DNA Option Course 2018 - 2019 (Semester One 2018/19)

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Reading List for the Level 4 DNA option - Semester 1 2018/19

52 items

This is the reading list for the DNA option course in 2018.

The numbered references listed here are the ones that we think give the best introduction to the topics, but in some sections we have suggested further reference(s) in the notes that might be useful if you want more information. You can find links to all of these "extra references" grouped together at the bottom of the list. The references are mostly reviews; we'll refer to some research papers during the course, and also get you to present some to the class on Days 6-10.

Glasgow University has electronic subscriptions to all the good journals in this field. This reading list should direct you straight to the electronic version of the reference; Just click on the "Online Resource" button next to the reference. You will have to supply your GUID and password the first time you use this feature in every session, but this allows you to access these references wherever you are.

New papers and reviews in the field are coming out all the time. We will probably need to make alterations to the list during the course, and you should try to keep up with recent developments. Look at the latest issues of (e.g.) Cell, Nature, and Science to see what's happening.

Copies of the specialist textbooks mentioned in the list may be available for short-term borrowing on request from Marshall, if you really can't get them by conventional means.

TEXTBOOKS AND REVIEW JOURNALS (3 items)

The standard Molecular Biology textbooks in this section all have OK sections on DNA structure and biochemistry. Some also have reasonable introductions to more specialised topics such as chromatin structure, recombination, replication, repair, topoisomerases, site-specific recombination, transposition etc. However, we strongly suggest you also read the more detailed and up-to-date reviews listed below for each topic.

Molecular cell biology - Harvey F. Lodish, c2013
Book

Molecular biology of the cell - Bruce Alberts, 2015
Book

Lewin's genes XII - Jocelyn E. Krebs, Elliott S. Goldstein, Stephen T. Kilpatrick, 2018
Book

DNA structure (5 items)

1. Understanding DNA: the molecule & how it works - C. R. Calladine, 2004
Book | A little book on DNA. Excellent introduction to DNA structures and bending. Nice easy-read
style.

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2. A Structure for Deoxyribose Nucleic Acid - J.D. Watson, F.H.C. Crick, 1953
Article | Well worth reading if only because it is the most famous scientific paper ever. For a concise,
chatty account of the history and development of the DNA story, read the "50th anniversary"
News article by Elizabeth Pennisi, "DNA's cast of thousands", Science, 300, 282-285 (2003).

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3. The structure of an oligo(dA)-oligo(dT) tract and its biological implications - Hillary C. M. Nelson, John T. Finch, Bonaventura F. Luisi, Aaron Klug, 1987-11-19
Article | A classic X-ray structural analysis of a piece of bent DNA, which we'll present in the lectures.

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4. DNA G-quadruplexes in the human genome: detection, functions and therapeutic potential - Robert Hänsel-Hertsch, Marco Di Antonio, Shankar Balasubramanian, 2017-2-22
Article | Short review on why we should be paying attention to G-quadruplexes - maybe they do things in cell genomes!

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5. Beyond the Fold: Emerging Biological Applications of DNA Origami - Arun Richard Chandrasekaran, Nate Anderson, Megan Kizer, Ken Halvorsen, Xing Wang, 2016-06-16
Article | How to make useful objects out of DNA, and what they can be used for in biology. DNA origami can be used to build all sorts of things - boxes, machines, etc.!

PROTEIN-DNA INTERACTIONS: BINDING, BENDING, LOOPING (5 items)

6. Origins of Specificity in Protein-DNA Recognition - Remo Rohs, Xiangshu Jin, Sean M. West, Rohit Joshi, Barry Honig, Richard S. Mann, 2010-06-07
Article | Fat but very informative review on the ways that proteins bind to DNA. If you would like to read a recent "state of the art" paper on analysis of modes of DNA binding (also from Rohs/Mann group), see N. Abe et al. (2016). Deconvolving the recognition of DNA shape from sequence. Cell 161, 307-318.

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7. Crystal Structure of an IHF-DNA Complex: A Protein-Induced DNA U-Turn - Phoebe A Rice, Shu-wei Yang, Kiyoshi Mizuuchi, Howard A Nash, 1996-12
Article | How IHF, a protein involved in transcription, site-specific recombination, and transposition in
bacteria, makes a very sharp DNA bend. Reviewed in K.K. Swinger and P.A. Rice (2004). IHF and HU: flexible architects of bent DNA. Curr. Opin. Struct. Biol. 14, 28-35.

Engineering altered protein–DNA recognition specificity - Adam J Bogdanove, Andrew Bohm, Jeffrey C Miller, Richard D Morgan, Barry L Stoddard, 2018-06-01
Article | Big review describing ways to alter protein-DNA recognition, and explaining the potential functionalities and uses for engineered altered-specificity proteins.

The Biology of CRISPR-Cas: Backward and Forward - Frank Hille, Hagen Richter, Shi Pey Wong, Majda Bratovič, Sarah Ressel, Emmanuelle Charpentier, 2018-03
Article | Recent review detailing the biological functions of CRISPR systems in bacterial cells - what they are actually for. I've also added another recent review on the applications of CRISPR enzymes in the Additional Material below.

New structures of protein-DNA complexes are coming out all the time, and structure papers will be cited in many of the reviews on the Reading list. You should look at some of them to help you to appreciate the variety of ways that proteins and DNA interact.

DNA SUPERCOILING, AND ITS EFFECTS ON TRANSCRIPTION (2 items)

Supercoiling in DNA and chromatin - Nick Gilbert, James Allan, 2014-04
Article | A nice short and clear review on the roles of DNA supercoiling in cells, relevant to Sean's lecture on topology/topoisomerases.

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11. DNA topoisomerases: harnessing and constraining energy to govern chromosome topology - Allyn J. Schoeffler, James M. Berger, 2008-2
Article | A monster article, but very well written, well illustrated and informative review. Just about everything you need to know about topology and topoisomerases is in here somewhere! There's a more recent big review on topoisomerases (S.H. Chen et al. (2013). New mechanistic and functional insights into DNA topoisomerases. Annu. Rev. Biochem. 82, 139-170), well worth a read if you're interested, but I think the Berger one is nicer.

TRANSCRIPTION AND CHROMATIN (6 items)

12. Structural Insights into the Eukaryotic Transcription Initiation Machinery - Eva Nogales, Robert K. Louder, Yuan He, 2017-05-22
Article | Big new review on what we know of the structures and mechanisms of transcription initiation in euks.

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13. RNA Polymerase Active Center: The Molecular Engine of Transcription - Evgeny Nudler, 2009-06
Article | Detailed description of the transcription machinery.

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14. Disentangling the Many Layers of Eukaryotic Transcriptional Regulation - Katherine M. Lelli, Matthew Slattery, Richard S. Mann, 2012-12-15
Article | Describes how transcription is regulated at multiple levels, from DNA sequence to 3D chromosome structure.

Organizational principles of 3D genome architecture - M. Jordan Rowley, Victor G. Corces, 2018-12
Article | Thorough recent review on the 3D organization of chromatin and genomes. It also gives good descriptions of the techniques (Hi-C etc) used for 3D chromatin analysis.

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16. Mechanisms of action and regulation of ATP-dependent chromatin-remodelling complexes - Cedric R. Clapier, Janet Iwasa, Bradley R. Cairns, Craig L. Peterson, 2017-5-17
Article | Excellent thorough new review on how nucleosome remodelling works at the mechanistic level. Student presentation on Day 6 will provide further details! A good, quite concise review on histone modifications and how they affect remodelling is Tessarz and

Kouzarides, Nat. Rev. Mol. Cell Biol. 2014.

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17. SMC complexes: from DNA to chromosomes - Frank Uhlmann, 2016-4-14
Article | All about what the bizarre tweezers-like SMC proteins are doing to organize DNA in cells. You'll hear more about this in the student presentation on Day 7.

REPLICATION (1 items)

18. Replisome mechanics: insights into a twin DNA polymerase machine - Richard T. Pomerantz, Mike O'Donnell, 2007-4
Article | Nice pictorial review on the replisome machinery. A recent wee review on the structures and functions of polymerase enzymes is S. Doublié and K.E. Zahn (2014). Structural insights into eukaryotic DNA replication. Frontiers in Microbiology 5, 1-8.

DNA REARRANGEMENTS (5 items)

19. Mechanisms and principles of homology search during recombination - Jörg Renkawitz, Claudio A. Lademann, Stefan Jentsch, 2014-5-14
Article | Current models for the crucial stage of homologous recombination where DNA sequences find their homologous partners.

A change of view: homologous recombination at single-molecule resolution - Kyle Kaniecki, Luisina De Tullio, Eric C. Greene, 2017-12-11
Article | This is a nice new review focusing on the biochemistry of homologous recombination and especially how it can be studied using single-molecule techniques. It's very good on the methods, and along the way gives a modern overview of the molecular events during HR.

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21. Bacterial DNA repair: recent insights into the mechanism of RecBCD, AddAB and AdnAB - Dale B. Wigley, 2012-12-3
Article | Minireview on the mechanism of the RecBCD machine and its relatives.

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22. A moveable feast: An introduction to Mobile DNA.

Nancy L. Craig, Microbiology Spectrum 2014 (doi: 10.1128/microbiolspec.MDNA3-0062-2014).

An excellent, comprehensive review on mechanisms of transposition and site-specific recombination. Contact Marshall if you are having trouble getting this review. There's another nice (shorter) review on transposition in the 'additional references' below by Montano and Rice (2011).

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23. Retroviral DNA Integration - Paul Lesbats, Alan N. Engelman, Peter Cherepanov, 2016-10-26
Article | Clear, beautifully illustrated review on structures and mechanisms of retroviral integrases.

DNA REPAIR (3 items)

24. DNA mismatch repair and its many roles in eukaryotic cells - Dekang Liu, Guido Keijzers, Lene Juel Rasmussen, 2017-07
Article | A new general review on mismatch repair. This review is from a journal called DNA Repair; in February 2016 there was a special issue all about mismatch repair.

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25. The Repair and Signaling Responses to DNA Double-Strand Breaks - Aaron A. Goodarzi, Penelope A. Jeggo
Article | Comprehensive recent review of how double-strand breaks are repaired, including immune system V(D)J recombination. A bit daunting in places (ignore some of the reference-dense accounts of prior research) but not as big as it looks! (small pages, 12 of which are title or references).

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26. Understanding nucleotide excision repair and its roles in cancer and ageing - Jurgen A. Marteijn, Hannes Lans, Wim Vermeulen, Jan H. J. Hoeijmakers, 2014-6-23
Article | A big but nicely written and illustrated review on NER pathways (including how NER is coupled to transcription) and roles in human health/disease.

Additional Reading (11 items)

These references are suggested for more detailed information in some areas. They are all mentioned in the notes to the numbered references above.

DNA's Cast of Thousands - E. Pennisi, 2003-4-11
Article | In addition to Reference 2 (Watson and Crick 1953). A concise, chatty account of the history and development of the DNA story, can be read in this "50th anniversary" News article by Elizabeth Pennisi

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Deconvolving the Recognition of DNA Shape from Sequence - Namiko Abe, Iris Dror, Lin Yang, Matthew Slattery, Tianyin Zhou, Harmen J. Bussemaker, Remo Rohs, Richard S. Mann, 2015-04
Article | In addition to Reference 6 (Rohs et al 2010). A recent "state of the art" paper on analysis of modes of DNA binding

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IHF and HU: flexible architects of bent DNA - Kerren K Swinger, Phoebe A Rice, 2004-2
Article | In addition to Reference 7 (Rice et al 1996). A nice review of the IHF structure.

Five big mysteries about CRISPR's origins - Heidi Ledford, 2017-1-12
Article | In addition to reference 9. An interesting mini-article on what we still don't know about CRISPR systems and what they really do for the bacteria that have them.

The CRISPR tool kit for genome editing and beyond - Mazhar Adli, 2018-12
Article | A new, clearly written review detailing all the multifarious uses of the 'CRISPR tool kit'.

New Mechanistic and Functional Insights into DNA Topoisomerases - Stefanie Hartman Chen, Nei-Li Chan, Tao-shih Hsieh, 2013-06-02
Article | In addition to Reference 11 (Schoeffler and Berger 2008). A more recent big review on topoisomerases. Well worth a read if you're interested, but I think the Schoeffler and Berger one is nicer.

Histone core modifications regulating nucleosome structure and dynamics - Peter Tessarz, Tony Kouzarides, 2014-10-15

Article | In addition to Reference 16. A good little review on histone modifications.

Structural insights into eukaryotic DNA replication - Sylvie DubliÃ©, Karl E. Zahn, 2014-08-25
Article | In addition to Reference 18 (Pomerantz and O'Donnell 2007). A recent wee review on the structures and functions of eukaryotic polymerase enzymes.

The search for a human Holliday junction resolvase - Stephen C. West, 2009-06-01
Article | In addition to Reference 19. A very readable short review by Steve West on the mechanism of the later stages of homologous recombination.

Moving DNA around: DNA transposition and retroviral integration - Sherwin P Montaño, Phoebe A Rice, 2011-6
Article | In addition to references 21 and 22. Review on the structures and mechanisms of transposition.

Mechanisms in

and Human Mismatch Repair (Nobel Lecture) - Paul Modrich, 2016-07-18
Article | In addition to ref. 23. This is the text of the Nobel lecture by Paul Modrich, awarded for his studies of mismatch repair. It's actually quite a nice overview of the field.

Papers for student presentations (10 items)

Here are the papers and minireviews accompanying the student presentations on Days 6-10 (only those not in the main list). (One or two are still missing! I'll fix later).

ISWI Remodelers Slide Nucleosomes with Coordinated Multi-Base-Pair Entry Steps and Single-Base-Pair Exit Steps - Sebastian Deindl, William L. Hwang, Swetansu K. Hota, Timothy R. Blosser, Punit Prasad, Blaine Bartholomew, Xiaowei Zhuang, 2013-01
Article

Independent and Stochastic Action of DNA Polymerases in the Replisome - James E. Graham, Kenneth J. Marians, Stephen C. Kowalczykowski, 2017-06
Article

The condensin complex is a mechanochemical motor that translocates along DNA - Tsuyoshi Terakawa, Shveta Bisht, Jorine M. Eeftens, Cees Dekker, Christian H. Haering, Eric C. Greene, 2017-11-03
Article

Novel insights into chromosomal conformations in cancer - Ruobing Jia, Peiwei Chai, He Zhang, Xianqun Fan, 2017-12
Article

The chromatin accessibility landscape of primary human cancers - M Ryan Corces et al., 2018
Article

Structures of the CRISPR genome integration complex - Addison V. Wright, Jun-Jie Liu, Gavin J. Knott, Kevin W. Doxzen, Eva Nogales, Jennifer A. Doudna, 2017-09-15
Article

Mutational signatures associated with tobacco smoking in human cancer - Ludmil B Alexandrov et al., 2016
Article

Understanding the origins of human cancer - Ludmil B Alexandrov, 2018
Article

BRCA1–BARD1 promotes RAD51-mediated homologous DNA pairing - Weixing Zhao, Justin B. Steinfeld, Fengshan Liang, Xiaoyong Chen, David G. Maranon, Chu Jian Ma, Youngho Kwon, Timsi Rao, Weibin Wang, Chen Sheng, Xuemei Song, Yanhong Deng, Judit Jimenez-Sainz, Lucy Lu, Ryan B. Jensen, Yong Xiong, Gary M. Kupfer, Claudia Wiese, Eric C. Greene, Patrick Sung, 2017-10-4
Article

Biochemistry: Complex assistance for DNA invasion - Petr Cejka, 2017-10-4
Article