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Venkatraman Ramakrishnan

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Venkatraman Ramakrishnan is a physicist who switched to biology and won the Nobel Prize in 2009. He started over as a biology student.

1 Who is Venkatraman Ramakrishnan?

Ramakrishnan studies the shapes of large molecules inside cells. People call him a structural biologist.

Where did he start?

- He was born on 1 April 1952 in Chidambaram, India.
- He studied physics at the University of Baroda.
- He moved to the United States in 1971.
- He earned a physics PhD from Ohio University in 1976.

What is the memory hook?

Think “1952 born, 1971 left, 1976 PhD”. Each date marks one step.

> **Quick check 1.** Ramakrishnan earned his first PhD in physics from Ohio University in 1976. *(True or False?)* See answer ↓

Sources: achievement.org; falling-walls.com; minerva.edu

2 Why did he switch from physics to biology?

After his PhD, he wanted to work on living systems. He started again as a student.

What are the steps?

- He joined a second graduate programme in biology at the University of California, San Diego.
- He then did a postdoc at Yale with Peter Moore. There he began to study the ribosome.
- He later worked at Brookhaven National Laboratory and the University of Utah.
- In April 1999 he moved to the Medical Research Council (MRC) Laboratory of Molecular Biology in Cambridge, England.

Was the path smooth?

No. He applied to more than 50 institutions and got no interview invitations. He kept working on the ribosome.

What is the memory hook?

Think “physics, biology, ribosome, Cambridge”. Four stops tell the story.

> **Quick check 2.** He joined the MRC Laboratory of Molecular Biology in Cambridge in April 1999. *(True or False?)* See answer ↓

Sources: achievement.org; minerva.edu

3 What did the 2009 Nobel Prize reward?

The 2009 Nobel Prize in Chemistry went to three people. They shared it for work on the ribosome.

Who shared the prize?

- Venkatraman Ramakrishnan, then at Cambridge.

- Thomas A. Steitz of Yale.
- Ada E. Yonath of the Weizmann Institute.
- The citation praised studies of the structure and function of the ribosome.

What is the ribosome?

- It is the cell's protein-making machine.
- It reads genetic instructions and links amino acids into proteins.
- It is one of the cell's most complex machines.

How did they see it?

They used X-ray crystallography. X-rays pass through a crystal of the molecule. The scattered rays reveal the atomic shape.

What is the memory hook?

Think "three shared, one machine". The machine is the ribosome.

> **Quick check 3.** The 2009 Nobel Prize in Chemistry was won by Ramakrishnan alone. *(True or False?)* See answer ↓

Sources: bnl.gov; chemistryworld.com; achievement.org

4 What does the ribosome have to do with antibiotics?

Many antibiotics work by blocking the ribosomes of bacteria. A blocked ribosome cannot make proteins. The bacteria then cannot survive.

What did his team find?

- In 2000 his team solved the structure of the 30S subunit. This is the smaller half of the bacterial ribosome.
- He used the National Synchrotron Light Source at Brookhaven for this work.
- The structure showed where antibiotics bind to the ribosome.

Why does this matter?

Drug makers can see the target. They can then design drugs that fit better. This helps against bacteria that resist current drugs.

What is the memory hook?

Think “30S is the small half”. Antibiotics have a target to hit.

> **Quick check 4.** The ribosome is the cell's protein-making machine. *(True or False?)* See answer ↓

Sources: bnl.gov; achievement.org

5 What honours has he received?

His honours span science, India and Britain.



Venkatraman Ramakrishnan, 2015 portrait. Photo: Royal Society, CC BY-SA 4.0, via Wikimedia Commons.

What is the order?

- **2007:** Louis-Jeantet Prize for Medicine.
- **2009:** Nobel Prize in Chemistry.
- **2010:** Padma Vibhushan from India.
- **2012:** knighted for services to molecular biology.
- **December 2015 to November 2020:** President of the Royal Society.
- **2022:** appointed to the Order of Merit by King Charles III.

What is the Royal Society?

It is Britain’s national academy of sciences. He was its 62nd President. He was the first Indian-origin scientist to hold the post.

What is the memory hook?

Think “prize, honour, knight, president, merit”. It runs from 2009 to 2022.

> **Quick check 5.** He served as President of the Royal Society from December 2015 to November 2020. *(True or False?)* See answer ↓

Sources: achievement.org; indiawrites.org

Sources: globalindian.com; commons.wikimedia.org

6 Is he an "Indian Nobel laureate"?

This question is a common exam trap. The answer needs care.

What are the facts?

- He was born in India.
- He studied in India until his first degree.
- He holds British and American citizenship.
- He won the prize while working in Britain.

How do lists treat him?

Many lists call him an Indian-origin or Indian-born laureate. Read the question wording closely. “Indian citizen” and “of Indian origin” are different.

What is the memory hook?

Think “born Indian, citizen elsewhere”. Match the exam’s exact words.

Quick check 6. He holds only Indian citizenship. *(True or False?)*

See answer ↓

Sources: achievement.org; falling-walls.com

7 What are the common exam traps?

Four mix-ups appear again and again. Learn each pair.

What are the traps?

- **Which Nobel?** His prize was in Chemistry, not Physics or Medicine.
- **Which year?** The prize year is 2009. The 30S structure is from 2000.
- **Which subunit?** The 30S subunit is the smaller one.
- **Which post?** He led the Royal Society, not the Nobel committee.
- **Which Indian honour?** The Padma Vibhushan came in 2010.

How do you remember the Nobel?

Think “chemistry of life”. Proteins are made by a molecular machine.

Quick check 7. The Padma Vibhushan was awarded to him in 2010. *(True or False?)* See answer ↓

Sources: chemistryworld.com; achievement.org

Practice MCQs

1. In which year did Venkatraman Ramakrishnan win the Nobel Prize in Chemistry?

A. 1999

B. 2011

C. 2005

D. 2009

See answer ↓

2. Venkatraman Ramakrishnan shared the 2009 Nobel Prize in Chemistry with

A. Thomas A. Steitz and Ada E. Yonath

B. Jennifer Doudna and Emmanuelle Charpentier

C. Frances Arnold and George Smith

D. Roger Kornberg and Aaron Klug

See answer ↓

3. The 2009 Nobel Prize in Chemistry shared by Ramakrishnan was awarded for studies of the

A. Structure and function of the ribosome

B. Structure of haemoglobin

C. Structure of the proton

D. Structure of DNA

See answer ↓

4. In 2000 Ramakrishnan's team solved the structure of which part of the bacterial ribosome?

A. The 70S nucleus

B. The 30S subunit

C. The 16S membrane

D. The 50S subunit

See answer ↓

5. Venkatraman Ramakrishnan served as President of the Royal Society during

A. 2005 to 2010

B. 2015 to 2020

C. 2020 to 2025

D. 2010 to 2015

See answer ↓

Answer Key

1. **D.** The answer is 2009. He shared the Nobel Prize in Chemistry that year for studies of the structure and function of the ribosome. 2005, 2011 and 1999 are wrong. In 1999 he only moved to Cambridge. Memory hook: ribosome, 2009. ↑ Q1
2. **A.** The answer is Thomas A. Steitz and Ada E. Yonath. All three studied the ribosome. Doudna and Charpentier won in 2020. Arnold and Smith won in 2018. Memory hook: three, one machine. ↑ Q2
3. **A.** The answer is the structure and function of the ribosome. The ribosome makes proteins in the cell. DNA, haemoglobin and the proton were not the subject. Memory hook: ribosome, the protein factory. ↑ Q3
4. **B.** The answer is the 30S subunit, the smaller half. It showed where antibiotics bind. The 50S subunit is the larger half. A ribosome has no nucleus or membrane. Memory hook: 30S is the small half. ↑ Q4
5. **B.** The answer is 2015 to 2020. He led the Royal Society from December 2015 to November 2020. He was the first Indian-origin scientist in that post. Memory hook: five years from 2015. ↑ Q5

Quick-check answers

1. **True.** He had moved to the United States in 1971. ↑ 1
2. **True.** He led ribosome work there. ↑ 2
3. **False.** it is false. He shared it with Thomas Steitz and Ada Yonath. ↑ 3
4. **True.** It reads genetic instructions and builds proteins. ↑ 4
5. **True.** He was the first Indian-origin scientist in that post. ↑ 5
6. **False.** it is false. He holds British and American citizenship. ↑ 6
7. **True.** It is India's second-highest civilian honour. ↑ 7

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