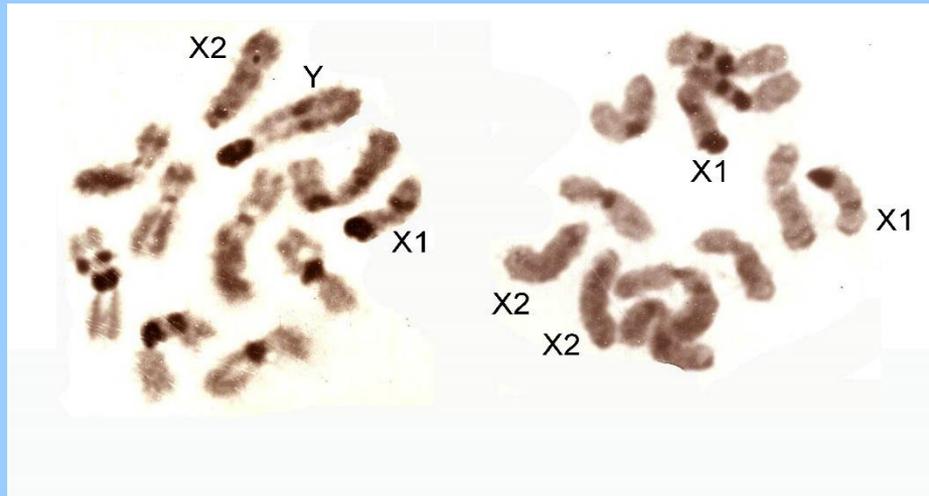
DAPI → AT  
CMA3 → GC



# Cromossomos sexuais em Dípteros

Suborder	Infraorder	Family	Genus	Sex chromosomes	
Nematocera	Tipulomorpha	Tipulidae	<i>Tipula</i>	XX/XY, H	
			<i>Pales</i>	XX/XY	
	Bibionomorpha	Sciaridae	<i>Sciara</i>	XX/X0 (somatic)	
			<i>Mayetiola</i>	$X_1X_1X_2X_2/X_1X_20$	
	Culicomorpha	Culicidae	<i>Culex</i>	H	
			<i>Anopheles</i>	H	
			<i>Aedes</i>	XX/XY	
		Simuliidae	<i>Eusimulium</i>	H	
			Chironomidae	<i>Chironomus</i>	H
					<i>Polypedilum</i>
Brachycera	Tabanomorpha	Tabanidae		XX/XY	
		Stratiomyidae		XX/XY	
Cyclorrhapha	Muscomorpha	Phoridae	<i>Megaselia</i>	H	
			Schizophora	Tephritidae	<i>Ceratitis</i>
	<i>Anastrepha</i> (exceptions)	$X_1X_1X_2X_2/X_1X_2Y$ ZW/ZZ			
	Drosophilidae	<i>Drosophila</i>			XX/XY (exceptions: X0, $X_1X_2Y, XY_1Y_2$ )
	Schizophora Calyptratae	Muscidae	<i>Musca</i>	XX/XY, H	
			Calliphoridae	<i>Calliphora</i>	XX/XY, H
				<i>Chrysomya</i>	XX/XY, H
	<i>Lucilia</i>	XX/XY			

# Cariótipo de *Anastrepha serpentina*



## Sistemas de cromossomos sexuais: vertebrados

### **Cromossomos homomórficos**

Anfíbios, répteis, maioria das espécies de peixes

### **Peixes ( $\approx$ 5% das espécies)**

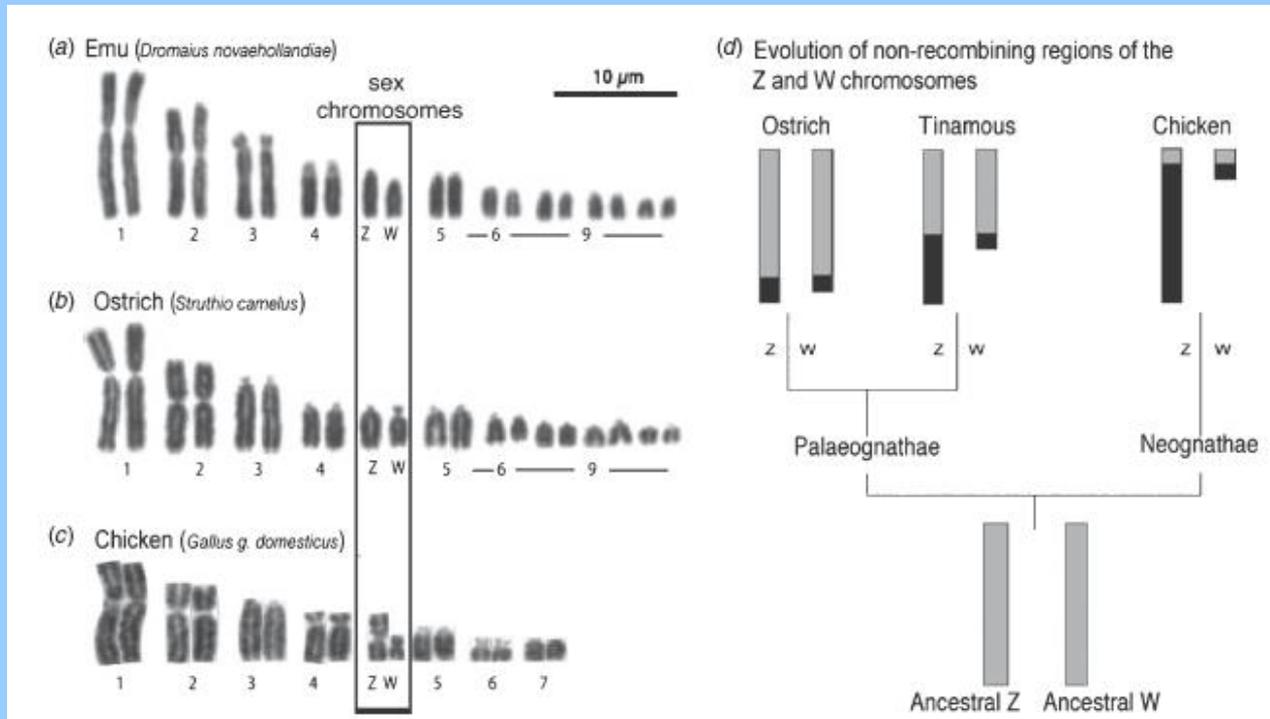
$XX:XY$  -  $XX:XO$  -  $X_1 X_1 X_2 X_2 : X_1 X_2 Y$  -  $ZZ:ZW$  -  $XX:XY_1 Y_2$

### **Aves e serpentes**

$ZZ$  (machos) e  $ZW$  (fêmeas)

**Mamíferos**  $\rightarrow$   $XX:XY$  (maioria) -  $XX:XO$  -  $XX:XY_1 Y_2$  -  $X_1 X_1 X_2 X_2 : X_1 X_2 Y$

## Cromossomos sexuais aves



Smith (2010) *Emu* **110**: 364–377

# Modificações nos cromossomos Z e W de Aves

## Genome assembly

ID: acrAru1

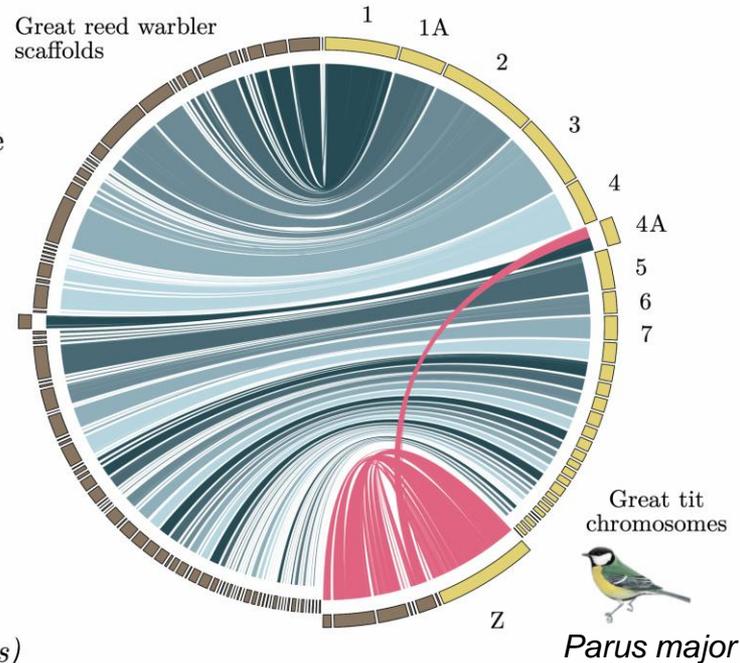
N50: 21.5 Mb

BUSCO: 93.1% complete



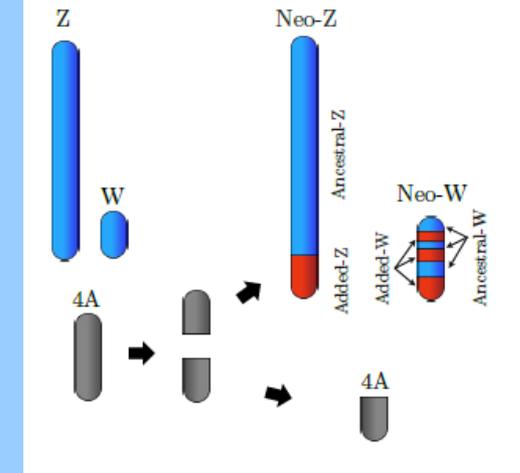
Great reed warbler  
(*Acrocephalus arundinaceus*)

Rouxinol gande-dos-caniços



(Chapim real)

## Neo-sex chromosome formation



Sigeman et al., Mol Biol Evol 38: 5275-5291 (2021)

# Cromossomos sexuais de um Ornitorrinco

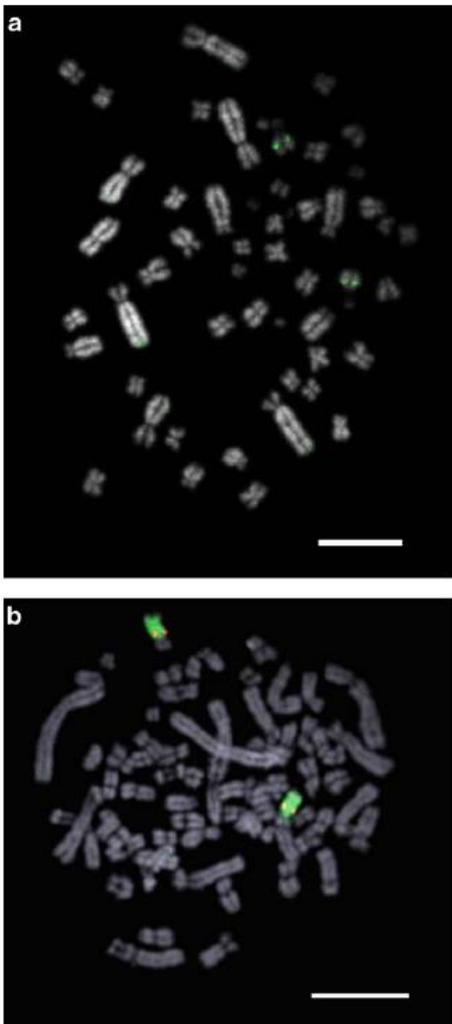
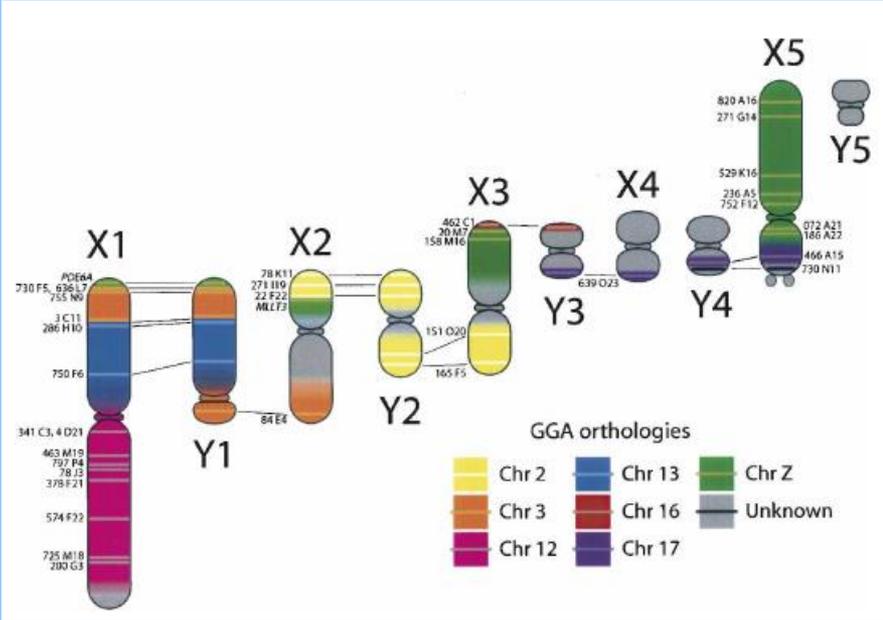


Figure 2. a Localization of BAC representing *SOX3*-containing Ultracontig 15 to platypus chromosome 6. b Co-localization of echidna *SOX3*-containing BAC and platypus chromosome 6 paint to male echidna chromosome 16. Scale bars represent 10  $\mu$ m.



Veyrunes et al.(2008) Genome Res. 18: 965-973

# Evolução dos cromossomos sexuais nos vertebrados

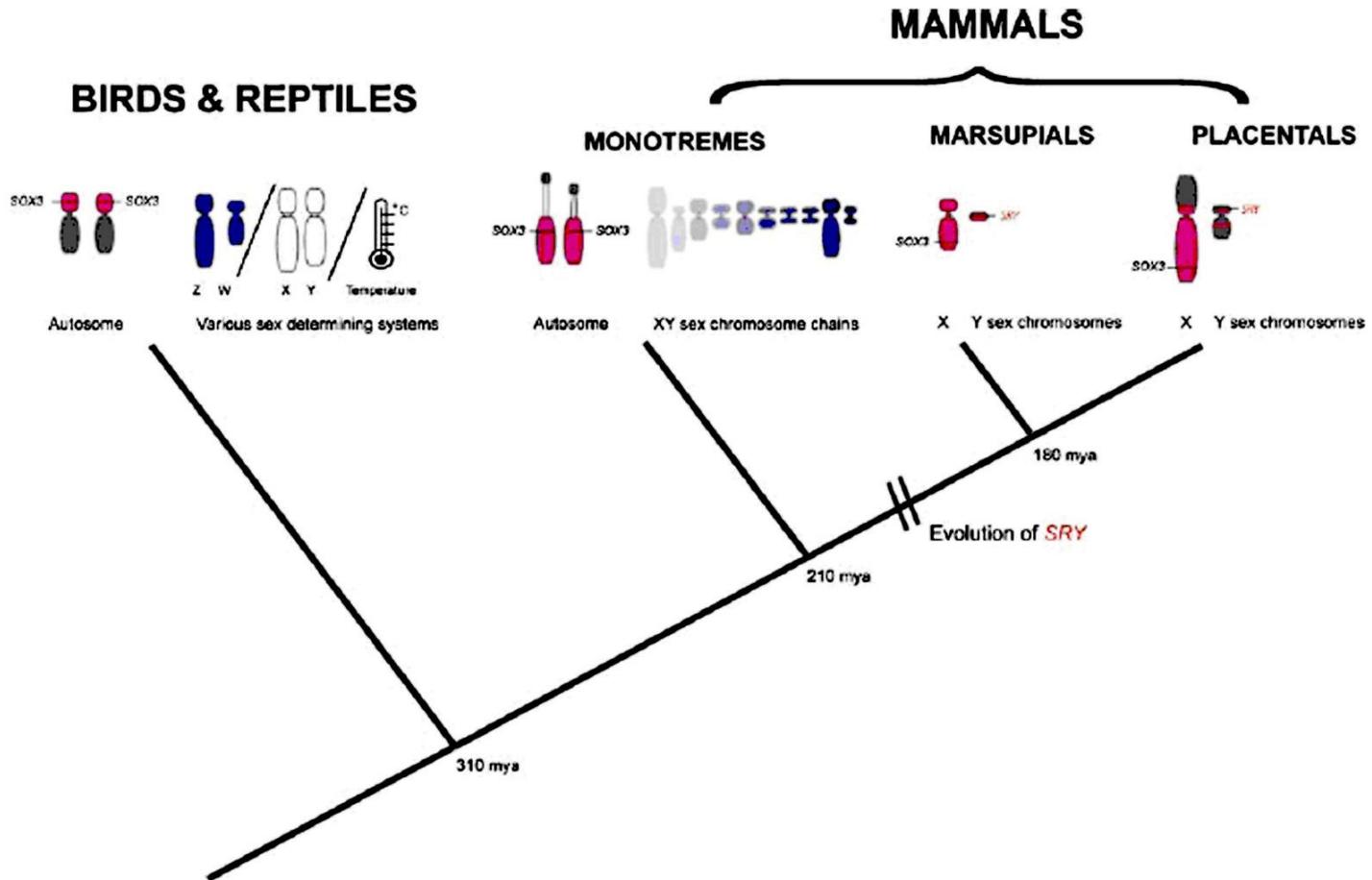
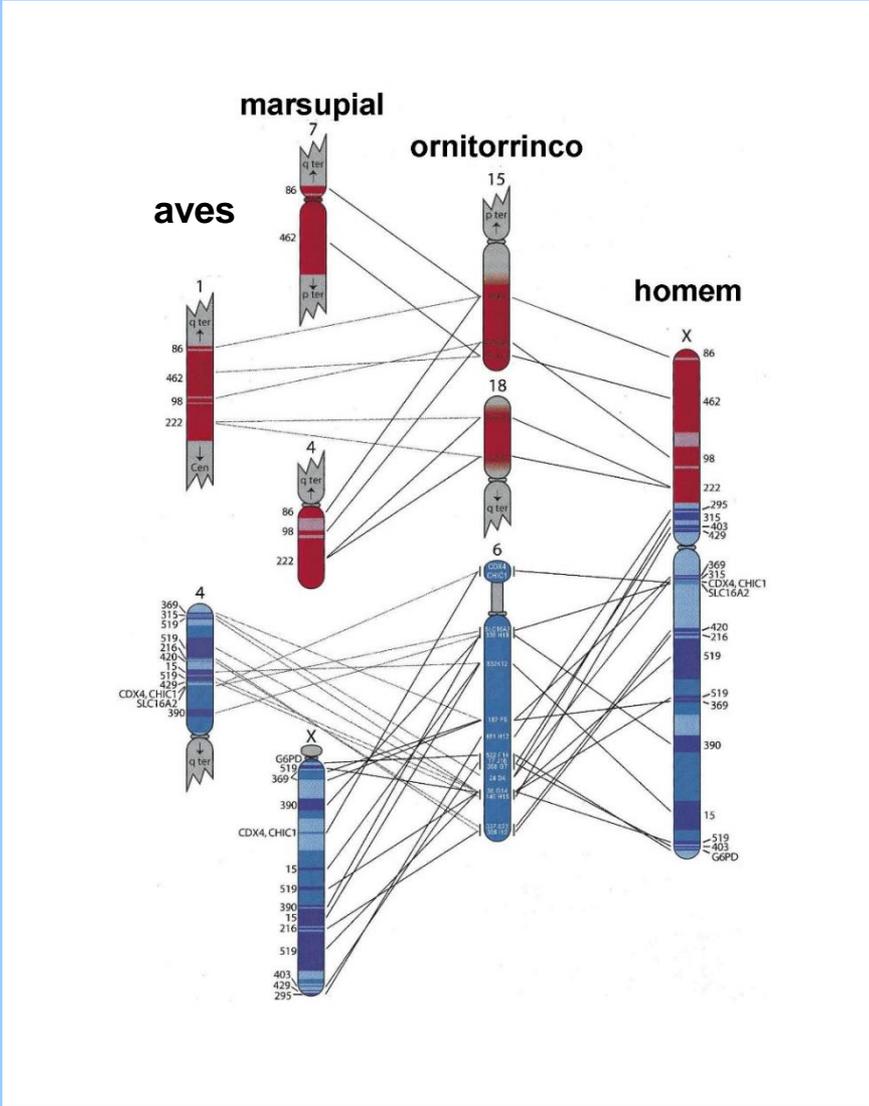


Figure 3. The evolution of the male-determining *SRY* gene from a *SOX3* allele defined new therian sex chromosomes from an autosome pair 210–180 million years ago.



# Origem do comossomo X



# Evolução de cromossomos sexuais

