The Doctor Who Discovered the Cause of Yellow Fever

Dr. Carlos Finlay was a Cuban physician and scientist who made a groundbreaking discovery in the late 19th century. The theory that *Bacillus icteroides* (a type of bacteria) was responsible for causing yellow fever was first proposed by him.

He is best known for identifying the mosquito as the carrier of the yellow fever virus, a discovery that revolutionized the understanding and prevention of this deadly disease.

Born in 1833 in Puerto Príncipe (now Camagüey), Cuba, Finlay was the son of a Scottish physician and a Cuban mother. From a young age, he showed a keen interest in science and medicine. After completing his medical studies in Cuba, he traveled to France and the United States to further his education.

In 1879, Finlay began conducting research on yellow fever, a disease that had long plagued the Caribbean and parts of the Americas. At the time, the cause of yellow fever was still a mystery, and many theories existed, including the belief that it was spread through miasmas (bad air) or direct contact with infected individuals.

Finlay, however, suspected that the disease was transmitted by a vector, a living organism that carries and transmits the disease-causing agent. After years of careful observation and experimentation, he concluded that the mosquito was the carrier of the yellow fever virus. His experiments were unsuccessful and people thought he was crazy.

In 1881, Finlay presented his groundbreaking theory at the Havana Academy of Sciences. He proposed that a specific species of mosquito, now known as the Aedes aegypti, was responsible for transmitting the yellow fever virus from infected individuals to healthy ones. This was a revolutionary idea at the time, as it challenged the prevailing miasma theory and the belief that the disease was spread through direct contact.

Despite initial skepticism from the scientific community, Finlay's theory gained traction over the years. In 1900, the U.S. Army's Yellow Fever Commission, led by Major Walter Reed, conducted experiments that confirmed Finlay's findings. This paved the way for the development of effective prevention and control measures against yellow fever, including mosquito eradication and the use of insecticides.

Finlay's groundbreaking work had a significant impact on public health and the fight against yellow fever. His discovery helped save countless lives and contributed to the control and eventual eradication of the disease in many parts of the world. Finlay's legacy as a pioneering scientist and public health advocate continues to inspire and inform modern medical research and practice.

Directions: Using the above text answer the below questions.

1. Who was the scientist that discovered the mosquito as the carrier of yellow fever?
a. Louis Pasteur
b. Carlos Finlay
c. Walter Reed
d. Marie Curie

2. Where was Carlos Finlay born?
a. Havana, Cuba
b. Paris, France
c. Puerto Príncipe, Cuba
d. London, England

3. What year did Carlos Finlay present his theory about the transmission of yellow fever?
a. 1881
b. 1900
c. 1865
d. 1833

4. Which species of mosquito did Finlay identify as the carrier of the yellow fever virus?
a. Anopheles
b. Culex
c. Aedes aegypti
d. Toxorhynchites

5. Before Finlay's discovery, what was a common belief about how yellow fever spread?
a. Through mosquito bites
b. Through miasmas (bad air)
c. Through water
d. Through bird droppings

6. Which organization confirmed Finlay's theory in 1900?
a. World Health Organization
b. U.S. Army's Yellow Fever Commission
c. Centers for Disease Control
d. Red Cross

7. What impact did Finlay's discovery have on public health?
a. It led to the discovery of antibiotics
b. It was ignored and had no impact
c. It helped control and eradicate yellow fever
d. It caused yellow fever to spread more

8. What was Carlos Finlay's nationality?
a. American
b. Cuban
c. French
d. British

9. What did Finlay propose as a method to prevent yellow fever?
a. Vaccination
b. Mosquito eradication
c. Herbal medicine
d. Quarantine

10. Who led the experiments that confirmed Finlay's findings?
a. Louis Pasteur
b. Alexander Fleming
c. Walter Reed
d. Joseph Lister

The Doctor Who Discovered the Cause of Yellow Fever

Answer Key

1. b
2. c
3. a
4. c
5. b
6. b
7. c
8. b
9. b
10. c

Dr. Jesse Lazear: A Pioneer in Modern Medicine

Dr. Jesse Lazear was a remarkable American physician who made significant contributions to the field of modern medicine. Born in 1866, Lazear dedicated his life to understanding and combating infectious diseases, ultimately playing a crucial role in the fight against yellow fever.

Lazear's journey began at the Johns Hopkins University, where he earned his medical degree in 1889. After completing his studies, he joined the U.S. Army Medical Corps and was stationed in Cuba during the Spanish-American War. It was during this time that Lazear's interest in yellow fever intensified, as the disease was ravaging the local population.

He traveled to Cuba aboard the *USS Sedgwick.* Lazear arrived in June 1900 as part of his assignment to the U.S. Army Yellow Fever Commission.

The Commission was established by the U.S. Army to investigate the cause and transmission of yellow fever, which was a major health problem for American troops stationed in Cuba during and after the Spanish-American War.

Determined to find a solution, Lazear collaborated with a team of researchers, including the renowned Dr. Walter Reed. Together, they conducted groundbreaking experiments to determine the cause and transmission of yellow fever. Lazear's work was instrumental in proving that the disease was spread by a specific type of mosquito, known as the Aedes aegypti.

Tragically, Lazear's dedication to his research ultimately cost him his life. While conducting experiments, he became infected with yellow fever and succumbed to the disease in 1900, at the young age of 34. However, his sacrifice was not in vain, as his findings paved the way for the development of effective prevention and treatment methods for yellow fever.

Lazear's legacy continues to inspire medical professionals and researchers around the world. His unwavering commitment to understanding and conquering infectious diseases has left an indelible mark on the field of public health. Today, Lazear is remembered as a true hero, whose life and work have had a lasting impact on the lives of countless individuals.

Directions: Using the article about Dr. Lazear answer the following questions.

1. What was Dr. Jesse Lazear's primary contribution to medicine?
a. Discovering a cure for the common cold
b. Researching the transmission of yellow fever
c. Developing vaccines for influenza
d. Inventing modern surgical tools

2. Where did Dr. Jesse Lazear earn his medical degree?
a. Harvard University
b. Stanford University
c. Johns Hopkins University
d. University of Pennsylvania

3. Which disease was Dr. Jesse Lazear particularly focused on studying?
a. Malaria
b. Tuberculosis
c. Yellow fever
d. Cholera

4. What insect did Lazear and his team prove to spread yellow fever?
a. Anopheles mosquito
b. Aedes aegypti mosquito
c. Tsetse fly
d. Housefly

5. In what year did Dr. Jesse Lazear pass away?
a. 1890
b. 1900
c. 1910
d. 1920

6. Which war was Dr. Jesse Lazear involved in as part of the U.S. Army Medical Corps?
a. World War I
b. World War II
c. Spanish-American War
d. Civil War

7. Who was one of the renowned researchers Lazear collaborated with?
a. Dr. Jonas Salk
b. Dr. Walter Reed
c. Dr. Louis Pasteur
d. Dr. Albert Sabin

8. What was the outcome of Lazear's experiments on yellow fever?
a. Yellow fever was eradicated immediately
b. It was proven that yellow fever is airborne
c. The transmission method was identified
d. No significant findings were made

9. How is Dr. Jesse Lazear remembered today?
a. As a pioneer in cardiac surgery
b. As a hero in public health
c. As a leading cancer researcher
d. As an inventor of antibiotics

10. What legacy did Dr. Jesse Lazear leave behind?
a. Development of new antibiotics
b. Contributions to understanding infectious diseases
c. Creation of a new medical device
d. Discovery of a new virus

Dr. Jesse Lazear: A Pioneer in Modern Medicine

Answer Key

1. b
2. c
3. c
4. b
5. b
6. c
7. b
8. c
9. b
10. b

The Remarkable Life and Contributions of Dr. James Carroll

Dr. James Carroll was a pioneering American physician and researcher who made significant contributions to the fields of medicine and public health. Born in 1854 in Maryland, Dr. Carroll's life and work were marked by a relentless pursuit of scientific understanding and a deep commitment to improving the health and well-being of people around the world.

After graduating from the University of Maryland School of Medicine, Dr. Carroll joined the U.S. Army Medical Corps, where he had the opportunity to work alongside the renowned physician and researcher Dr. Walter Reed. Together, they conducted groundbreaking research on yellow fever, a devastating disease that had claimed countless lives.

Carroll traveled to Cuba aboard the *USS Sedgwick*. He arrived in June 1900 as part of his assignment to the U.S. Army Yellow Fever Commission.

Dr. Carroll traveled to Cuba in 1900 as part of the Yellow Fever Commission's efforts to study the disease. Havana was a major focus for this research, as it was plagued by frequent and severe outbreaks of yellow fever. The Commission chose Cuba because it provided the best opportunity to study the disease and conduct controlled experiments in an area where the virus was endemic.

James Carroll had never believed in the mosquito theory. He'd never thought the insects carried the disease. But like the rest of the Yellow Fever Commission, he supported the theory initially proposed by Dr. Carlos Finlay. The theory posited that yellow fever was not spread through direct contact or contaminated objects (fomites) but rather through the bite of an infected *Aedes aegypti* mosquito. Dr. Carroll's role was to help design and conduct experiments to provide conclusive evidence for this mode of transmission.

Dr. Carroll was one of the scientists who volunteered to participate in the experiments to prove the mosquito transmission theory. In August 1900, he allowed himself to be bitten by mosquitoes that had previously bitten yellow fever patients. Shortly after, he developed the symptoms of yellow fever and fell seriously ill, though he ultimately survived.

Through their experiments, Dr. Carroll and his colleagues were able to demonstrate that yellow fever was transmitted by mosquitoes, a revolutionary discovery that paved the way for more effective prevention and treatment methods. This landmark achievement earned Dr. Carroll widespread recognition and respect within the scientific community.

But Dr. Carroll's contributions extended far beyond his work on yellow fever. He also made important contributions to the understanding of other infectious diseases, such as typhoid fever and malaria. His research helped to improve diagnostic techniques and develop more effective therapies, saving countless lives in the process.

In addition to his scientific work, Dr. Carroll was also a passionate advocate for public health initiatives. He worked tirelessly to promote the importance of sanitation, hygiene, and preventive care, helping to raise awareness and drive positive change in communities across the country.

Throughout his illustrious career, Dr. Carroll received numerous honors and awards in recognition of his groundbreaking work. He was elected to the prestigious National Academy of Sciences and was awarded the prestigious Kober Medal for his outstanding contributions to the field of medicine.

Today, Dr. James Carroll is remembered as a true pioneer in the world of medicine, a man whose dedication, innovation, and compassion have left an indelible mark on the lives of countless individuals. His legacy serves as an inspiration to aspiring scientists and healthcare professionals around the world, reminding us of the transformative power of knowledge, perseverance, and a deep commitment to the betterment of humanity.

Directions: Read about Dr. Carroll and answer questions about him.

1. Where was Dr. James Carroll born?
a. New York
b. Maryland
c. Virginia
d. California

2. What was Dr. Carroll's main field of work?
a. Engineering
b. Medicine
c. Architecture
d. Law

3. With which renowned physician did Dr. Carroll conduct research on yellow fever?
a. Dr. Jonas Salk
b. Dr. Alexander Fleming
c. Dr. Walter Reed
d. Dr. Albert Sabin

4. What significant discovery did Dr. Carroll and his colleagues make about yellow fever?
a. It is caused by bacteria
b. It is transmitted by mosquitoes
c. It can be cured with penicillin
d. It is not contagious

5. Besides yellow fever, which other disease did Dr. Carroll study?
a. Tuberculosis
b. Typhoid fever
c. Diabetes
d. Influenza

6. Which organization recognized Dr. Carroll for his contributions to medicine?
a. The United Nations
b. The Red Cross
c. The National Academy of Sciences
d. The World Health Organization

7. What medal did Dr. Carroll receive for his work?
a. The Nobel Prize
b. The Kober Medal
c. The Medal of Honor
d. The Pulitzer Prize

8. What public health initiative was Dr. Carroll passionate about?
a. Vaccination
b. Sanitation and hygiene
c. Nutrition
d. Exercise programs

9. Dr. Carroll's research led to improvements in which area?
a. Transportation
b. Diagnostic techniques
c. Education systems
d. Computer technology

10. What is Dr. Carroll's legacy remembered for?
a. His wealth
b. His leadership in politics
c. His dedication to medicine and public health
d. His inventions

The Remarkable Life and Contributions of Dr. James Carroll

Answer Key

1. b
2. b
3. c
4. b
5. b
6. c
7. b
8. b
9. b
10. c

Dr. Walter Reed: A Pioneering Physician

Dr. Walter Reed was a remarkable American physician and medical researcher who made significant contributions to the field of public health. Born in 1851 in Gloucester County, Virginia, Reed dedicated his life to advancing medical knowledge and improving the lives of people around the world.

One of Dr. Reed's most notable achievements was his work in the study of yellow fever, a deadly disease that was a major public health concern in the late 19th and early 20th centuries. He helped eliminate the theory of Bacillus icteroides. Reed even volunteered for the experiments. In the 1890s, Reed led a team of researchers to Cuba, where they conducted groundbreaking experiments to determine the cause of yellow fever. They arrived in Cuba in 1900 on USS Sedgwick. Through their work, they discovered that the disease was transmitted by a specific species of mosquito, rather than through direct contact with infected individuals.

One of the key findings was that mosquitoes needed a period of incubation (about 12 days) after feeding on an infected person before they could transmit the disease. This incubation period explained why yellow fever outbreaks often appeared in cycles.

This discovery was a major breakthrough in the understanding of infectious diseases and paved the way for more effective prevention and treatment methods. Dr. Reed's research not only saved countless lives but also had far-reaching implications for the field of epidemiology and public health.

In addition to his work on yellow fever, Dr. Reed made other significant contributions to the medical field. He was a skilled surgeon and served as a medical officer in the United States Army, where he helped to improve the health and well-being of soldiers. He also played a key role in the development of the Army Medical School, which helped to train the next generation of military physicians.

Throughout his career, Dr. Reed was recognized for his outstanding work and dedication to the medical profession. He received numerous honors and awards, including the prestigious Cullum Geographical Medal from the American Geographical Society and the Cothenius Medal from the German Academy of Natural Scientists.

Today, Dr. Walter Reed's legacy continues to inspire and influence the field of public health and medicine. His groundbreaking research and tireless efforts to improve the lives of others have left an indelible mark on the world, and he is remembered as a true pioneer in the field of medicine.

Directions: Read the passage and answer the questions that follow.

1. What major disease did Dr. Walter Reed study?
a. Malaria
b. Yellow fever
c. Tuberculosis
d. Smallpox

2. Where did Dr. Reed conduct his groundbreaking experiments on yellow fever?
a. Mexico
b. Brazil
c. Cuba
d. United States

3. What did Dr. Reed and his team discover about the transmission of yellow fever?
a. It was spread by contaminated water
b. It was airborne
c. It was transmitted by mosquitoes
d. It was spread through direct contact with infected individuals

4. How long is the incubation period for mosquitoes to transmit yellow fever after feeding on an infected person?
a. 5 days
b. 7 days
c. 12 days
d. 15 days

5. Besides his work on yellow fever, what other role did Dr. Reed play in the U.S. Army?
a. Infantry officer
b. Medical officer
c. Engineer
d. Pilot

6. What notable school did Dr. Reed help develop?
a. Army Medical School
b. Harvard Medical School
c. Johns Hopkins University
d. Mayo Clinic School

7. Which prestigious medal did Dr. Reed receive for his outstanding work?
a. Nobel Prize
b. Medal of Honor
c. Cullum Geographical Medal
d. Pulitzer Prize

8. What was one major impact of Dr. Reed's yellow fever research?
a. Development of antibiotics
b. Improved public transportation
c. Better prevention and treatment methods for infectious diseases
d. Discovery of vaccines

9. What year was Dr. Walter Reed born?
a. 1840
b. 1851
c. 1865
d. 1872

10. What is Dr. Reed's legacy in the field of public health?
a. A leading figure in space exploration
b. A pioneer in the development of the internet
c. A significant influence in the understanding and control of infectious diseases
d. A key player in the invention of X-rays

Dr. Walter Reed: A Pioneering Physician

Answer Key

1. b
2. c
3. c
4. c
5. b
6. a
7. c
8. c
9. b
10. c

Dr. Aristides Agramonte: A Pioneer in Yellow Fever Research

Dr. Aristides Agramonte was a Cuban-American physician and scientist who made significant contributions to the understanding and prevention of yellow fever in the late 19th and early 20th centuries. His work was crucial in the fight against this deadly disease, which had plagued many parts of the world for centuries.

Born in 1868 in Havana, Cuba, Agramonte grew up in a family of medical professionals. He studied medicine at the University of Havana and later completed his medical training in the United States. After graduating, Agramonte returned to Cuba and began working as a physician, focusing on infectious diseases.

In the late 1800s, yellow fever was a major public health concern, particularly in tropical and subtropical regions. Dr. Agramonte was already in Cuba when the Yellow Fever Commission began its work in 1900. He had been studying infectious diseases there before joining the team led by Dr. Walter Reed.

Dr. Agramonte initially focused on a more traditional view of yellow fever transmission. Before joining the Yellow Fever Commission, he believed that yellow fever could be spread through direct contact with infected patients or contaminated objects (fomites). However, as a pathologist, he was open to exploring other possibilities and was willing to test new hypotheses, including the mosquito transmission theory that was gaining support. Agramonte also helped to eliminate the theory of Bacillus icteroides.

His main role in the Commission was to investigate the pathological aspects of yellow fever by studying the disease's effects on the body and conducting autopsies to better understand its progression. This work complemented the experiments being conducted to prove mosquito transmission.

Although Dr. Agramonte was not the primary experimenter in the direct mosquito transmission experiments (which involved figures like Dr. Jesse Lazear and Dr. James Carroll), he contributed by studying and analyzing the pathological specimens from patients who had died of yellow fever. His findings helped rule out other theories about transmission, providing support for the mosquito vector hypothesis.

The disease was caused by a virus transmitted by infected mosquitoes, and it could lead to severe symptoms, including fever, headache, and internal bleeding. Agramonte recognized the need for a better understanding of the disease and its transmission, and he dedicated his career to studying it.

Agramonte's research was instrumental in the development of the theory that yellow fever was transmitted by the Aedes aegypti mosquito. He conducted experiments and field studies that provided evidence for this theory, which was later confirmed by the work of other scientists, including the famous U.S. Army physician Walter Reed.

In addition to his research on yellow fever, Agramonte also made contributions to the field of bacteriology. He studied the causes of various infectious diseases and worked to develop effective treatments and preventive measures.

Agramonte's dedication to his work and his commitment to improving public health earned him widespread respect and recognition. He served as the president of the Cuban Academy of Sciences and was a member of several prestigious medical organizations, including the American Medical Association and the American Public Health Association.

Throughout his career, Agramonte remained committed to the fight against yellow fever and other infectious diseases. His groundbreaking research and his tireless efforts to improve public health have left a lasting legacy, and he is remembered as a true pioneer in the field of medical science.

Directions: Answer the questions that follow.

1. What was Dr. Aristides Agramonte's main focus in his medical career?
a. Dental health
b. Infectious diseases
c. Cardiology
d. Neurology

2. Where was Dr. Aristides Agramonte born?
a. New York, USA
b. Madrid, Spain
c. Havana, Cuba
d. Lisbon, Portugal

3. Which mosquito was found to transmit yellow fever, as supported by Agramonte's research?
a. Anopheles mosquito
b. Culex mosquito
c. Aedes aegypti mosquito
d. Tsetse fly

4. What was one of Dr. Agramonte's roles on the Yellow Fever Commission?
a. Conducting direct mosquito experiments
b. Investigating pathological aspects of yellow fever
c. Developing vaccines
d. Treating patients directly

5. Which organization did Dr. Agramonte serve as president of?
a. World Health Organization
b. Cuban Academy of Sciences
c. American Red Cross
d. National Institutes of Health

6. What was a major public health concern in the late 1800s that Dr. Agramonte worked on?
a. Smallpox
b. Malaria
c. Yellow fever
d. Influenza

7. Before joining the Yellow Fever Commission, what did Dr. Agramonte initially believe about yellow fever transmission?
a. It was spread by water
b. It was spread through direct contact or fomites
c. It was spread by air
d. It was spread by food

8. Which famous U.S. Army physician's work confirmed the mosquito transmission theory supported by Dr. Agramonte?
a. Dr. James Carroll
b. Dr. Robert Koch
c. Dr. Ignaz Semmelweis
d. Dr. Walter Reed

9. Apart from yellow fever, which field did Dr. Agramonte also contribute to?
a. Bacteriology
b. Dermatology
c. Orthopedics
d. Psychiatry

10. How is Dr. Agramonte remembered today in the field of medical science?
a. As a famous cardiologist
b. As a pioneer in medical research
c. As the inventor of the microscope
d. As a popular television doctor

Dr. Aristides Agramonte: A Pioneer in Yellow Fever Research

Answer Key

1. b
2. c
3. c
4. b
5. b
6. c
7. b
8. d
9. a
10. b

The Theories of Yellow Fever Transmission

Yellow fever is a serious viral disease that has puzzled scientists for centuries. Over time, several theories have been proposed to explain how the disease is transmitted from person to person. Here are four of the main theories about yellow fever transmission:

1. Miasma Theory
The miasma theory was one of the earliest explanations for how yellow fever spreads. This theory was well known from ancient times. This theory suggested that the disease was caused by "bad air" or miasmas - poisonous vapors that arose from swampy or decaying organic matter. According to this view, yellow fever could be transmitted through these noxious fumes in the environment.

2. Contagion Theory
The contagion theory (fomites) proposed that yellow fever was a communicable disease that could be transmitted directly from an infected person to a healthy person through close contact. This theory suggested that the disease spread through bodily fluids or other means of direct transmission between individuals like contaminated clothing or furniture.

3. Mosquito Theory
In the late 19th century, the mosquito theory emerged as a more accurate explanation for yellow fever transmission. This theory posited that the yellow fever virus was spread by certain species of mosquitoes, particularly the Aedes aegypti mosquito. The mosquitoes would become infected after biting a person with yellow fever and then transmit the virus to other people through their bites.

4. Bacteria Theory
The theory suggests that Bacillus icteroides, a rod-shaped bacterium, can infect humans and cause the characteristic symptoms of yellow fever, such as fever, jaundice (yellowing of the skin and eyes), and organ damage. The bacteria were thought to be transmitted through the bites of infected mosquitoes, similar to how malaria is spread.

These four theories represent the evolution of scientific understanding about yellow fever over time. The bacteria theory was an important step in understanding yellow fever, it is now considered an outdated and inaccurate explanation for the cause of this disease. While the miasma and contagion theories were initially proposed, the mosquito theory ultimately provided a more accurate and evidence-based explanation for how this deadly disease is transmitted.

Name_____ Date_____

4 Theories
1) Bacteria (Bacillus icteroides)
2) Contaminated clothing (fomites)
3) Contaminated air (miasma)
4) Contaminated mosquito

The Five Doctors

Doctor	Picture	Description	Location/travel	Theory
Dr. Carlos Finlay		Cuban physician and scientist; his experiments were unsuccessful and people thought he was crazy	Worked in Havana, Cuba	1st came up with theory that Bacillus icteroides caused Yellow Fever, but later decided Female Aedes aegypti spreads the yellow fever disease
Dr. Jesse Lazear		American physician; member of U.S. Army Yellow Fever Commission; bitten by mosquito with yellow fever and died	Went to Cuba in 1900 on USS Sedgwick	Supported Dr. Finlay's theory

Dr. James Carroll		American Army physician; member of U.S. Army Yellow Fever Commission; bitten by mosquito; developed Yellow Fever but survived	Went to Cuba in 1900 on USS Sedgwick	Didn't believe the mosquito theory, but supported it.
Dr. Walter Reed		American Army physician; head of U.S. Army Yellow Fever Commission; volunteered for the experiments	Went to Cuba in 1900 on USS Sedgwick	Helped eliminate the theory of Bacillus icterodes; found out that mosquitoes need 12 day incubation period
Dr. Aristides Agramonte		Born in Cuba and educated in the U.S. and Cuba; physician and pathologist	Was already in Cuba before the Commission	Yellow fever spread through direct contact with infected patients or contaminated objects (fomites); helped eliminate the theory of Bacillus icteroides

Name_____ Date_____

4 Theories
1)
2)
3)
4)

The Five Doctors

Doctor	Picture	Description	Location/travel	Theory
Dr. Carlos Finlay				
Dr. Jesse Lazear				

Dr. James Carroll				
Dr. Walter Reed				
Dr. Aristides Agramonte