Nale-Biology Name & Pd – --

DNAi.org Timeline Investigation e-sheet

c/oe When done, e-mail me at pdn1056@ptd.net

Go to http://www.dnai.org/timeline/index.html

1. In 1869, **Gregor Mendel**, working with peas, showed that --
   [This will be a long three or four part answer.]

2a. In -- **Friedrich Miescher** first -- from white blood cells.

He found it nearly indestructible. He called it --

Where then did he go on to find it? --

What did he propose its function was? --

2b. Where did he get white blood cells for his work? --

3. What did **Correns** rediscover? --

4. Applying his knowledge of Mendel's work,

what did **Erich von Tschermak-Seysenegg** produce? --

5. What organism did **Thomas Hunt Morgan** work with? --
   [Common name and scientific name of this model organism.]

What did he successfully establish? --

6a. What did **Hermann Muller** intentionally cause? --
   Please remember that, fundamentally, we know what things do – how they work – by studying organisms in which something is wrong – something is not working.

6b. What is EUGENICS? --

7. **Who** did the ground-breaking work determining the mechanism

for the transposition of genes in corn? --

What is TRANSPOSITION? --

8. In 1941, what did **George Beadle** and **Edward Tatum** show? --

What organism did they use to study? [Common and Scientific names] --

9. What did **Joshua Lederberg** show? --

What organism did he use? --

What was there debate about? — whether bacteria had -- or not?

What is CONJUGATION? --

10. What did **Oswald Avery** discover? --

Explain --

What are the two strains of *Pneumococcus* that **Avery** used? --

Oswald Avery won a -- scholarship to college, where he was leader of the --

11. **Evelyn Witkin** showed that some mutations can confer resistance, resistance to what? --
Please note that she worked at Cold Spring Harbor, as did McClintock, as did Watson, … with HHMI funding

Who else worked at Cold Spring Harbor Laboratory? --

Who funded this website? --

Where is the Dolan DNA Learning Center located? --

Why is it not in a two-bit third-world country run by a petty tyrant? --

12a. What did **Erwin Chargaff** discover about **Miescher's** nuclein? --
(NOTE THE ERROR BAR – MARGIN OF ERROR in **Chargaff**'s ratios!)
And yet, he interpreted the results correctly!
(And note his 'sample' included more than one organism.)

12b. Explain why studying the ratio of the four bases in several organisms could help you reach the same conclusion as **Chargaff**? --

13. What huge contribution did **Rosalind Franklin** make to DNA science? --

Why did her father discourage her? --

Why was St. Paul's Girl's School unique? --

Should we, as a society, waste our precious resources educating women today? -- Explain. --

Are there any societies in the world that do not allow their women to become educated? --

14. Did **Barbara McClintock** experience similar societal prejudices? –

Explain and give examples. --

15. What contribution did **Martha Chase** and **Alfred Hershey** make? --

What is the connection between big band leader **Fred Waring**, Shawnee-on-the-Delaware and the **Hershey-Chase** experiments? --

Did you know that viruses are basically vessels carrying DNA? (or RNA?) --

16. What are those Gold Coins scattered all over this timeline? --

Why didn't Mendel win a gold coin? --

17. **Linus Pauling** made many great contributions to chemistry. It is sad that he is remembered here because of his *incorrect hypothesis*.

What did he get wrong about the structure of the DNA molecule? --

Even great scientists make mistakes, which only 'proves' that they are human. A key component of science is that it is self-correcting. You will probably be remembered most for what you do ***right*** in life. It is the idea, the discovery, the theory that stands or does not stand as possibly correct, or invalid. Attacking the man, noting that he or she made some mistakes, (**Charles Darwin**, for example) only proves that they were human. Do opponents of evolution 'prove' Natural Selection is wrong by pointing out that science (not them) has modified or discarded some incorrect ideas? --

18. What did **Francis H.C. Crick** and **James D. Watson** discover in 1953? --

Explain in one sentence why this is so fundamentally important? --

How did the world change on April 25, 1953? --

What journal published the seminal Double Helix article? --

What was the Rosetta Stone? -- Why the reference here? --

19a. **Seymour Benzer**. What is a phage? --

What did he discover/demonstrate? --

19b. What is a point mutation? --

How many DNA triplets do the affect? --

How many amino acids in a protein do they potentially alter? --

19c. What is a frame shift mutation? --

How many DNA triplets do they affect? --

How many amino acids in a protein do they potentially alter? --

19d. What are two kinds of frame shift mutations? What is a point mutation? --

How many DNA triplets do the affect? --

How many amino acids in a protein do they potentially alter? --

20. An evolution question: Which type of mutation, a point mutation or a frame shift mutation would probably have the greater effect upon the organism, and if the change imparted greater reproductive fitness, which would potentially have the greater (quicker) effect upon evolution? --

21. In a sentence, summarize **Francis Crick**'s Central Dogma. --

22. What molecule did **Paul Zamecnek** and **Mahlon Hoagland** discover the role of? --
    What biological tool did he use to *follow* polypeptide construction? --
    What biological tool did they use to *isolate* the heavier polypeptides
    from the lighter unincorporated amino acids? --
    What cellular organelle did they discover? --
23. What did **Matthew Meselson** and **Frank Stahl discover about DNA?** --
    What biological tool did they use to mark new DNA pieces? --
    What was their control group? --
    Why were the DNA from the bacteria first grown in ^{14}N and then ^{15}N form a layer in the centrifuge tube *midway*
    between the ^{14}N bacterial DNA and the ^{15}N bacterial DNA? --
    Where were they when they wrote their second paper about DNA replication? ☺ --
24. What enzyme did **Arthur Kornberg** discover? --
    What role does it play? --
    What model organism did he use? --
    What did he do so he could tell one Thymine base from another? --
    What symbol do they use for an enzyme!?! --
    What does DNA use as a template during replication? --
    DNA polymerase I … DNA polymerase III … ? whoops! Oh well…
    A Nobel for the wrong enzyme. People make mistakes. --
25. What did **Sydney Brenner** discover? --
    Note phage and *E. coli* and tagging with radioisotopes again …
    Please be sure to listen to his audio analogy about DNA in a bacterium, snakes, ribosomes and mRNA.
26. **Marshall Nirenberg** and his group discovered that the DNA code was formed in --
    and that each one of these, a 'DNA word' coded for one –
27. **François Jacob** explains that in the 1950s science believed that a cow was a cow and a horse was a horse because each was made from distinctive different 'cow or horse molecules.' This turned out to be wrong.
    What did scientists find? --
    How do they explain the finding? --
    What is a lac operon? --
28. What did **David Baltimore** discover about the genome of the poliovirus? --
29. How did the work of **Howard Martin Temin** begin the 'unraveling' of The Central Dogma? --
    What is forward transcription? --
    What is reverse transcription? --
30. What type of DNA did **Stanley Cohen** and **Herbert Boyer** discover? --
    What is a plasmid? --

The end for now …