

**Genus: Listeria**  
***L. monocytogenes***

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# General characteristics

- Gram positive rods
- Non-spore-forming
- Non-acid fast
- Facultative anaerobes (growing enhanced by 10%  $\text{CO}_2$ )
- Catalase positive
- Oxidase negative

# General characteristics

- Hydrolyse aesculin
- Tolerate 10% NaCl
- Motile by 1-5 peritrichous flagella
- They grow on nutrient agar and blood agar but not on MacConkey agar

Veterinarians, medical doctors and people involved in food science know **Listeriosis** by various names (circling disease, silage sickness, leukocytosis, cheese sickness, tiger river disease)



# History and taxonomy

<b>Kingdom</b>	Bacteria
<b>Phylum</b>	Firmicutes
<b>Class</b>	Bacilli
<b>Order</b>	Bacillales
<b>Family</b>	Listeriaceae
<b>Genus</b>	Listeria
<b>Species</b>	Listeria monocytogenes (Murray et al., 1926) Pirie, 1940

# History and taxonomy

- Listeria divided in to seven species with two distinct group the most
- *L. monocytogenes*,
- *L. innocua*,
- *L. welshimeri*,
- *L. seeligeri*,
- *L. grayi* and
- *L. ivanovii* subsp. *ivanovii* and
- *L. ivanovii* subsp. *Londoniensis*.
- Only *L. monocytogenes* causes disease in both animals and humans.
- *L. ivanovii* is known to cause spontaneous abortions in sheep.

# Classification

- Listeria divided in to seven species with two distinct group the most important species in veterinary medicine is *Listeria monocytogenes*

# Natural habitat

- *Listeria* spp. are widely distributed in the environment
- can be isolated from soil, plants, decaying vegetation and silage
- Asymptomatic fecal carriers occur in man and animal species.
- *L. monocytogenes* can be extracted in bovine milk



## Natural habitat

- They can grow temperature range 3-45C
- Silage is commonly implicated in outbreaks of Listeriosis in cattle and sheep
- Human foods associated with Listeriosis in man include coleslaw ,soft cheeses, milk and poultry meat

# Listeriosis in sheep



# Pathogenesis

- It is thought that the pathogenic listeria spp. can penetrate the epithelia barrier in the intestine and multiply in hepatic and splenic macrophages aided by the **haemolysin** named **listerolysin O**.

# Pathogenesis

- An alternative route may be through damaged mucosal surfaces to the central nervous system ,via the neural sheath of peripheral nerve ending of the trigeminal nerve.

# Pathogenesis

- Most pathogenic bacteria require the availability of iron in the host for metabolic activities.
- High iron levels in silage that lead to elevated tissue concentrations of iron may be predispose cattle and sheep, fed on silage, to Listeriosis

# Laboratory diagnosis

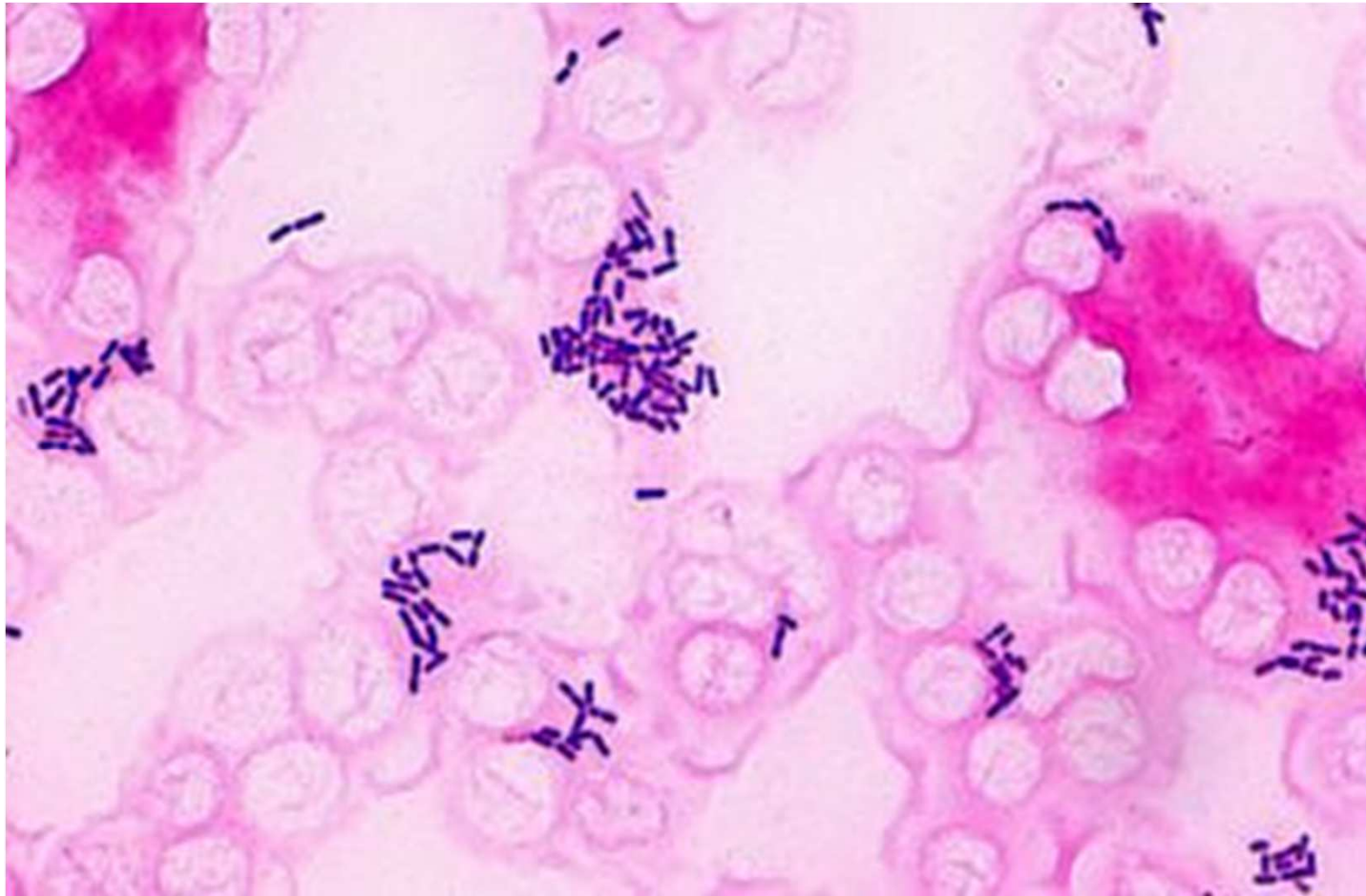
## Samples collection

- Visceral form: samples from lesions in liver, kidney or spleen
- Neural form: spinal fluid, brain stem, tissue from several sites in the medulla oblongata
- Abortion form : placenta, foetal abomasal contents and or uterine discharges

## Microscopic examination

- Stained smear are not as useful in Listeriosis as they in other diseases
- Smear from lesions may be reveals Gram positive rods(often coccobacillary)
- Histopathological examination of fixed 10% formalin from brain tissue can give presumptive diagnosis of neural listeriosis.

# Microscopic examination





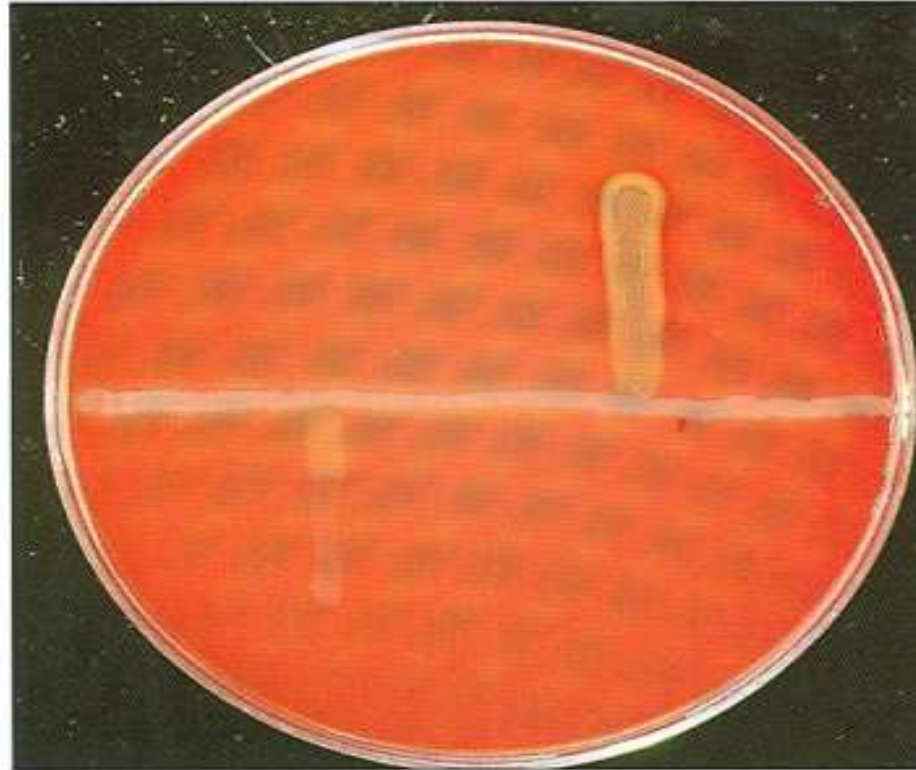
# Isolation

- The routine media for isolation is
  1. ox and sheep blood agar
  2. MacConkey agar plate to detect any Gram negative pathogene or contaminants.
- Selective media include
  1. blood agar supplement with antibiotic
  2. Or blood agar containing 0.05% potassium tellurite (inhibitory for G- bacteria)

# Isolation

- A cold –enrichment procedure is necessary for brain tissue from neural Listeriosis:
- Small pieces of spinal cord and medulla are homogenized and 10% suspension is placed in the refrigerator at 4C and subculture on blood agar once weekly for up to 12 weeks. This method select for *L.monocytogenes* which able to grow at refrigerator temperature

# Modified CAMP test

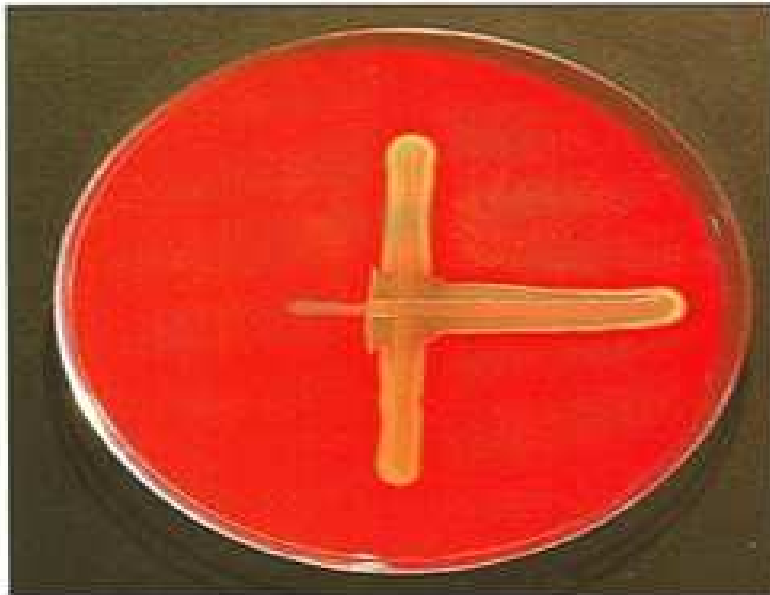


**205** CAMP test with *Staphylococcus aureus* (horizontal) showing enhancement of the effect of the staphylococcal beta-haemolysin by *L. monocytogenes* (left) but not by *L. ivanovii* (right).

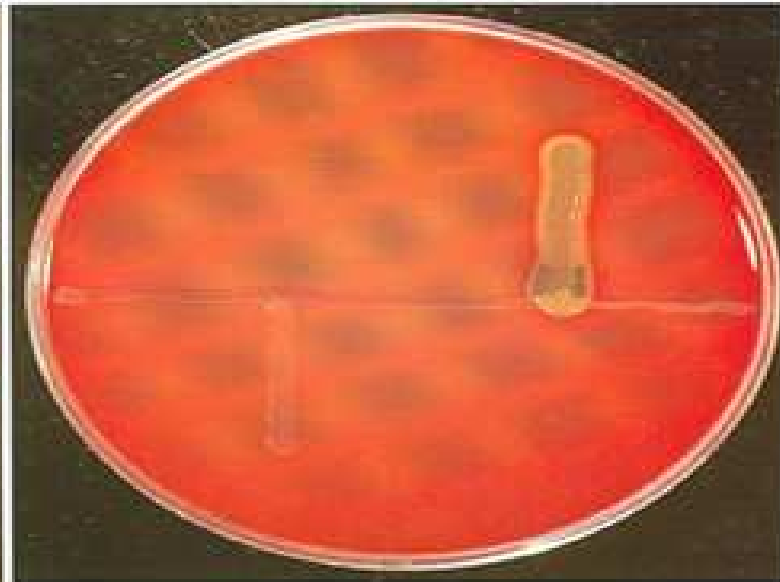
# Modified CAMP test

- Modified CAMP test with *staphylococcus aureus* and with *R. equi* are useful to differentiate the two pathogenic species

## Modified CAMP test

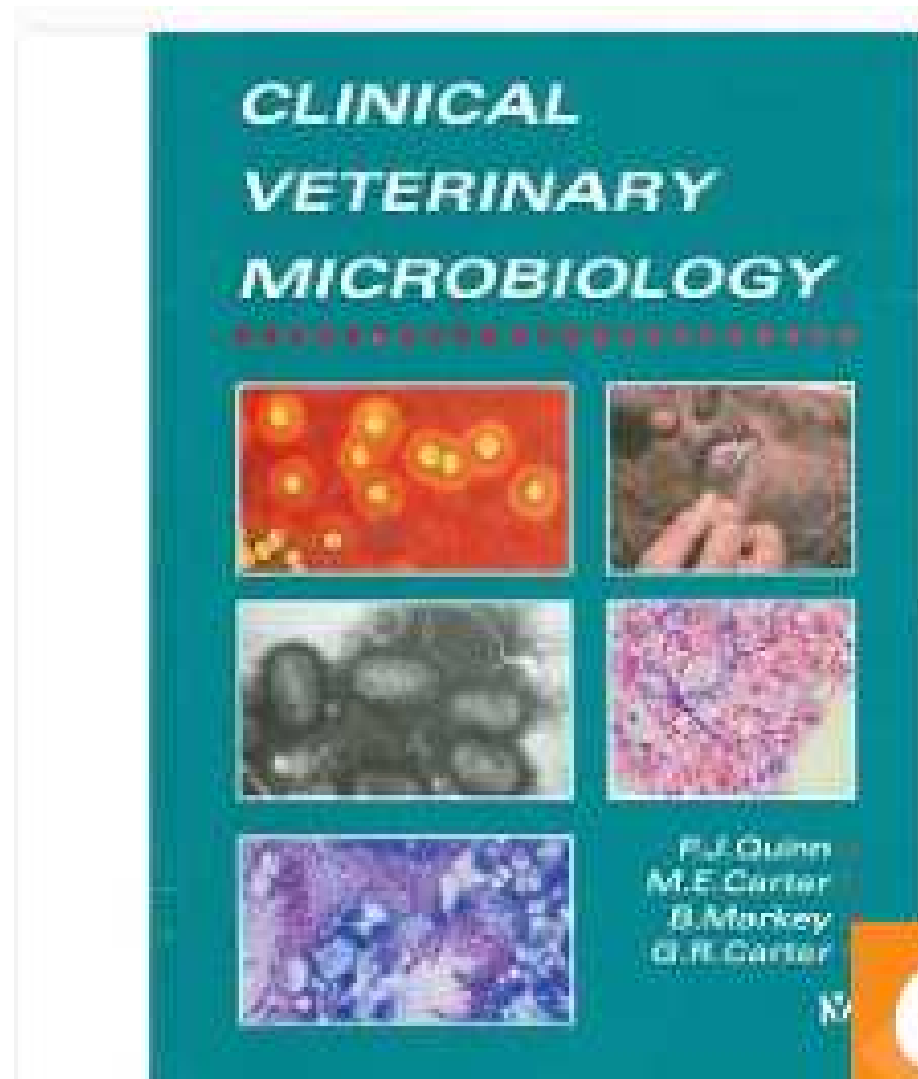


207 *Rhodococcus equi* streaked across (left to right) a vertical streak of *L. ivanovii* giving an enhanced haemolytic effect.



206 CAMP test with *Rhodococcus equi* (horizontal): no reaction by *L. monocytogenes* (left) and enhancement of haemolysis by *L. ivanovii* (right).

# References



# Any Question

