A secret about creationism

Even among ardent creationists, most believe in evolution.
Why?

- Natural selection is a provable biological process.
- Selection causes evolution critical in medicine, agriculture and biotech.
The potential power of natural selection is pretty obvious
Selection causes evolution with visible and dangerous results
# Case study 1: Antibiotics and staph infections

<table>
<thead>
<tr>
<th>Year</th>
<th>Event</th>
</tr>
</thead>
<tbody>
<tr>
<td>1943</td>
<td>Penicillin commercially available</td>
</tr>
<tr>
<td>1947</td>
<td>First resistance reported</td>
</tr>
<tr>
<td>1960’s</td>
<td>Switch to methicillin</td>
</tr>
<tr>
<td>1980’s</td>
<td>Methicillin resistance rising</td>
</tr>
<tr>
<td>1990’s</td>
<td>35% resistant to methicillin</td>
</tr>
<tr>
<td>1990’s</td>
<td>Switch to vancomycin</td>
</tr>
<tr>
<td>1996</td>
<td>Vancomycin resistance reported</td>
</tr>
<tr>
<td>2000</td>
<td>Linezolid approved by FDA</td>
</tr>
<tr>
<td>2002</td>
<td>Linezolid resistance reported</td>
</tr>
</tbody>
</table>
The antibiotic race

Discovery and deployment of new antibiotic

Evolution of resistance
Amoxicillin

Evolution of resistance

Add clavulanic acid = Augmentin

Evolution of resistance

Cost: $US 4-24

Cost: $US 64-172
Discovery and deployment of new antibiotic

Escalation

Evolution of resistance
<table>
<thead>
<tr>
<th>Type of Infection</th>
<th>Cost Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hospital staph infections</td>
<td></td>
</tr>
<tr>
<td>penicillin resistant</td>
<td>$US 2-7 billion</td>
</tr>
<tr>
<td>methicillin resistant</td>
<td>$US 8 billion</td>
</tr>
<tr>
<td>Community acquired staph infections</td>
<td>$US 14-21 billion</td>
</tr>
<tr>
<td>Total for staph</td>
<td>$US 24-36 billion</td>
</tr>
</tbody>
</table>
Insects run their own arms races
Evolution of DDT resistance is easy to document
US farmers use more than 1 billion pounds of pesticide annually.
Rapid evolution of resistance in 100s of insect species
Morphology of HIV virus

The deadliest arms race

Outer coat proteins gp120 and gp41

Protease

Reverse Transcriptase
UN asks billions for AIDS

Evolution of HIV costs $6 billion in the US and more around the world

$Billions proposed for AIDS
Why does AIDS cost so much?

AZT is cheap and powerful
It could vanquish HIV
But HIV evolves resistance
The evolutionary nightmare of avian flu
1918 worldwide flu epidemic

Army hospital in 1918
20 million died
More casualties than WWI

Army hospital in 1918
In the October 7 2005 *Science*: Exhumed 1918 flu had avian flu genes mutated to forms that produced a killer human virus.
Two key genes determine flu strength and infectability

Hemagglutinin lets flu virus penetrate lung cells.

Neuraminidase lets virus emerge from cells and spread

H5N1, H9N2 and H7N7 – bird flu’s that have jumped the species to humans.
Two key genes determine flu strength and infectability.

Hemagglutinin lets flu virus penetrate lung cells.

Neuraminidase lets virus emerge from cells and spread.

BUT human-human transmission is rare or non-existent.
Influenza A human epidemics

1874 --- (H3N8)
1890 --- (H2N2) epidemic
1902 --- (H3N2)
1918 --- (H1N1) epidemic
1933 --- (H1N1)
1947 --- (H1N1)
1957 --- (H2N2) "Asian" Flu epidemic
1968 --- (H3N2) "Hong Kong" Flu epidemic
1976 --- (H1N1) "Swine" Flu, non-epidemic
1977 --- (H1N1)/(H3N2) "Russian" Flu epidemic

All epidemics had genes from bird or swine flu
The prediction of evolution:

**Human flu**

H1 - N1 - Typical virulence

**Recombined human disease with bird flu strength**

H1 - N1 - Highly virulent

**Bird flu**

H5 - N1 - Highly virulent
Avian flu epidemics

1959 Scotland, chicken, H5N1
1963 England, turkey, H7N3
1966 Ontario (Canada), turkey, H5N9
1976 Victoria (Australia), chicken, H7N7
1979 Germany, chicken, H7N7
1979 England, turkey, H7N7
1983–1985 Pennsylvania
1997 Hong Kong
1999–2000 Italy*
2002 Hong Kong
2003 Netherlands*
2004 Canada
2004-2005 SE Asia
Avian flu epidemics

1959 Scotland, chicken, H5N1
1963 England, turkey, H7N3
1966 Ontario (Canada), turkey, H5N9
1976 Victoria (Australia), chicken, H7N7
1979 Germany, chicken, H7N7
1979 England, turkey, H7N7
1983–1985 Pennsylvania 17 million birds killed
1997 Hong Kong 1.5 million birds killed
1999–2000 Italy*, 2.7 million birds killed
2002 Hong Kong >1 million birds killed
2003 Netherlands* 30 million birds killed
2004 Canada 17 million birds killed
2004-2005 SE Asia - ongoing

Attempts to stop evolution of virus
Dr. Lee Jong-Wook, head of the U.N. World Health Organization, issued a stark warning to the world about the danger of bird flu.
Mutation and spread of the virus is the pulse beat of its evolution.
Sept. 29, 2005

Health officials fear virus will mutate and trigger a worldwide outbreak

WASHINGTON - The Senate voted Thursday to provide $4 billion to the Centers for Disease Control and Prevention to stockpile anti-flu medicine to protect people against bird flu and prepare for a potential outbreak.
At a White House press conference on Wednesday, President Bush proposed using the military to enforce quarantine in case of a bird flu epidemic.
If evolution isn’t true,

Why is the Senate spending $4 billion to combat it?

Why has the CDC spent $100 million on vaccines for a virus that doesn’t exist?
Evolution by natural selection is an established biological fact.
The President, the US Senate, the U.N. and most creationists act as if evolution was a true fact.
If evolution is true,

Shouldn’t we be teaching that it is?
Why the controversy?

Because a minority believes that humans can’t have evolved from monkeys.
• Creationism denies the biological process of evolution by natural selection in order to simplify a social and religious agenda.
Evolution by natural selection is a powerful and sometimes dangerous force.
Don’t cast doubt on it.
Teach it so we have the ability to respond to it.
Who will be served?
The real name of Intelligent Design is Intelligent Speciation - a supernatural cause of species formation.
The value of using the right names for things:

If supernatural speciation is the proposed science curriculum,

- Does it create all species or just some?
- Is it working now, or just in the past?
- Does it create viruses and germs with the same enthusiasm as it does mammals?
- Does it create species that we can’t tell apart? Or just the obvious ones?
Before supernatural or intelligent speciation is throw into classrooms, find out what it really is.
Teaching that evolution doesn’t exist puts us in peril of losing the arms race.
The US Senate, the U.N. and most creationists act as if evolution was a true fact.
Early Darwin tried to tell the world about evolution.