Forget Evolution

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Presentation Outline

- Introduction
- Ping-Pong
- Engineers Versus Biologists
- House of Cards
- Flipping Coins
- Marshmallows
- Fallacies
- Conclusion

1. Introduction

- Demonstrations followed by questions asked to reinforce content (Socratic method)
  - One of the questions at the end will be: Why is the presentation's title "Forget Evolution"
- Does anyone here have a laptop with a spreadsheet on it who would like to volunteer to do some calculations

2. Ping-Pong

- Need a volunteer who wouldn't mind being sensory-deprived for a short time
  - Blindfolded
  - Earplugs
- Concepts will be explained after first part of demonstration
- Handouts will be distributed after that too

3. Engineers Versus Biologists

- A Match of a Century? Or Two Centuries?
- Reverse engineering
  - Starting with readily obtainable industrial and chemical materials (no unobtanium necessary)
- Harley Davidson motorcycle
- simple/minimal cell

4. House of Cards

5A. Flipping Coins: Random

- Shake pennies in can and dump on table
- Time how long takes to put them into can, shake out, and verify they are not all heads
  - Record that 1st trial time on worksheet
- Repeat twice, recording 2nd and 3rd times
- Calculate the Random All Heads: Years Required (average to get all heads by randomly shaking 25 coins)

5B. Flipping Coins: Intelligently

- Shake pennies in can and dump on table
- Time how long it takes to put them into can, shake out, and turn all to heads
  - Record that 1st trial time on worksheet
- Repeat twice, recording 2nd and 3rd times
- Compare to time on average it would take to randomly get 25 heads (previous table Column D calculation)

5C. Flipping and Arranging Coins

- Shake pennies in can and dump on table
- Time putting them into can, shaking out, turning all to heads, and arranging in 5 rows and 5 columns
  - Record that 1st trial time on worksheet
- Repeat twice, recording 2nd and 3rd times
- Compare to multiplying random heads times (Table A, Column D) by 33,554,432?

6A. Chirality Demonstration

- Stick a toothpick straight into the center of one of round faces of a marshmallow, stick two half Gummi Bears onto it
- Put three toothpicks into edges of other face, equally spaced (120 degrees) from each other and angling out like a tripod
- Stick red Gummi Bear at 12 o'clock position
- Flip a coin, record as H for a head, or T

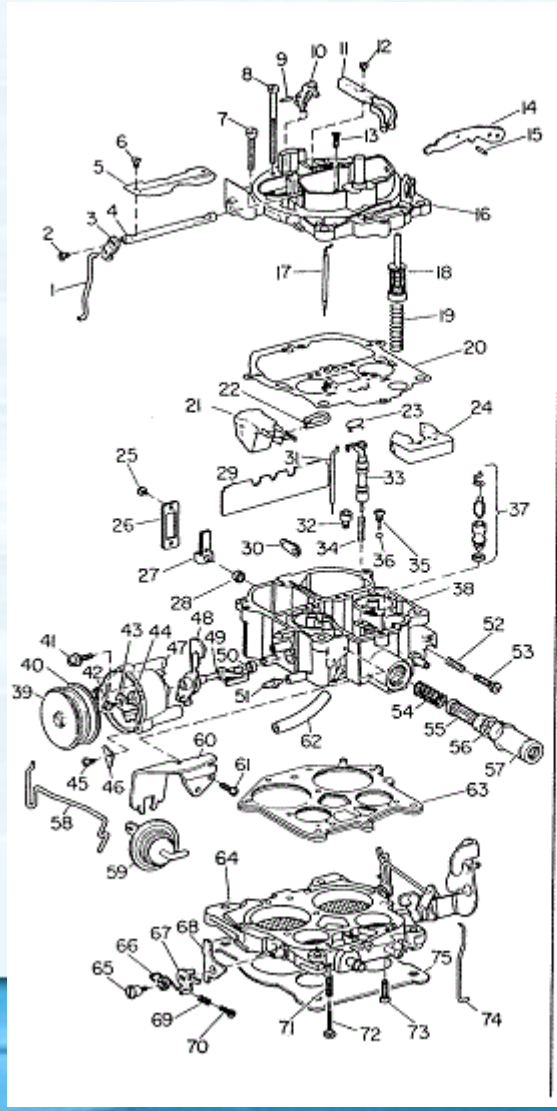
6B. Chirality Demonstration

- If you have an H, stick a green Gummi Bear at 4 o'clock, otherwise put a yellow one there
- Stick the remaining Gummi Bear (yellow or green) at the 8 o'clock position
- Pair up with team that has a marshmallow face that is a mirror image of yours when they face each other and are rotated to have red at 12 o'clock

6C. Chirality Demonstration

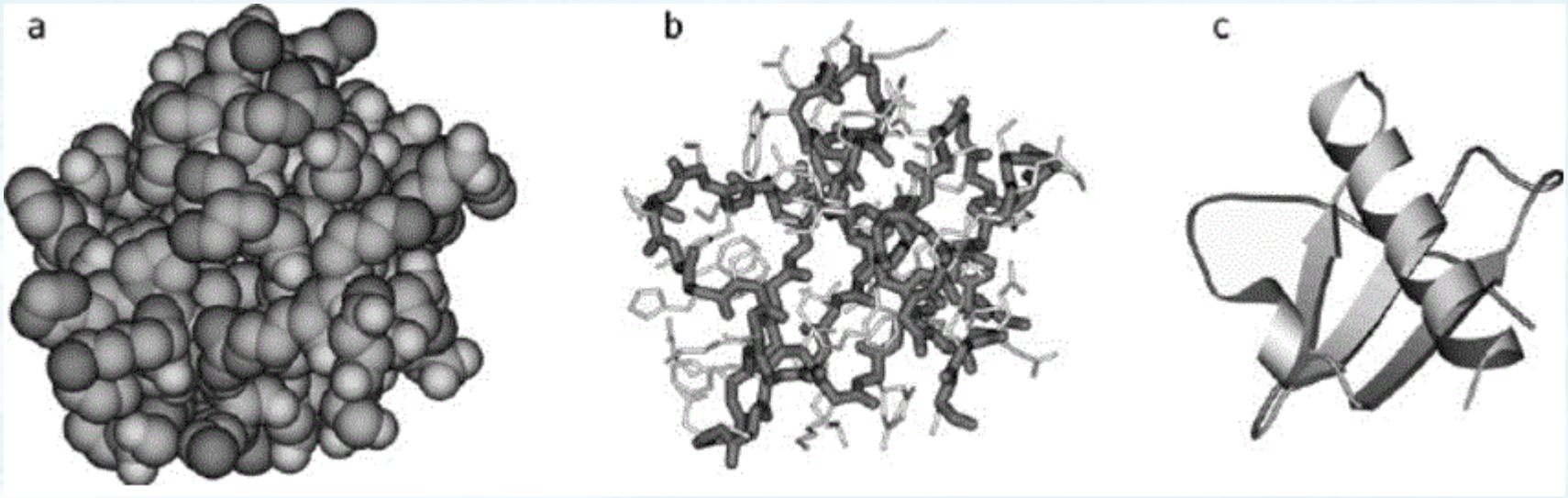
- Turn mirror image marshmallows to both face the same wall
- Note that when viewed from front, the motion from red to green is clockwise on one and counterclockwise on other
- Head count: H versus T marshmallows?
  - Why aren't they all H or all T?

6D. Mechanical Complexity: Four-Barrel Carburetor



1 Rod—Choke
2 Screw—Choke Lever
3 Lever—Choke
4 Shaft—Choke
5 Valve—Choke
6 Screw—Choke Valve (2)
7 Screw—Air Horn (Short)
8 Screw—Air Horn (Long)
9 Roll Pin—Air Valve Lockout Lever
10 Lever—Air Valve Lockout
11 Holder—Secondary Metering Rod
12 Screw—Secondary Metering Rod Holder
13 Screw—Air Horn (Countersunk) (2)
14 Lever—Pump Actuating
15 Roll Pin—Pump Lever
16 Air Horn Assembly
17 Metering Rod—Secondary (2)
18 Pump Assembly
19 Spring—Pump Return
20 Gasket—Air Horn
21 Float Assembly
22 Hinge Pin—Float Assembly
23 Spring—Primary Metering Rod Retainer
24 Insert—Float Bowl
25 Screw—Idle Compensator Cover (2)
26 Cover—Idle Compensator
27 Idle Compensator
28 Seal—Idle Compensator
29 Baffle—Float Bowl (Secondary Bores)
30 Lever—Choke Rod (Lower End)
31 Metering Rod—Primary (2)
32 Jet—Primary Main Metering (2)
33 Power Piston Assembly
34 Spring—Power Piston
35 Retainer—Pump Discharge Ball
36 Ball—Pump Discharge
37 Needle and Seat Assembly, Gasket and Pull Clip
38 Float Bowl Assembly
39 Thermostatic Cover and Coil Assembly
40 Gasket—Thermostatic Cover
41 Screw—Choke Housing to Bowl
42 Screw—Choke Coil Lever
43 Lever—Choke Coil
44 Seal—Intermediate Choke Shaft
45 Screw—Stat Cover (3)
46 Retainer—Stat Cover (3)
47 Choke Housing
48 Cam—Fast Idle
49 Lever Assembly—Inter. Choke Shaft
50 Seal—Intermediate Choke Shaft
51 Seal—Choke Housing to Bowl
52 Spring—Idle Adjust Screw
53 Screw—Idle Adjusting
54 Spring—Filter Relief
55 Filter—Fuel Inlet
56 Gasket—Filter Nut
57 Filter Nut—Fuel Inlet
58 Rod—Vacuum Break
59 Vacuum Break Diaphragm Assembly
60 Bracket—Vacuum Break Control
61 Screw—Bracket Attaching
62 Hose—Vacuum Control
63 Gasket—Throttle Body to Bowl
64 Throttle Body Assembly
65 Screw—Cam and Fast Idle Levers
66 Spring—Fast Idle Lever
67 Lever—Fast Idle
68 Lever—Cam Follower
69 Spring—Fast Idle Screw
70 Screw—Fast Idle Adjusting
71 Spring—Idle Mixture Needle (2)
72 Needle—Idle Mixture (2)
73 Screw—Throttle Body to Bowl Attaching
74 Rod—Pump
75 Gasket—Flange (Carburetor to Manifold)

6E. Biological Complexity: Three Representations of Same Protein



6F. Amino Acid Sequence in One Specific Protein

>sp|P00533|EGFR_HUMAN Epidermal growth factor receptor OS=Homo sapiens GN=EGFR PE=1 SV=2

MRPSGTAGAALLALLAALCPASRALEEKKVCQGTSNKLTQLGTFEDHFLSLQRMFNNCEVVL
GNLEITYVQRNYDLSFLKTIQEVAGYVLIALNTVERIPLENLQIIRGNMYYENSYALAVLSNYDA
NKTGLKELPMRNLQEILHGAVRFSNNPALCNVESIQWRDIVSSDFLSNMSMDFQNHLGSCQ
KCDPSCPNGSCWGAGEENCQKLTKIICAQQCSGRCRGKSPSDCCHNQCAAGCTGPRESD
CLVCRKFRDEATCKDTCPPLMLYNPTTYQMDVNPEGKYSFGATCVKKCPRNYVVTDHGSC
VRACGADSYEMEEDGVRKCKKCEGPCRKVCNGIGIGEFKDSLSINATNIKHFKNCTSISGDL
HILPVAFRGDSFTHTPPLDPQELDILKTVKEITGFLLIQAWPENRTDLHAFENLEIIRGRTKQHG
QFSLAVVSLNITSLGLRSLKEISDGDVIISGNKNLCYANTINWKKLFGTSGQKTKIISNRGENSC
KATGQVCHALCSPEGCWGPEPRDCVSCRNVSRGRECVDKCNLLEGEPREFVENSECIQC
HPECLPQAMNITCTGRGPDNCIQCAHYIDGPHCVKTCPAGVMGENNTLVWKYADAGHVCH
LCHPNCTYGCTGPGLEGCPTNGPKIPSIATGMVGALLLLLVVALGIGLFMRRRHIVRKRTLRR
LLQERELVEPLTPSGEAPNQALLRILKETEFKKIKVLGSGAFGTVYKGLWIPEGEKVKIPVAIKE
LREATSPKANKEILDEAYVMASVDNPHVCRLLGICLTSTVQLITQLMPFGCLLDYVREHKDNI
GSQYLLNWCVQIAKGMNYLEDRRLVHRDLAARNVLVKTPQHVKITDFGLAKLLGAEEKEYHA
EGGKVPIKWMALESILHRIYTHQSDVWSYGVTVWELMTFGSKPYDGIPASEISSILEKGERLP
QPPICTIDVYMIMVKCWMIDADSRPKFRELIIEFSKMARDPQRYLVIQGDERMHLPSPTDSNF
YRALMDEEDMDDVVDADEYLIPQQGFFSSPSTSRTPLLSSLSATSNNSTVACIDRNGLQSCP
IKEDSFLQRYSSDPTGALTEDSIDDTFLPVPEYINQSVPKRPAGSVQNPVYHNQPLNPAPSRD
PHYQDPHSTAVGNPEYLNTVQPTCVNSTFDSPAHWAQKGSHQISLDNPDYQQDFFPKEAK
PNGIFKGSTAENAEYLRVAPQSSEFIGA

6G. Amino Acid Sequence Key

A	Alanine
C	Cysteine
D	Aspartic acid
E	Glutamic acid
F	Phenylalanine
G	Glycine
H	Histidine
I	Isoleucine
K	Lysine
L	Leucine
M	Methionine
N	Asparagine
O	Pyrrolysine *
P	Proline
Q	Glutamine
R	Arginine
S	Serine
T	Threonine
U	Selenocysteine *
V	Valine
W	Tryptophan
Y	Tyrosine

* "non-standard," not in previous slide

6H. Typical E. coli Cell

Substance	% of Mass	Molec. Weight	# of Copies	# of Kinds
Water	70%	18	40 billion	1
Inorganic ions, small molecules of all other kinds	7	~145	500 million	750
DNA	1	3 billion	4	1
RNA	6	?	?	?
Proteins	15	~30,000	5 million	4,288

6I. Protein Complexity Issues

The final probability of getting a **functional** protein composed of 100 amino acids is 1 in 10^125. Even if you fill the universe with pre-biotic soup, and react amino acids at Planck time (very fast!) for 14 billion years, you are probably not going to get even 1 such protein. And you need at least 100 of them for minimal life functions, plus DNA and RNA.

6J. Combinatorial Explosion

Infinite Monkey Theorem

A monkey hitting keys at random on keyboard for an infinite time will almost surely type a given text … probability of a universe full of monkeys typing Hamlet by Shakespeare is so tiny ... chance of it occurring during a period of time hundreds of thousands of orders of magnitude ($10^{100,000+}$) longer than the age of the universe is extremely low (but not zero).

6K. 2nd Law of Thermodynamics

- "How … can evolution produce more complex life forms over time? The … second law is only valid in closed systems with no external sources of energy. Since the Earth receives continual energy from the Sun, the second law does not apply."
- Possibly true for evolution. But not necessarily for abiogenesis in the absence of energy-harnessing mechanisms.

7. Fallacies and Myths

- Jumping to conclusions
- Past history guarantees future performance
- The myth of time
- Invalid analogies
- Argument from ignorance

Conclusions:
8A.Darwin Admitted It

It is no valid objection [to the theory of evolution] that science as yet throws no light on the far higher problem of the essence or origin of life.

Darwin, *The Origin of Species*, 1861(third ed.), p. 514

8B. Augustine Warned

If they find a Christian mistaken in a field in which they themselves know well and hear him maintaining his foolish opinions about our books, how are they going to believe those books in matters concerning the resurrection of the dead, the hope of eternal life, and the kingdom of heaven, when they think their pages are full of falsehoods on facts which they themselves have learned from experience and the light of reason?

8C. Reflection Questions

- Can atheists reasonably claim that the theory of evolution makes God unnecessary if:
  - the origin of life by random natural causes is incredibly improbable
  - and intelligent agents can create very complex functional mechanisms?
- Why is this presentation titled "Forget Evolution?"

8D. Questions? Comments?

- Any questions?
- Any comments, including constructive criticism?
- Please send feedback to RDWESTFALL@CPP.EDU