

# Difference Between 16s rRNA and 16s rDNA

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## Key Difference - 16s rRNA vs 16s rDNA

Ribosomes are the biological sites of protein synthesis in all living organisms. Ribosomes contain two components; small subunit and a large subunit. Prokaryotic organisms and Eukaryotic organisms differ from the composition of ribosome they contain. Each subunit is composed of ribosomal RNA and different proteins. These two subunits fit together and work as one during the protein synthesis. Prokaryotic ribosomes are the 70S, and they are composed of 30S small subunit and 50S large subunit. Eukaryotic ribosomes are 80S, and they are composed of 40S small subunit and 60S large subunit. In prokaryotes, ribosomal RNA of the small subunit of ribosomes is known as 16s rRNA. This 16s rRNA is transcribed from the chromosomal DNA which is known as 16s rDNA. 16s rDNA is the gene which produces 16s rRNA by the transcription. The **key difference** between the 16s rRNA and 16s rDNA is that **16s rRNA is the transcribed single-stranded ribosomal RNA which is a component of the small subunit of prokaryotes while 16s rDNA is the double-stranded chromosomal DNA or the gene that code for 16s rRNA**. Gene of the 16s rRNA is the 16s rDNA.

## What is 16s rRNA?

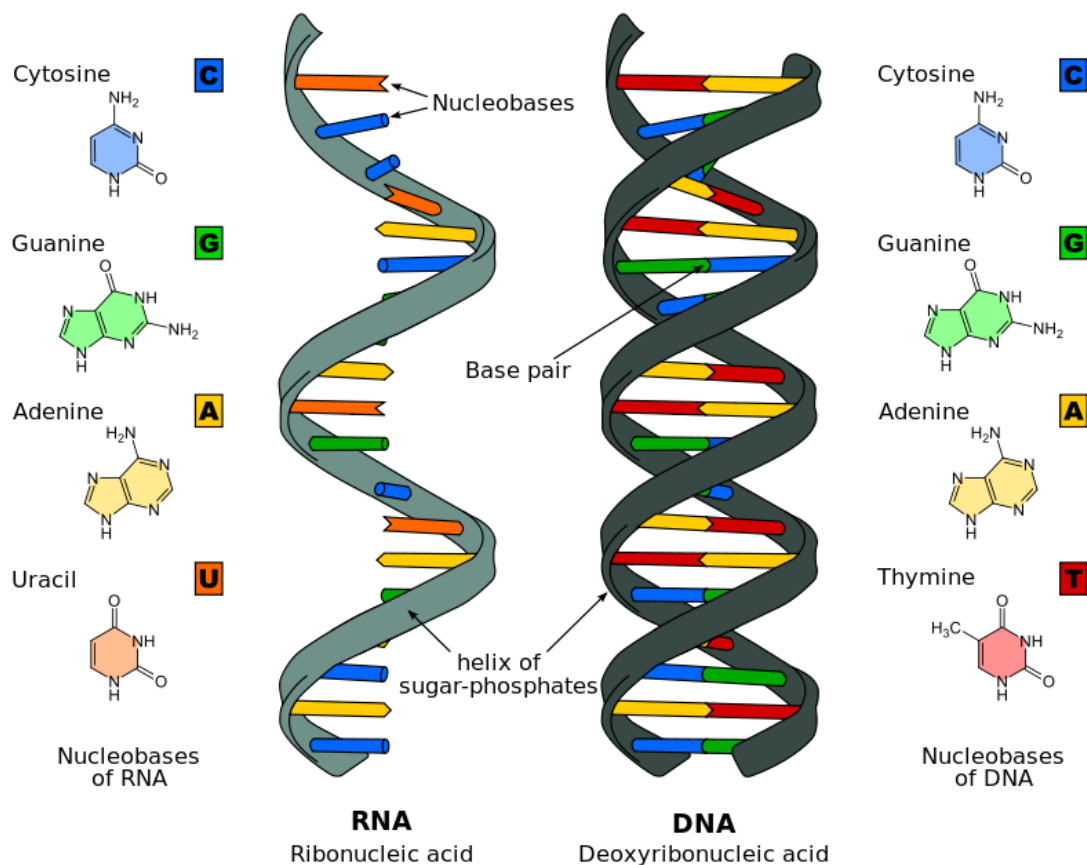
rRNA is a component of ribosomes. 16s rRNA is the specific component of 30S small subunit of the prokaryotic ribosome that binds with Shine-Dalgarno sequence. This 16s rRNA sequence shows high variability among the bacterial species. Hence it can be used for the bacterial phylogeny and taxonomy.

## What is 16s rDNA?

Prokaryotes have 70S ribosomes. The small subunit of the prokaryotic ribosomes is the 30S. The ribosomal RNA (rRNA) of the 30S small subunit is known as 16s rRNA, and the gene 16s rDNA codes it. Hence 16s rDNA is known as 16s rRNA gene. 16s rDNA is chromosomal DNA. It is double-stranded, and it is a gene composed of coding and noncoding regions. When 16s rDNA gene is transcribed, it produces 16s rRNA sequence. 16s rDNA is universal DNA sequence in prokaryotes. However, the sequence of the 16s rDNA among the prokaryotes vary. It facilitates the use of 16s rDNA sequence in accurate identification of bacterial species and also for the discovery of novel bacterial species.

16s rDNA plays an important role in bacterial phylogeny and taxonomy. Therefore it is used as a reliable molecular marker in phylogenetic studies of prokaryotes since it is highly conserved between different species. 16s rDNA nucleotide sequence has nine

hypervariable regions (V1-V9) that provide a good source for differentiation of [bacteria and archaea](#).



**Figure 02: DNA and RNA**

The sequencing of 16s rDNA gene has facilitated reclassification of the bacteria into new species or genera. Hence, this gene is used in molecular laboratories as a most common housekeeping marker for identification of microbes. There are several reasons that made 16srDNA as the best marker for identification of microbes such as the presence of 16srDNA in all bacteria, the unchanged nature of the function of the 16s rDNA gene over the time, and the large size of 16s rDNA that makes it enough for information purposes.

## What are the Similarities Between 16s rRNA and 16s rDNA?

- Both are [nucleic acids](#).
- Both are made up of [nucleotides](#).
- Both are related to ribosomal RNA.

# What is the Difference Between 16s rRNA and 16s rDNA?

16s rRNA vs 16s rDNA	
16s rRNA is the ribosomal RNA component of the small subunit of 30s ribosome of prokaryotes.	16s rDNA is the chromosomal DNA that encodes for the 16s rRNA sequence of prokaryotes.
Number of Strands	
16s rRNA is single-stranded.	16s rDNA is double stranded
Gene or Sequence	
16s rRNA is a transcribed RNA of a gene.	16s rDNA is a gene.
Coding Sequence	
16s rRNA has only the coding sequence.	16s rDNA has both coding and non-coding strands.
Uracil Base	
16s rRNA contains Uracil bases in its nucleotide sequence.	16s rDNA does not contain base Uracil in its nucleotide sequences.
Thymin Base	
16s rRNA does not contain Thymine bases in its nucleotide sequence.	16s rDNA contains Thymine bases in its nucleotide sequences.
Synthesis	
16s rRNA is made upon transcription of 16s rDNA gene.	16s rDNA is in the genome of the prokaryotes.

## Summary - 16s rRNA vs 16s rDNA

16s rRNA is the ribosomal RNA component of the small subunit of ribosomes of prokaryotes. The gen 16s rDNA encodes this RNA sequence. 16s rRNA is single-stranded and 16s rDNA is double-stranded. This is the difference between 16s rRNA and 16s rDNA.

**Reference:**

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**Image Courtesy:**

1. 'Difference DNA RNA-EN' By Sponk (talk) - chemical structures of nucleobases by Roland1952, [\(CC BY-SA 3.0\)](#) via [Commons Wikimedia](#)

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