



DNA and RNA Structure

IST-1.K.1

DNA, and in some cases RNA, is the primary source of heritable information.

IST-1.K.2

Genetic information is transmitted from one generation to the next through DNA or RNA—

- a. Genetic information is stored in and passed to subsequent generations through DNA molecules and, in some cases, RNA molecules.**
- b. Prokaryotic organisms typically have circular chromosomes, while eukaryotic organisms typically have multiple linear chromosomes.**



DNA and RNA Structure

IST-1.K.3

Prokaryotes and eukaryotes can contain plasmids, which are small extra chromosomal, double-stranded, circular DNA molecules.

IST-1.L.1

DNA, and sometimes RNA, exhibits specific nucleotide base pairing that is conserved

through evolution: adenine pairs with thymine or uracil (A-T or A-U) and cytosine pairs with guanine (C-G)–

- a. Purines (G and A) have a double ring structure.
- b. Pyrimidines (C, T, and U) have a single ring structure.



What is the primary source of genetic information?

- A. Carbohydrates**
- B. DNA/RNA**
- C. Lipids**
- D. Proteins**

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What is the primary source of genetic information?

B. DNA/RNA



DNA and RNA are nucleic acids. Nucleic acids are the source of genetic information for all organisms.



Prokaryotic DNA is...

- A. Double stranded and circular**
- B. Double stranded and linear**
- C. Single stranded and circular**
- D. Single stranded and linear**

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Prokaryotic DNA is...

A. Double stranded and circular



Prokaryotes have a single circular DNA strand while eukaryotes have multiple linear DNA strands.

DNA is traditionally double stranded.



Eukaryotic DNA is...

- A. Double stranded and circular**
- B. Double stranded and linear**
- C. Single stranded and circular**
- D. Single stranded and linear**

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Eukaryotic DNA is...

**B. Double stranded and
linear**



Eukaryotes have multiple linear DNA strands while prokaryotes have a single circular DNA strand.

DNA is traditionally double stranded.

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How do the number of origins of replication differ and why?

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How do the number of origins of replication differ and why?

Prokaryotic cells have ONE origin of replication, and Eukaryotic cells have MULTIPLE origins of replication. Prokaryotic cells have single circular DNA strands, so it would be more efficient to start at one location and move around the entire circle to make two DNA strands. Eukaryotic cells have multiple linear DNA strands, so they have multiple origins of replication to increase efficiency and allow for DNA to replicate quickly.

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What is a plasmid?

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What is a plasmid?



**Small, extra chromosomal,
double stranded, circular DNA
molecule.**

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Both prokaryotic and eukaryotic cells have plasmids?

A. True

B. False

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Both prokaryotic and eukaryotic cells have plasmids?

A. True



Although traditionally discussed in prokaryotes, plasmids have been found in eukaryotes.

Plasmids carry a minimum of one gene that is beneficial to the host but do not carry genetic information about the organism.

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Plasmids can provide genetic variation to prokaryotes?

- A. True**
- B. False**

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TOPIC

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Plasmids can provide genetic variation to prokaryotes?

A. True



Plasmids are small, extra chromosomal, double stranded, circular DNA molecule. This is additional genetic information that can provide additional genetic information thus genetic variation.

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In RNA, adenine pairs with...

- A. Cytosine**
- B. Guanine**
- C. Thymine**
- D. Uracil**

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**In RNA, adenine pairs
with...**

D. Uracil



**RNA has four nucleotides:
adenine, cytosine, guanine, and
uracil. Base pairing is Adenine
with Uracil and Cytosine with
Guanine.**

**Apples Under the Tree (A-U)
Cars in the Garage (C-G)**

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In DNA, adenine pairs with...

- A. Cytosine**
- B. Guanine**
- C. Thymine**
- D. Uracil**

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In DNA, adenine pairs
with...

C. Thymine



**DNA has four nucleotides:
adenine, cytosine, guanine, and
thymine. Base pairing is Adenine
with Thymine and Cytosine with
Guanine.**

Apples in the Tree (A-T)

Cars in the Garage (C-G)

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**In RNA or DNA, cytosine pairs
with...**

- A. Adenine**
- B. Guanine**
- C. Thymine**
- D. Uracil**

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**In RNA or DNA, cytosine
pairs with...**

B. Guanine



**There are five nucleotides: adenine,
cytosine, guanine, thymine, and
uracil. Base pairing is Adenine with
Thymine or Uracil and Cytosine with
Guanine.**

**Apples in the Tree (A-T)
Cars in the Garage (C-G)**

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What is a purine?

- A. Carbohydrate with a single ring**
- B. Carbohydrate with a double ring**
- C. Nitrogenous base with a single ring**
- D. Nitrogenous base with a double ring**

What is a purine?

D. Nitrogenous base with a double ring



Nucleotides are made up of pentose sugar, nitrogenous base, and phosphate group. There are two types of nitrogenous bases: purine (double-ring) and pyrimidine (single-ring). Adenine & Guanine are Purines and Cytosine, Uracil, and Thymine are Pyrimidines.



Which bases are purines?

- A. Adenine and Cytosine**
- B. Adenine and Guanine**
- C. Cytosine and Guanine**
- D. Cytosine and Thymine**

Which bases are purines?

B. Adenine and Guanine



Nucleotides are made up of pentose sugar, nitrogenous base, and phosphate group. There are two types of nitrogenous bases: purine (double-ring) and pyrimidine (single-ring). Adenine & Guanine are Purines and Cytosine, Uracil, and Thymine are Pyrimidines.

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What are pyrimidines?

- A. Carbohydrate with a single ring**
- B. Carbohydrate with a double ring**
- C. Nitrogenous base with a single ring**
- D. Nitrogenous base with a double ring**

What are pyrimidines?

**C. Nitrogenous base with
a single ring**



Nucleotides are made up of pentose sugar, nitrogenous base, and phosphate group. There are two types of nitrogenous bases: purine (double-ring) and pyrimidine (single-ring). Adenine & Guanine are Purines and Cytosine, Uracil, and Thymine are Pyrimidines.



Which bases are pyrimidines?

- A. Adenine and Cytosine**
- B. Adenine and Guanine**
- C. Cytosine and Guanine**
- D. Cytosine and Thymine**

**Which bases are
pyrimidines?**

D. Cytosine and Thymine



Nucleotides are made up of pentose sugar, nitrogenous base, and phosphate group. There are two types of nitrogenous bases: purine (double-ring) and pyrimidine (single-ring). Adenine & Guanine are Purines and Cytosine, Uracil, and Thymine are Pyrimidines.



Contrast shape of DNA between prokaryotes and eukaryotes.

A. Eukaryotes have circular and prokaryotes have linear DNA

B. Prokaryotes have circular and eukaryotes have linear DNA

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Contrast shape of DNA between prokaryotes and eukaryotes.

B. Prokaryotes have circular and eukaryotes have linear DNA



The DNA structure differs between prokaryotes and eukaryotes. Prokaryotes have a single circular DNA strand while eukaryotes have multiple linear DNA strands. Prokaryotes store theirs in the nucleoid while eukaryotes store theirs in the nucleus.



Contrast amount of DNA between prokaryotes and eukaryotes.

A. Eukaryotes have multiple DNA strands while prokaryotes have one DNA strand

B. Prokaryotes have multiple DNA strands while eukaryotes have one DNA strand

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Contrast amount of DNA between prokaryotes and eukaryotes.

A. Eukaryotes have multiple DNA strands while prokaryotes have one DNA strand



The DNA structure differs between prokaryotes and eukaryotes. Prokaryotes have a single circular DNA strand while eukaryotes have multiple linear DNA strands. Prokaryotes store theirs in the nucleoid while eukaryotes store theirs in the nucleus.



Which organism has plasmids?

- A. Bacteria (prokaryotes)**
- B. Yeast (eukaryotes)**
- C. Both bacteria and yeast**

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Which organism has plasmids?

C. Both bacteria and yeast



Both prokaryotes and eukaryotes have plasmids (small, extra chromosomal, double stranded, circular DNA molecule). It has been found in fungi, yeast, and some higher animals.

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DNA is more stable than RNA

- A. True**
- B. False**

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**DNA is more stable than
RNA**

A. True



DNA is double stranded while RNA is single stranded. The double stranded component provides structural stability as it is harder to break and there is another strand to compare when an error occurs in replication.