

Hit the Ground *Biology*

This file <https://www.mskcc.org/teaser/1953-nature-papers-watson-crick-wilkins-franklin.pdf> contains the three papers which were so fundamental to our understanding of the structure of DNA.

Read the papers carefully and then answer the questions. Some questions are answered in the papers themselves; others will require you to look things up.

Molecular Structure of Nucleic Acids

1. Who wrote this paper?
2. Who were Pauling and Corey?
3. Why was their three strand model considered by this paper's authors as **"unsatisfactory"**?
4. What is meant by a **"helical chain"**?
5. Explain the meaning of **" β -D-deoxy-ribofuranose residues with 3',5' linkages"**.
6. Why does the structure repeat itself **"after 10 residues on each chain"**?
7. What is the difference between purine and pyrimidine bases?
8. Which bases bind together, and why?
9. Why is the sequence of bases on one chain determined by the sequence of bases on the other chain? Give an example to illustrate this.
10. Why should the structure **"be regarded as unproved"**?
11. Who were Dr MHF Wilkins and Dr RE Franklin?

Molecular Structure of Deoxypentose Nucleic Acids

12. Who wrote this paper?
13. Explain how X Ray diffraction works in no more than 100 words.
14. Figure 1 of this paper shows the X Ray diffraction pattern of nucleic acid from *E coli*. What other organisms were investigated? Were the results the same?
15. The description of **"nitrogen bases arranged like a pile of pennies"** came from work by which two scientists?
16. In terms of DNA, what did Prof E Chargaff find out?

Molecular Configuration in Sodium Thymonucleate

17. Who wrote this paper?
18. What is special about the photo of Sodium deoxyribose nuclear from calf thymus?
19. What is a thesis?
What did Furberg suggest in his **"thesis, London 1949"**.

20. Who else has already quoted Furberg's work? Why is this significant?
21. How many times are the figures 34 Å and 3.4 Å mentioned in the three papers?
Why are these numbers significant?
22. From a scientific point of view, why should the researchers be quoting these figures so precisely?
23. 34 Å is a unit of distance. Find out how big in micrometres 34 Å is, and then how big in nanometres 3.4 Å is. (just so you know, Å is written now as Å, an A with a 'ring' above it)
24. There was a discussion about whether the phosphates were on the inside (Pauling and Corey) or the outside of the DNA molecule (Franklin and Gosling). What evidence appears to settle this question?
25. A second question on structure considered whether there were three chains or two chains in the DNA structure. Which piece of evidence makes this clear?

Finally

26. Watson, Crick, and Wilkins all received Nobel prizes for their work. Why didn't Rosalind Franklin get one as well?
27. What other work did Rosalind Franklin do after her work on DNA structure?
28. How is the double strand of DNA copied to make two copies of DNA?
29. Why are references important for scientific papers?
30. What three exciting developments in DNA technology have happened since 2000?