



Office of Biotechnology

Celebrating 25 Years of Expanding Biotechnology



Cool Things About DNA

"Ride the Wave"

Summer Instructor Institute 2009
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Cool Things About DNA

As is so apparent in this field, all facts and interpretation of facts can/have/will differ and probably change with time.

The following "facts" can differ from one source to another, however they are still "fun" to discuss in class.



Cool Things About DNA

Mendel failed his oral exam to become a teacher over a disagreement with examiners about the nature of genetics.

Frustrated and angry he went back to the monastery to prove them wrong....

The rest is history.



Cool Things About DNA

Human DNA contains 3.2 billion base units called nucleotides (A,T,C,Gs).

If each nucleotide would represent a letter on a text book page, you could stack the pages 65 feet high.

or

If each letter of newspaper print would represent a nucleotide, it would take 16.75 miles of pages laid end to end to equal your DNA.



Cool Things About DNA

Here is ~1.5 billion miles of
DNA in your body.

That is 3000 round trips to the moon
or 600 round trips to the sun.



Cool Things About DNA

If the diameter of DNA (2.0 nanometers) was as wide as a fishing line (0.5 mm) it would stretch 13.6 miles (21.3 km) in length and would all have to be packed into a nucleus sack 10 inches in diameter.



Cool Things About DNA

Polydactyl (more than 5 fingers) is dominant in humans.

Five fingers (digits) is due to recessive alleles.



Cool Things About DNA

On average, it takes ~4.5 genes to express a specific trait.

Today scientist have discovered over 1000 genes associated with smell.

A single point mutation (substitution) causes sickle-cell anemia

Deletion of three nucleotides causes cystic fibrosis



Cool Things About DNA

DNA is the most efficient storage system known to humans.

It would take 30 gigabytes of hard drive space to save both sides of the sequence.

Using the binomial language of modern computers, DNA could store 25 gigabytes of information per inch.

Human DNA is 6 feet long.



Cool Things About DNA

Cells can contain 6-9 feet of DNA.

In an average meal, you eat
approximately 55,000,000 cells
or
63,000- 93,000 miles of DNA.



Cool Things About DNA

All the DNA in your body weighs
7.5 grams or 0.26 ounces.

At today's market prices your
DNA is worth \$1.3 million a gram
or a total of \$9.7 million.





Cool Things About DNA

It took researchers nine years in the 1980s to discover the gene for cystic fibrosis,

nine days in 1999 to discover the gene for Parkinson's disease,

and nine seconds in 2001 to discover the gene for Crohn's disease.

Today an entire genome can be sequenced in days.

Cool Things About DNA

Genetic Testing

Today there are over 1000 genetic tests for humans.

In 2007 Iowa follows the American College of Medical Genetics recommendations (ACMG system) and mandates newborn screening for 29 genetic diseases. 28 test DNA profiles and 1 for functional hearing loss.



Cool Things About DNA Genetic Testing

Most common genetic
Disorders screenings :

Sickle cell anemia,
Congenital hypothyroidism,
Cystic fibrosis,
Maple syrup urine disease,
Hearing loss,
Phenylketonuria (PKU),
Congenital adrenal hyperplasia
and
Galactosemia



Cool Things About DNA

April 14, 2003 the human genome is completed.

Many scientists hailed the completion as the greatest human achievement since reaching the moon?

At a rate of 100 letters per minute, it would take you 57 years, without breaks, to read aloud the entire sequence.



Cool Things About DNA

Human DNA is 99.9% identical to each other:

99.1% to chimps

90% to mice

85% to Zebra fish

50% to bananas

21% to worms

7% to bacteria



Cool Things About DNA

Humans have 20-25,000 genes;

- Yeast 6,000
- Drosophila 13,000
- C. elegans 20,000
- Flowering plants 26,000

Humans have 46 chromosomes;

- Dove 16
- Gorilla 48
- Banana 66
- Dog 78
- Butterflies 380

More than 200 genes found in the human genome have a bacterial ancestry.



Cool Things About DNA

X vs Y

Women have more DNA than men.

XX vs Xy

but

Men have more DNA working.

One X chromosome in female mammals is essentially turned off.



Cool Things About DNA

In forensics, a DNA profile (often called DNA fingerprinting) looks at 13 specific DNA markers.

That equals a 1 in 10 trillion chance of another identical profile.

The FBI DNA database is called
CODIS
(Combined DNA Index System)



Cool Things About DNA

2-3% of the total DNA carries instruction to make protein. The rest was once referred to as "junk DNA."

Remember: we all save junk....

Known now is some "junk DNA" function as non-coding RNAs or "microRNAs" that influence gene expression.

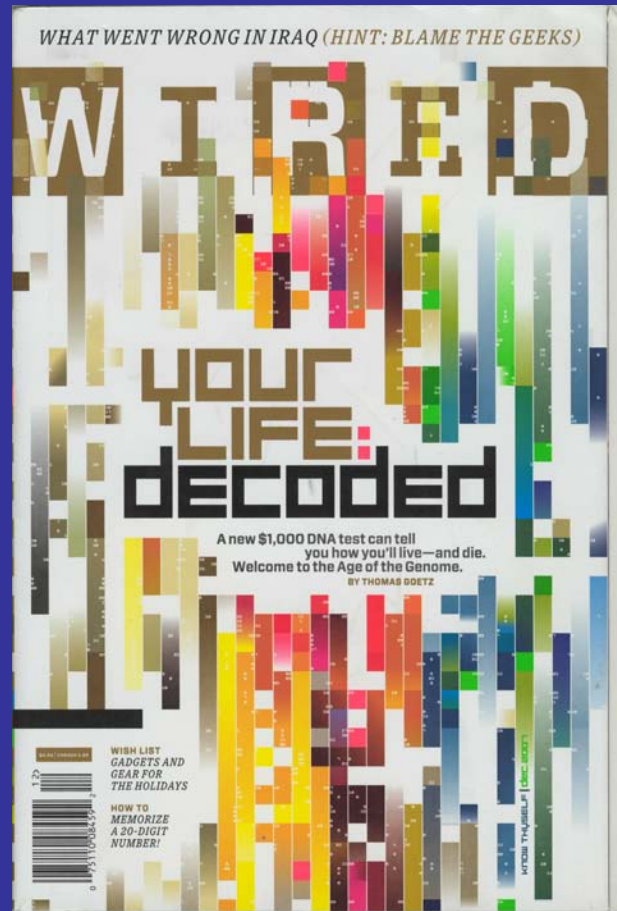


Cool Things About DNA

DNA Destiny....

You can see your genetic future.

23andMe will analyze your DNA for \$1000.



Cool Things About DNA

Did You Know...

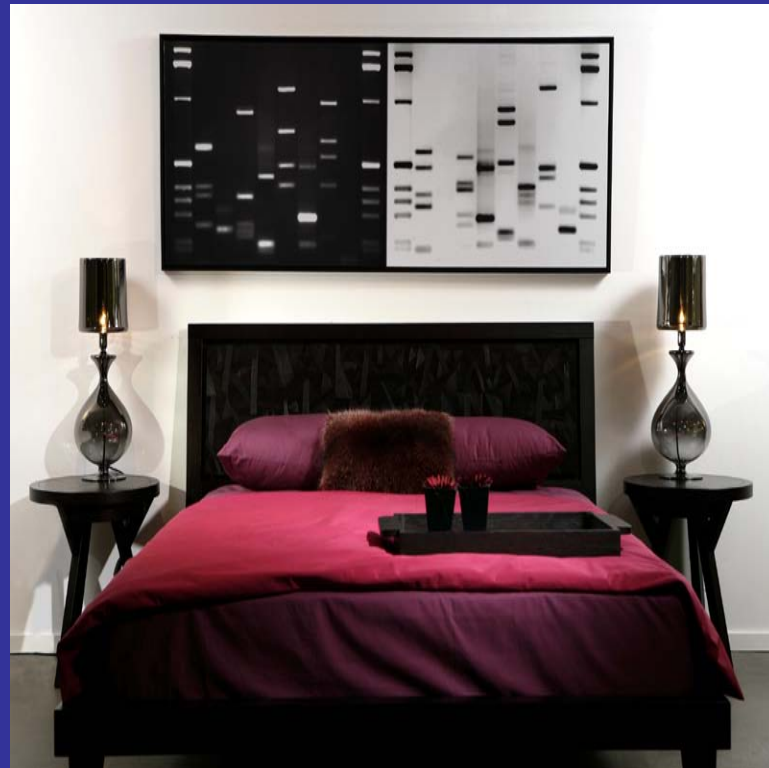
You can see your athletic future.

ACTN3 and ACE genes:
Power/Speed vs Endurance



Cool Things About DNA

You can have DNA Portraits....



www.dna11.com

Cool Things About DNA

Any additions???

Any Question???



Cool Things About DNA

Thanks for attending
the session.

