

# ДНК и РНК

Андрей Шапал

Deoxyribonucleic acid (DNA) is a nucleic acid that contains the genetic instructions used in the development, functioning, and reproduction of all known organisms and many viruses. DNA is a long molecule consisting of two antiparallel polynucleotide chains that are held together by hydrogen bonds between the nitrogenous bases. The DNA molecule is a double helix, and the two strands are connected by hydrogen bonds between the nitrogenous bases. The DNA molecule is a double helix, and the two strands are connected by hydrogen bonds between the nitrogenous bases.

Chemically, DNA consists of repeating units called nucleotides. Each nucleotide is composed of a phosphate group, a deoxyribose sugar, and a nitrogenous base. The phosphate groups are linked together by phosphodiester bonds, forming the backbone of the DNA molecule. The nitrogenous bases are attached to the deoxyribose sugars and are held together by hydrogen bonds.

There are four types of nitrogenous bases: adenine, thymine, guanine, and cytosine. Adenine and thymine are purines, while guanine and cytosine are pyrimidines. Adenine pairs with thymine, and guanine pairs with cytosine. The sequence of these four bases in the DNA molecule determines the genetic information. This information is used to synthesize proteins, which are the building blocks of life.

The genetic code is a set of rules that defines how the sequence of bases in DNA is translated into the sequence of amino acids in a protein. The genetic code is universal, meaning that it is the same in all organisms. The genetic code is read in groups of three bases, called codons. Each codon codes for a specific amino acid.

The process of copying a DNA molecule is called replication. Replication occurs in the nucleus of eukaryotic cells and in the cytoplasm of prokaryotic cells. The DNA molecule is first unwound, and then each strand is used as a template to synthesize a new strand. This process is called semi-conservative replication, because each new DNA molecule consists of one original strand and one newly synthesized strand.

When cells divide, DNA is replicated, and the two resulting daughter cells each receive a copy of the DNA. This process is called mitosis. In eukaryotic cells, the DNA is packaged into chromosomes. Each chromosome consists of a single DNA molecule that has been tightly coiled. The chromosomes are visible during cell division.

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- Полимеры
  - Белки
- Полисахариды
- Нуклеиновые кислоты
  - Рибонуклеиновая кислота
  - Дезоксирибонуклеиновая кислота
- Каучук

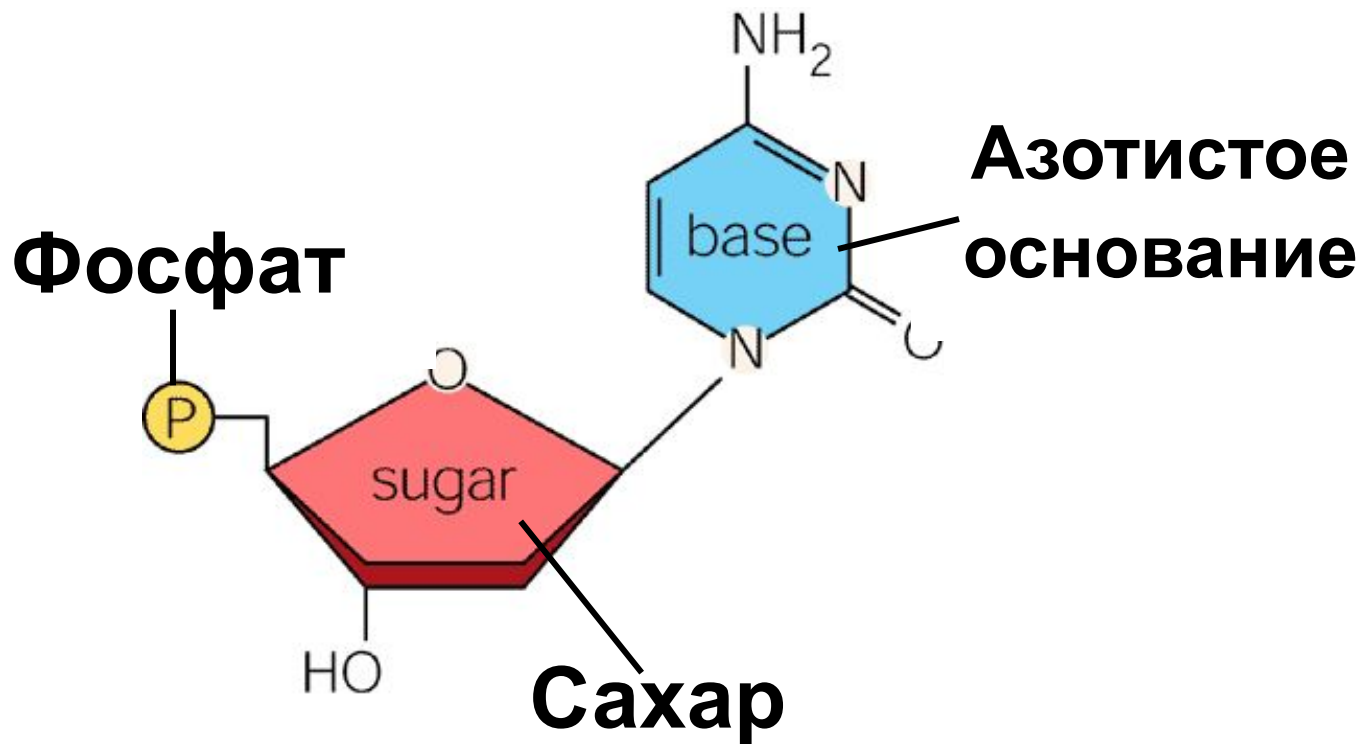
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Chromatin structure and  
DNA replication and  
transcription are  
regulated by the  
interaction of DNA  
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histones. The DNA  
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Classically, DNA consists of two long polynucleotide  
single strands called nucleotides, which are joined by  
hydrogen bonds. The two strands are antiparallel, meaning  
that one runs in the 5' to 3' direction and the other  
runs in the 3' to 5' direction. The two strands are  
held together by hydrogen bonds between the  
complementary bases of the two strands. The bases  
are adenine, thymine, guanine, and cytosine. Adenine  
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hydrogen bonds between the complementary bases  
of the two strands.

When cells divide, DNA is replicated. In prokaryotes,  
the DNA is replicated in a single circular chromosome.  
In eukaryotes, the DNA is replicated in multiple  
linear chromosomes. The DNA is replicated in the  
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# Нуклеотиды





# Нуклеотиды

Аденин

Гуанин

Тимин

Урацил

Цитозин

Chromatin is a complex of DNA and proteins. The DNA is packaged into a structure called chromatin. The DNA is wrapped around a core of histone proteins, forming a nucleosome. The nucleosome is the basic unit of chromatin. The DNA is then further packaged into a higher order structure called a chromosome. The chromosome is the structure that encodes the genetic information. The DNA is then further packaged into a higher order structure called a chromosome. The chromosome is the structure that encodes the genetic information.

Classically, DNA consists of two strands of simple units called nucleotides. The nucleotides are joined together by phosphodiester bonds. The two strands are antiparallel to each other and are therefore called complementary strands. The nucleotides are joined together by phosphodiester bonds. The two strands are antiparallel to each other and are therefore called complementary strands.

When cells divide, DNA is replicated into two identical copies called daughter cells. In a process called DNA replication, the DNA is duplicated. The DNA is then further packaged into a higher order structure called a chromosome. The chromosome is the structure that encodes the genetic information. The DNA is then further packaged into a higher order structure called a chromosome. The chromosome is the structure that encodes the genetic information.

plasmid

# Нуклеиновые кислоты

## ДНК

- Дезоксирибоза углевод.
- Вместо урацила тимин.
- Содержится в ядре.
- Миллионы нуклеотидов.

## РНК

- Рибоза углевод.
- Вместо тимина урацил.
- Содержится в ядре, в цитоплазме.
- Пару тысяч нуклеотидов.

random][plasmid

Chemical structure and function of DNA. DNA is a double-stranded molecule composed of two antiparallel strands of deoxyribose sugar-phosphate backbone and nitrogenous base pairs. The main role of DNA is to store and transmit genetic information. DNA is often compared to a blueprint or a recipe for a cell, which contains instructions for the synthesis of proteins and other cellular components. The DNA sequence determines the structure and function of these molecules, which in turn determine the phenotype of the organism. DNA is also involved in the regulation of gene expression and the repair of genetic damage.

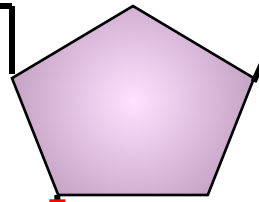
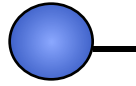
Chemically, DNA consists of two strands of simple units called nucleotides, which are joined together by hydrogen bonds. Each nucleotide is composed of a phosphate group, a deoxyribose sugar, and a nitrogenous base. The two strands are antiparallel, meaning they run in opposite directions. The bases of one strand pair with the bases of the other strand to form the major and minor grooves of the DNA double helix. The major groove is the site where most proteins bind to regulate gene expression. The minor groove is the site where some proteins bind to regulate gene expression. The DNA double helix is a highly organized structure that allows for the efficient storage and transmission of genetic information.

When cells divide, DNA is replicated into two identical copies. This process is called DNA replication. In eukaryotes, DNA replication occurs in the nucleus, while in prokaryotes it occurs in the cytoplasm. DNA replication is a complex process that involves the synthesis of new DNA strands using the existing strands as templates. The process is regulated by various proteins and enzymes, including DNA polymerase, DNA helicase, and DNA ligase. The resulting DNA molecules are then packaged into chromosomes, which are the structures that carry the genetic information. The DNA double helix is a highly stable structure that allows for the long-term storage of genetic information. The DNA double helix is also a dynamic structure that can undergo various conformational changes, such as bending and looping, to facilitate the processes of gene expression and DNA repair.

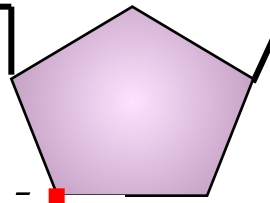
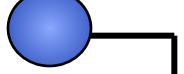
**5' конец цепи**

Направление роста

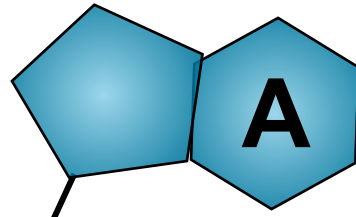
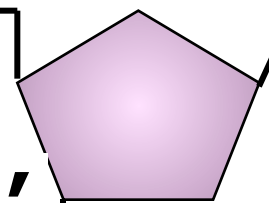
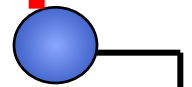
**5'**



Фосфодиэфирная  
связь



Фосфодиэфирная  
связь



**3' конец цепи**

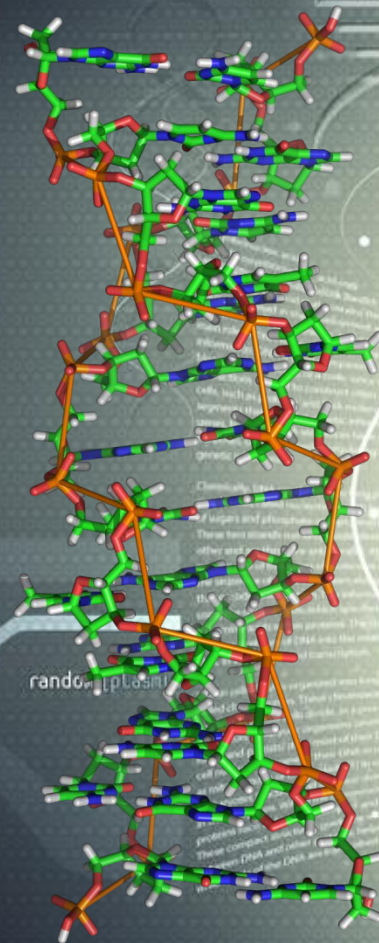
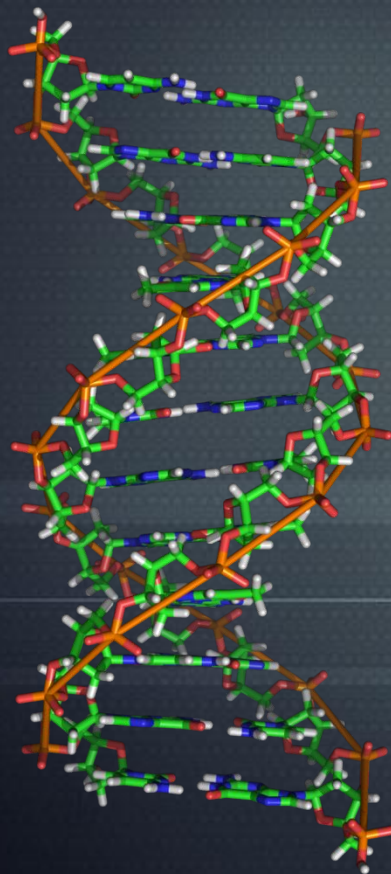
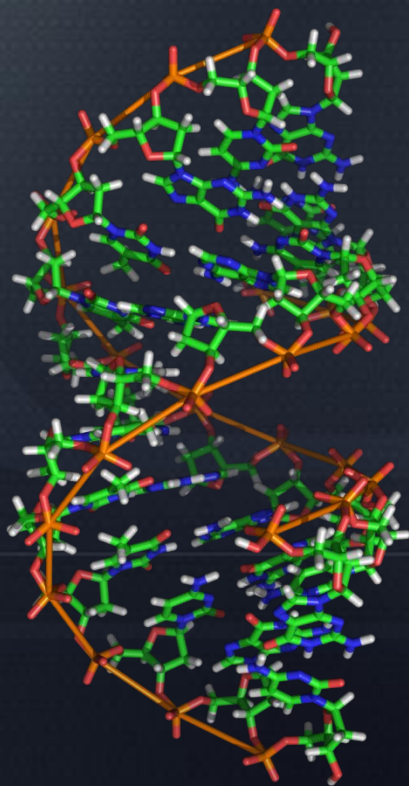
**3'**

ОН





# ДНК



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# Принципы строения ДНК



Нерегулярность

Двуцепочечность

Комплементарность

Антипараллельность

...reproduction and ...  
...DNA is a double-stranded molecule ...  
...produces one strand ...  
...of DNA ...  
...interactions ...  
...cells, such as proteins ...  
...genes, but other ...  
...functions, or are involved in ...  
...genetic information.

...Classically, DNA ...  
...the genome of ...  
...that encode ...  
...using the genetic code ...  
...the amino acids ...  
...carrying ...  
...RNA, in a process ...

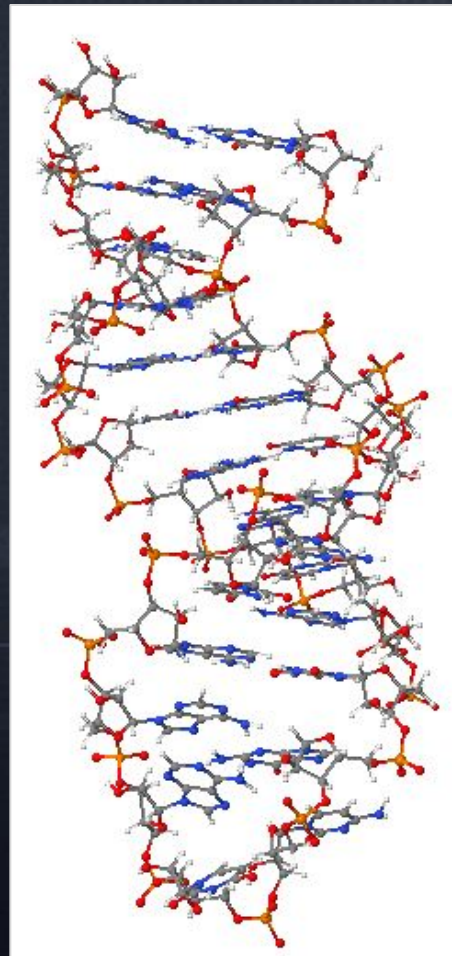
...randomly ...

...replication ...  
...lung, and ...  
...cell ...  
...at mitochondria ...  
...proteins ...  
...in the cytoplasm ...  
...proteins such as ...  
...These compact ...  
...between DNA ...  
...which parts of the DNA ...





# PHK



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Chemical structure and  
DNA is a double-stranded molecule composed of two strands of deoxyribose sugar-phosphate backbone and nitrogenous base pairs. The main role of DNA molecules is to store and transmit genetic information. DNA is often compared to a blueprint for a single or a multicellular organism. Instructions needed to construct other cells, such as proteins and RNA, are encoded in the DNA sequence. The DNA sequence is transcribed into messenger RNA (mRNA), which is then translated into proteins. Other molecules, such as ribosomes and tRNAs, are also encoded in the DNA sequence. The DNA sequence is also used to regulate the expression of genes.

Chemically, DNA consists of two strands of simple units called nucleotides, which are joined together by phosphate groups. These two strands run in opposite directions to each other and are therefore anti-parallel. The sugar-phosphate backbone of DNA is a double helix. It is the sequence of these two strands that encodes the genetic information. This information is used to synthesize proteins and other molecules. The DNA sequence is also used to regulate the expression of genes. The DNA sequence is also used to synthesize other molecules, such as RNA and proteins. The DNA sequence is also used to synthesize other molecules, such as RNA and proteins. The DNA sequence is also used to synthesize other molecules, such as RNA and proteins.

Within cells, DNA is organized into long, thin structures called chromosomes. These chromosomes are duplicated before cells divide. In a process called DNA replication, eukaryotic organisms produce about two copies of their DNA (one inside the nucleus and one outside in the mitochondria or chloroplasts). In some cells, such as prokaryotic bacteria and archaea, there is only one copy of the DNA. The DNA is also organized into structures called nucleosomes, which are composed of DNA wrapped around histone proteins. These compact structures are called chromatin. The DNA sequence is also used to synthesize other molecules, such as RNA and proteins. The DNA sequence is also used to synthesize other molecules, such as RNA and proteins. The DNA sequence is also used to synthesize other molecules, such as RNA and proteins.

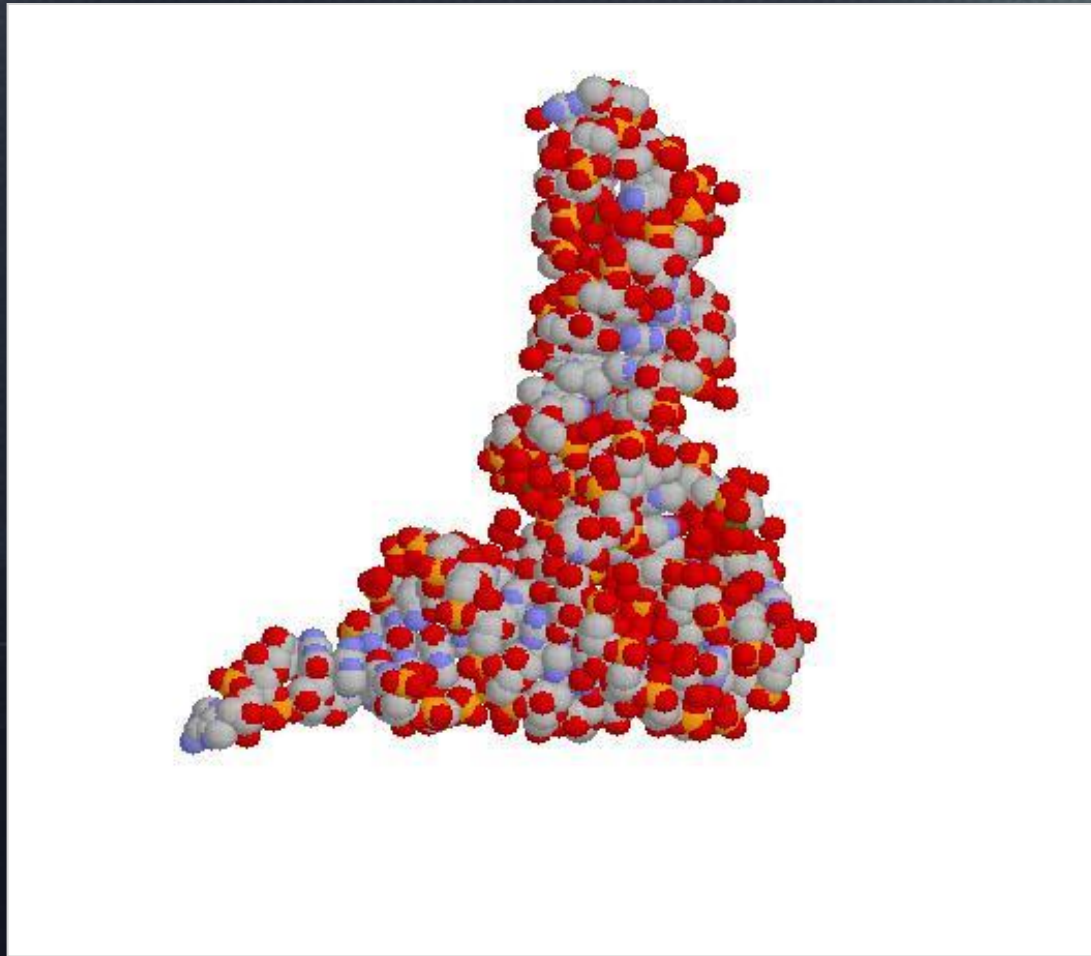
# Виды РНК

1. **и-РНК** = м-РНК информационная, матричная  
до 10 тысяч нуклеотидов
2. **т-РНК** транспортная  
около 100 нуклеотидов
3. **р-РНК** рибосомальная  
2-3 тысячи нуклеотидов

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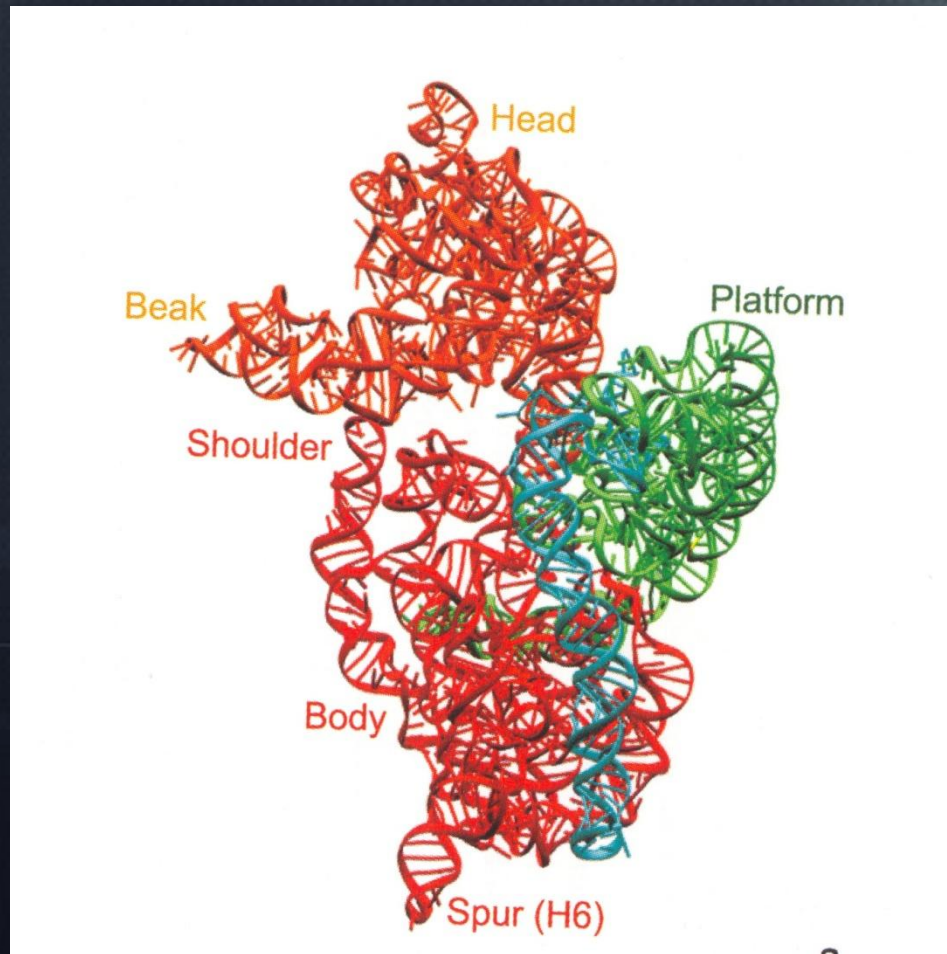


# Транспортная РНК





# Рибосомальная РНК



Genetic information is stored in DNA. DNA is a double helix structure. The main role of DNA is to store genetic information. DNA is often compared to a library. Instructions needed to produce other cells, such as proteins, are DNA. The DNA codes for the synthesis of proteins. Some proteins are enzymes, or are involved in other biological processes.

Classically, DNA consists of two strands of simple units called nucleotides. These two strands are antiparallel to each other and are therefore said to form a double helix. The sugar-phosphate backbone of the DNA is the structure of these two strands. The base pairs that encode information. This information is used to synthesize proteins. The structure of the amino acid side chains of the proteins is determined by the sequence of the DNA. In a process called transcription.

When cells divide, DNA is replicated into two identical copies called chromosomes. These chromosomes are duplicated before cell division. In a process called DNA replication. Eukaryotes undergo meiosis, which produces haploid cells. These cells are the gametes, such as sperm and eggs. In these cells, the DNA is packaged into chromosomes. In eukaryotes, DNA is packaged into chromosomes. In prokaryotes, DNA is packaged into a single circular chromosome. In the cytoplasm, within the ribosome, proteins such as ribosomes, transfer RNA, and other proteins, including enzymes. These compact structures are called ribosomes. The compact structures are called ribosomes. Between DNA and other proteins, including enzymes, which parts of the DNA are transcribed.



# Функции РНК

1. Информационная: хранение информации (у части вирусов)
2. Каталитическая
3. Регуляторная

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When cells divide, DNA is replicated into two identical copies called chromosomes. These chromosomes are duplicated before cell division. In a process called DNA replication, Eukaryotic organisms produce multiple copies of their DNA inside the nucleus and mitochondria. In some cases, such as mitochondria or chloroplasts, DNA is replicated in the cytoplasm, within the organelle and separate from the nucleus. These compact DNA molecules are called plasmids. Between DNA and other proteins, including enzymes, which parts of the DNA are transcribed.



# Болезни

1. Наследственные заболевания.
2. Генные болезни.
3. Хромосомные болезни.

random][plasmid

Chromatin structure and  
DNA replication and  
transcription are  
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interaction of DNA  
with proteins called  
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these proteins to form  
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histones are arranged  
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along the DNA, and  
the DNA is held  
together by the  
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histones with each  
other and with the  
DNA. This structure  
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Classically, DNA consists of two strands of  
simple units called nucleotides. The two strands  
of sugars and phosphate groups are called  
the sugar-phosphate backbones. The two  
strands are antiparallel and complementary  
to each other. The nitrogenous bases of the  
strands are held together by hydrogen bonds.  
The bases are arranged in a regular pattern  
along the DNA, and the DNA is held  
together by the interaction of the bases  
with each other and with the sugar-phosphate  
backbones. This structure is called DNA.

When cells divide, DNA is replicated and  
distributed to the daughter cells. In prokaryotes,  
DNA replication occurs in a single circular  
loop. In eukaryotes, DNA replication occurs  
in multiple linear chromosomes. The DNA  
is held together by the interaction of the  
histones with each other and with the  
DNA. This structure is called chromatin.  
The DNA is held together by the  
interaction of the histones with each  
other and with the DNA. This structure  
is called chromatin.



