Mostly sperm evolution

Mostly brain evolution
Spermatogenesis

Mouse: 34.5 days
Human: 65 days

Each and every day for 60-70 years
200-290 million sperm cells are made.

Each ejaculation releases
"280-290 million sperm"

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**Table 1.** The number of genes in each of the eight clusters that show apparent testis-specific expression

<table>
<thead>
<tr>
<th>Cluster</th>
<th>Total</th>
<th>Number</th>
<th>Unknowns/unknown expressed</th>
<th>Specifics</th>
<th>Only one other</th>
<th>Only two other</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>277</td>
<td>116</td>
<td>192</td>
<td>49 (22.1%)</td>
<td>12 (5.3%)</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>342</td>
<td>136</td>
<td>146</td>
<td>51 (15.1%)</td>
<td>20 (5.0%)</td>
<td>7 (1.3%)</td>
</tr>
<tr>
<td>3</td>
<td>184</td>
<td>1</td>
<td>183</td>
<td>52 (28.2%)</td>
<td>8 (4.4%)</td>
<td>7 (3.8%)</td>
</tr>
<tr>
<td>4</td>
<td>194</td>
<td>1</td>
<td>193</td>
<td>48 (24.9%)</td>
<td>8 (4.1%)</td>
<td>7 (3.6%)</td>
</tr>
<tr>
<td>5</td>
<td>180</td>
<td>1</td>
<td>179</td>
<td>49 (27.2%)</td>
<td>8 (4.4%)</td>
<td>7 (3.8%)</td>
</tr>
<tr>
<td>6</td>
<td>283</td>
<td>1</td>
<td>282</td>
<td>52 (18.4%)</td>
<td>8 (2.8%)</td>
<td>7 (2.5%)</td>
</tr>
<tr>
<td>7</td>
<td>277</td>
<td>1</td>
<td>276</td>
<td>51 (18.1%)</td>
<td>8 (2.9%)</td>
<td>7 (2.6%)</td>
</tr>
<tr>
<td>8</td>
<td>434</td>
<td>1</td>
<td>433</td>
<td>36 (8.3%)</td>
<td>7 (1.6%)</td>
<td>3 (0.7%)</td>
</tr>
</tbody>
</table>

*Expression data are based on microarray analysis of human and mouse testis datasets.
*The microarray analysis did not show a pattern of expression that fit the other eight clusters.

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**Q:** Why does a man have to release so many sperm cells for each ejaculation?

**A:** None of these male gametes is willing to ask for directions.

290,000,000 cells released
200 cells arrive to the vicinity of oocyte
Need to be 1) there, 2) alive, 3) able to be activated by oocyte when it ovulates
That leaves about 10 to 20 to attempt to find oocyte ("capacitated" sperm can sense temperature differences of 0.014°C/mm!

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Major selection on fertilization stage:
10 out of 290 x 10⁶ even possible?

Q: Why is it important to release so many sperm cells during an ejaculation?

A: The human sperm cell is a single cell that can be activated by the oocyte.

The number of sperm released during an ejaculation is estimated to be around 200-290 million.

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Spermatogenesis

- Mouse: 34.5 days
- Human: 65 days

- Each and every day for 60-70 years, 200-290 million sperm cells are made.

- Each ejaculation releases ~280-290 million sperm

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**Notes:**

- Spermatogenesis in mice and humans.
- The process involves the production of sperm cells from spermatogonia to mature spermatozoa.
- Each step of the process is crucial for the successful fertilization of the ovulated egg.
- The diagram illustrates the various stages of spermatogenesis, from the formation of spermatogonia to the production of mature sperm.

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**Image Descriptions:**

- A diagram showing the process of spermatogenesis in mice and humans.
- A chart displaying the number of genes in each of the eight clusters.
- An image of a sperm cell, highlighting the key components involved in fertilization.

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**Further Reading:**

- "Spermatogenesis: From Stem Cells to Spermatozoa" by J. D. Capel and D. G. Leibfried.
- "The Biology of the Sperm Cell" by J. M. Ross.

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**References:**

- [Link to relevant research articles and studies on spermatogenesis.]

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**Conclusion:**

The spermatogenesis process is a complex series of events that ensure the successful production of sperm cells. Understanding the mechanisms involved is crucial for reproductive health and fertility.
Spermatogenesis

Notice that cell division is not complete.

Each cell communicates with the others by cytoplasmic bridges.

WHY?

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Male mammals respond to a risk of sperm competition conveyed by odours of conspecific males

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1) Primary conjugation
2) Secondary conjugation

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Secondary conjugation

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Secondary conjugation