Sex-specific behaviors

Focus on sexual orientation in
- Flies
- Rodents
- Sheep
- Humans

Are male-specific behaviors are controlled by SRY?

Let’s start with flies

Drosophila sexual development

**XX (X:A=1)**
- Sex lethal gene **ON**
  - Doublesex protein
  - **♀ soma**
  - **♀ nervous system**
  - Fruitless

**XY (X:A=0.5)**
- Sex lethal gene **OFF**
  - Doublesex protein
  - **♂ soma**
  - **♂ nervous system**
  - Fruitless

Fruitless is expressed in a subset of CNS neurons
Fruitless is necessary and sufficient for male sexual behavior!

Fruitless mutant males lack courtship behavior, and when they do attempt to mate, they indiscriminately attempt to mate with males and females.

Females that express Fruitless exhibit male courtship behavior and attempt to mate with females.

During early development testosterone regulates mating behavior in rats

Sexually dimorphic regions of the rat brain

Sexual orientation in sheep

8% of rams are male oriented; i.e., they mate with rams.
Male-oriented rams have a sexually dimorphic part of the brain that is similar in size to that in females.

What about humans?

John Money, an psychologist at Johns Hopkins University, was highly influential in promoting the idea that gender neutrality. Gender identity resulted from childhood experiences, and children could be assigned either gender.

Money’s theories affected David Thiessen

What about humans?

CAH: XX individuals that produce testosterone and are virilized. Individuals who were raised as females (involving surgery and hormone treatments):

- Increased chance of sexual identity being male.
- At least four times as likely to define themselves as lesbian or bisexual than female relatives.

XY pseudohermaphrodites: XY individuals lacking DHT were raised as males or females have not been well studied.
Are the brains of men and women different?

![Brain Image]

Do genes other than SRY contribute to sexual orientation?  
Or, is there a “gay gene”?

Twin studies (results from six studies):
When one brother is gay,  
52% identical twins, 22% of fraternal twins, and 22% of brothers are gay.

When one sister is lesbian,  
48% of identical twins, 16% of fraternal twins, and 13% of sisters were also lesbian.

Could there be a gene on the X chromosome that contributes to sexual orientation in males?

<table>
<thead>
<tr>
<th>RESEARCHERS</th>
<th>BRAIN REGION</th>
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<tbody>
<tr>
<td>Sweab and Filers, 1985</td>
<td>Larger in men</td>
</tr>
<tr>
<td>Allen et al., 1989</td>
<td>No sex difference</td>
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<tr>
<td>LoVay, 1991</td>
<td>No sex difference</td>
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Other investigators have been unable to replicate the Hamer findings!

![X Chromosome Diagram]

A linkage between DNA markers on the X chromosome and male sexual orientation.  
Hamer DH, Hu S, Magnuson VL, Hu N, Pattatucci AM.  
Laboratory of Biochemistry, National Cancer Institute, National Institutes of Health, Bethesda, MD 20892.  
Science 1993

Could there be a gene on the X chromosome that contributes to sexual orientation in males?
Is there a “gay gene”?

If you define a “gay gene” as necessary and sufficient for a particular sexual orientation, then the answer is absolutely no.

If you define a “gay gene” as a gene that predisposes a male or female toward homosexuality, then the twin studies suggest that there may be genes with this property.

What is also clear is that environmental conditions, which could range from conditions in utero to upbringing, also shape sexual orientation.