

# Medical Microbiology

## Typhoid

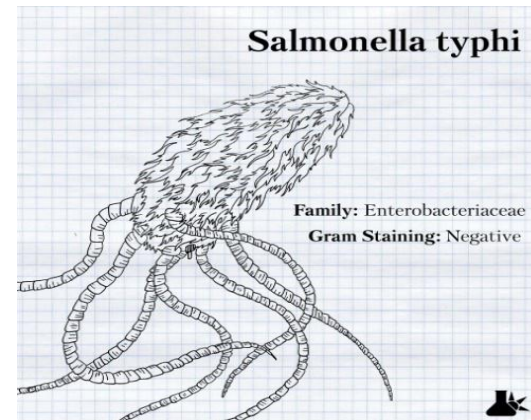


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# Typhoid

- [Greek *typhodes*, smoke] fever is caused by several virulent serovars of *Salmonella typhi*
- Symptoms may vary from mild to severe, and usually begin 6 to 30 days after exposure. Onset of a high fever, weakness, abdominal pain, constipation, headaches, and mild vomiting.
- Some people develop a skin rash with rose colored spots
- Other people may carry the bacterium but are asymptomatic
- Typhoid is spread by eating or drinking food or water contaminated with the feces of an infected person
- Only humans can be infected

## ROSE SPOTS



# Salmonella Typhi vs Paratyphi

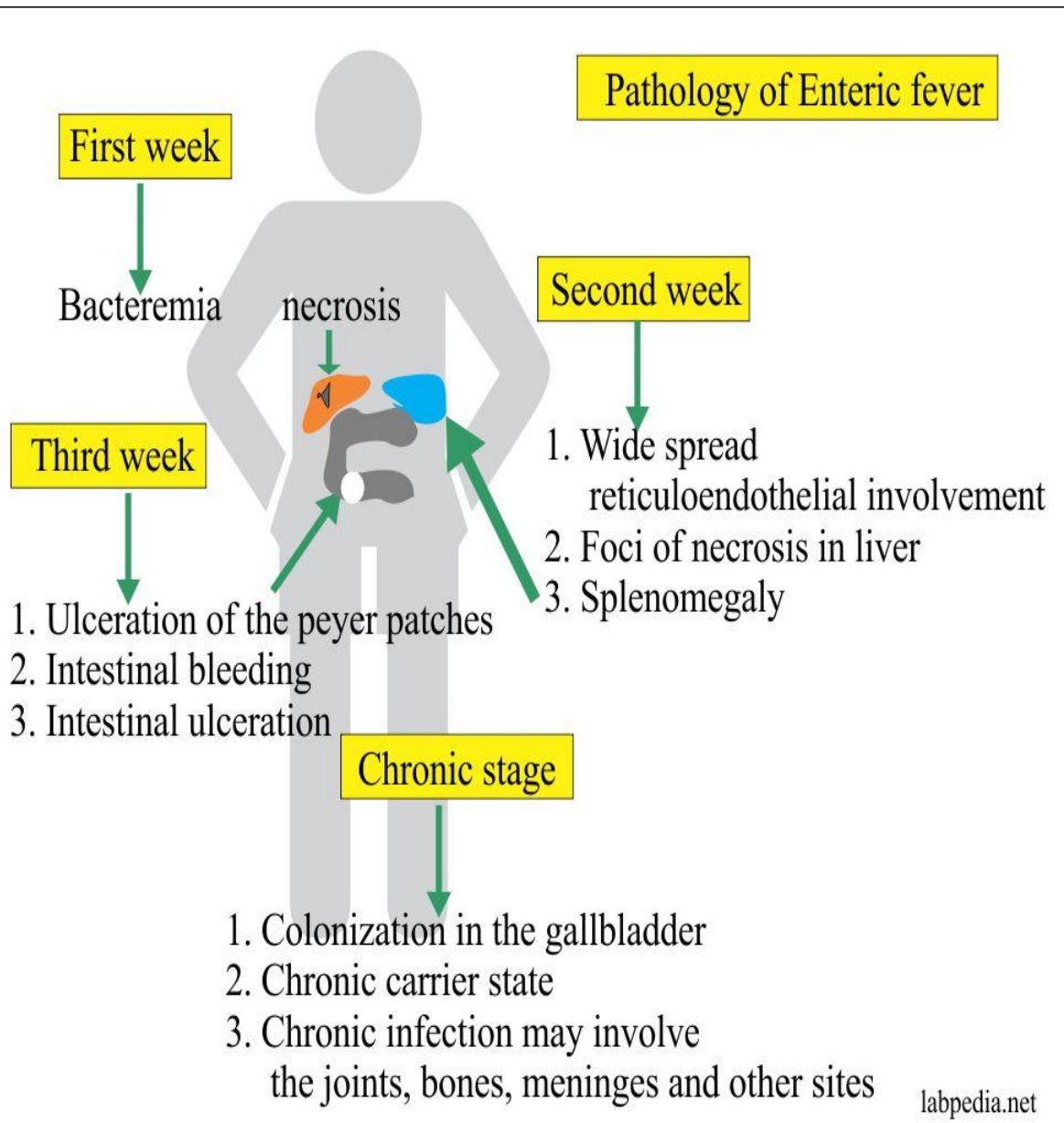
More Information Online [WWW.DIFFERENCEBETWEEN.COM](http://WWW.DIFFERENCEBETWEEN.COM)

	Salmonella Typhi	Salmonella Paratyphi
DEFINITION	Salmonella Typhi is the causative agent of typhoid fever	Salmonella Paratyphi is the causative agent of paratyphoid fever
ILLNESS	Typhoid fever	Paratyphoid fever
DISEASE SEVERITY	Higher	Milder
PREVALENCE	Highly prevalent	Less prevalent
TYPES	ST1 and ST2	Paratyphi A, Paratyphi B, and Paratyphi C

# Epidemiology

- **In 2015, 12.5 million new cases worldwide were reported.**
- **The disease is most common in India. Children are most commonly affected.**
- **Rates of disease decreased in the developed world in the 1940s as a result of improved sanitation and use of antibiotics to treat the disease.**
- **In 2015, it resulted in about 149,000 deaths worldwide**
- **The risk of death may be as high as 20% without treatment.**
- **Typhus is a different disease. However, the name typhoid means "resembling typhus" due to the similarity in symptoms.**

# Signs and Symptoms



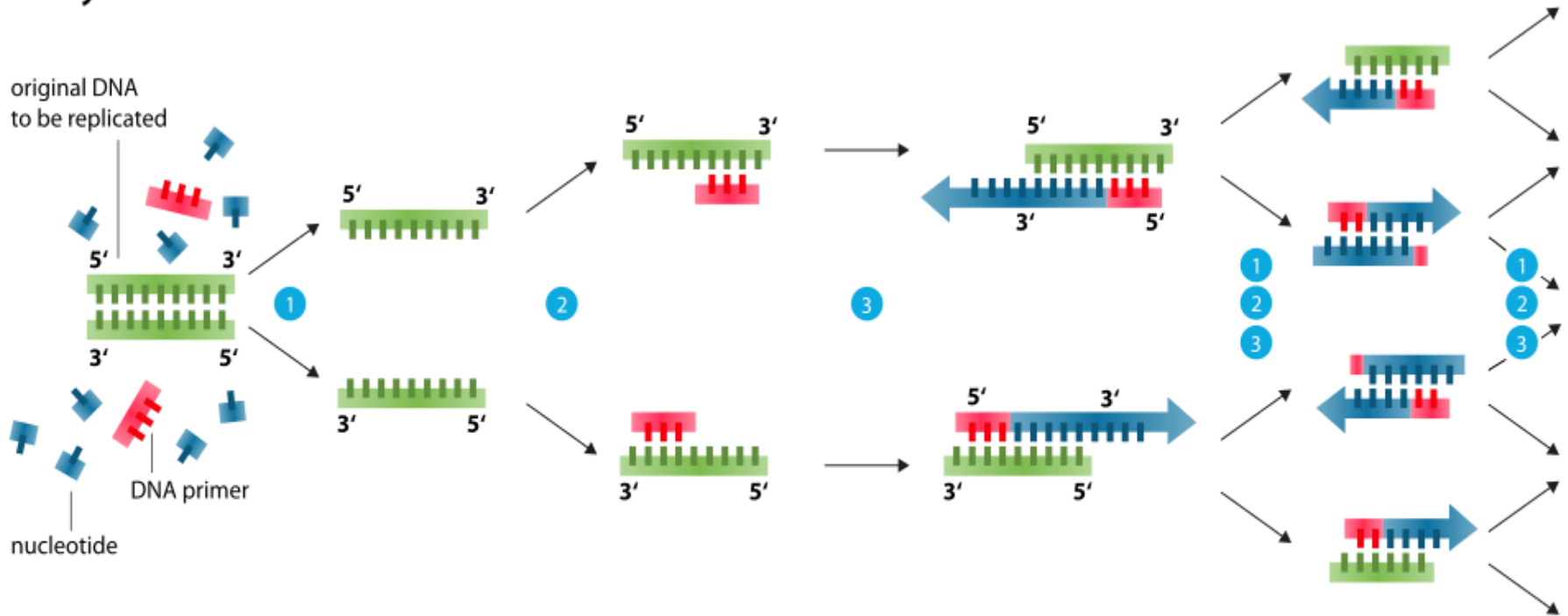
**First week;** bradycardia, malaise, headache, and cough, bloody nose (epistaxis) decrease of WBC (leukopenia), eosinopenia. The Widal test is usually negative

**Second week;** high bradycardia. delirium, rose spots, rhonchi, diarrhea spleen and liver are enlarged (hepatosplenomegaly). The Widal test is strongly positive, with antiO and antiH antibodies.

**Third week;** Intestinal haemorrhage, encephalitis, pneumonia , high fever and low platelet count (thrombocytopenia)

# Diagnosis

## Polymerase chain reaction - PCR

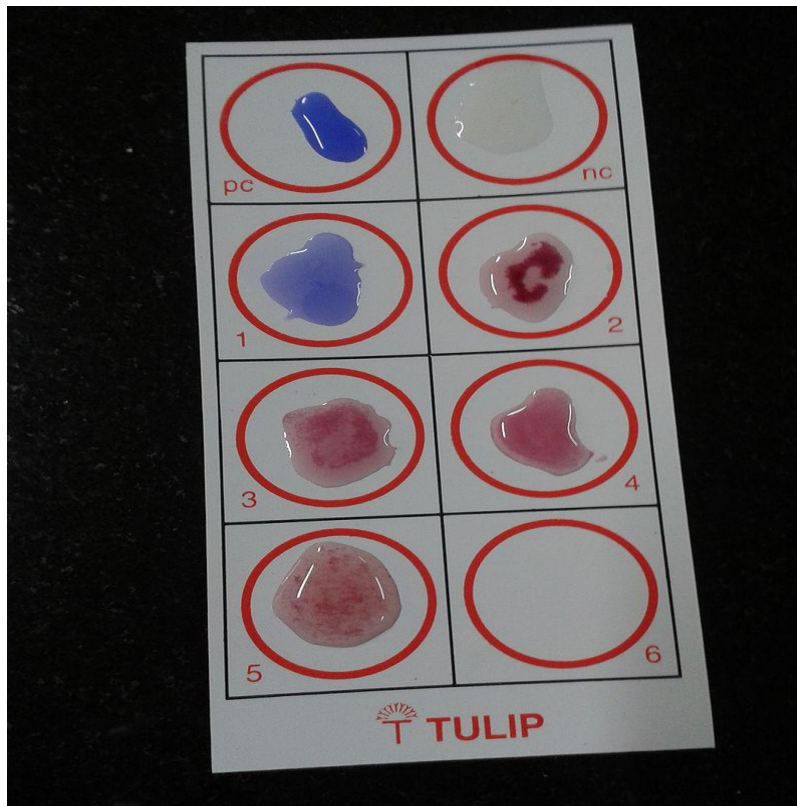


- 1 **Denaturation** at 94-96°C
- 2 **Annealing** at ~68°C
- 3 **Elongation** at ca. 72 °C

# Diagnosis

The global phylogeographical analysis showed dominance of a haplotype 58 (H58) which probably originated in India during late 1980s and now spreading through the world carrying multidrug resistance

**Immunoglobulin M (IgM):** The first antibody the body makes against a new infection



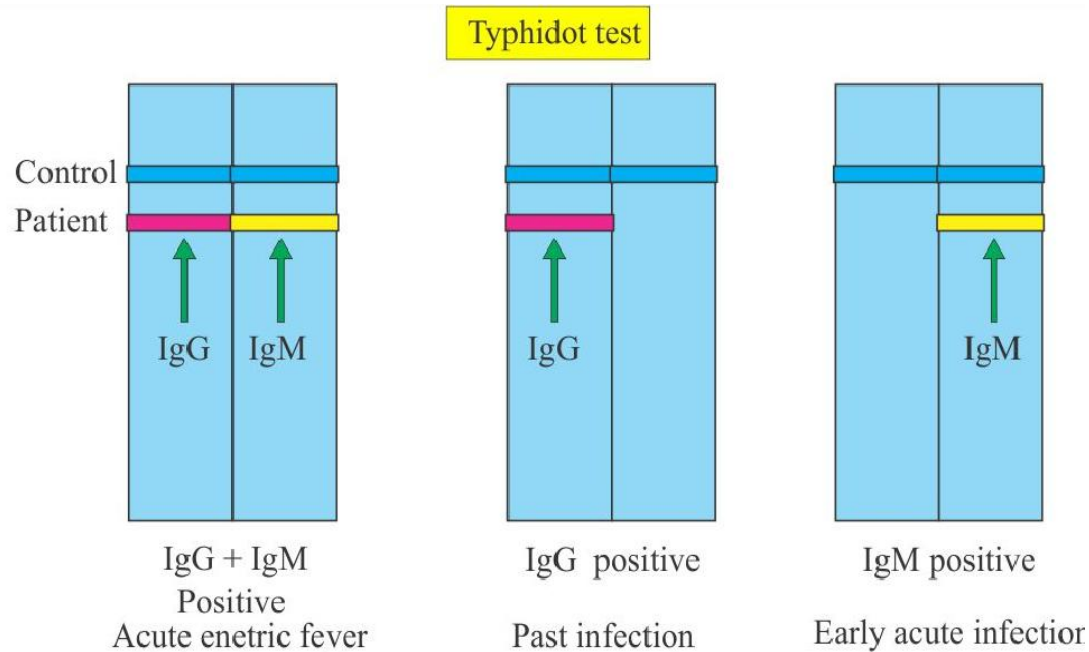
RESEARCH ARTICLE

## Rapid Emergence of Multidrug Resistant, H58-Lineage *Salmonella* Typhi in Blantyre, Malawi

Nicholas A. Feasey<sup>1,2,3\*</sup>, Katherine Gaskell<sup>1</sup>, Vanessa Wong<sup>3</sup>, Chisomo Msefula<sup>1,4</sup>, George Selemani<sup>1</sup>, Save Kumwenda<sup>5</sup>, Theresa J. Allain<sup>4</sup>, Jane Mallewa<sup>1,4</sup>, Neil Kennedy<sup>4</sup>, Aisleen Bennett<sup>1,6</sup>, Joram O. Nyirongo<sup>4</sup>, Patience A. Nyondo<sup>4</sup>, Madalitso D. Zulu<sup>4</sup>, Julian Parkhill<sup>3</sup>, Gordon Dougan<sup>3</sup>, Melita A. Gordon<sup>6a</sup>, Robert S. Heyderman<sup>1,2a</sup>

**Prevention: Sanitation and hygiene**

# Diagnosis



- **Diagnosis is made by any blood, bone marrow, or stool cultures and with the Widal test (Antibodies against *Salmonella* antigens O-somatic and H-flagellar)**
- **Vaccination: Live, oral Ty21a vaccine (Vivotif)  
Injectable typhoid polysaccharide vaccine (Typhim Vi)**
- **Treatment: Typhoid fever, when properly treated, is not fatal. Ampicillin, chloramphenicol, trimethoprim-sulfamethoxazole, amoxicillin, and ciprofloxacin**
- **Ciprofloxacin resistance is an increasing problem, especially in the Indian subcontinent, For these people, the recommended first-line treatment is Ceftriaxone.**



## Mary Mallon (1869-1938) and the history of typhoid fever

Filio Marineli, Gregory Tsoucalas, Marianna Karamanou, George Androutsos

Medical School, University of Athens, Athens, Greece



Mary Mallon as “Typhoid Mary”