

R34.18

B R U C E L L A

The Three Species
Differential Table

	<u>MELITENSIS</u>	<u>ABORTUS</u>	<u>SUIS</u>
Increased CO ₂ tension needed for culture	No	Yes ⁱ	No
H ₂ S liberated from culture	Trace only or none	Freely for two days	Very freely for four days ⁱⁱ
Growth in presence of basic fuchsin 1/23,000 to 1/50,000	Yes	Yes	No
Growth in presence of thionin 1/50,000	Yes	No	Yes
Usual animal host	Goat	Ox	Swine

Morphology: In young rapidly growing cultures abortus and suis are usually more bacillary than melitensis

Antigenic structure: By agglutinin absorption tests, there appear to be two major antigens - a melitensis antigen and an abortus antigen present in all species but the melitensis antigen predominates in the true melitensis types and the abortus in the true abortus types. There are, however, many intermediate types into which suis may fall

Utilization of glucose in culture medium: According to McAlpine and Slanetz abortus uses less than 4 per cent. of the available dextrose, while melitensis and suis may use from 4 to 18 per cent. Not confirmed by another worker.

Reduction of nitrates and nitrites: In a semi-solid medium to which 0.2 per cent. potassium nitrate has been added abortus and suis grow dispersed throughout the medium (pseudo-anaerobic growth), while melitensis is localized to a few mm. below the surface. The Danish suis strains resemble melitensis in this respect. Suis destroys more potassium nitrite in medium than melitensis or abortus, and melitensis destroys more than abortus.

The differences mentioned above between the three species are not "hard and fast" and there is much overlapping by individual strains.

ⁱ Abortus from cattle in Rhodesia does not require added CO₂ for its saprophytic growth.

ⁱⁱ The Danish strains of suis do not liberate more than a trace of H₂S.

Stafseth's media for culture of Brucellas
from the blood and for determination of
hydrogen sulphide production.

1 lb. of beef liver minced and ground to a plastic mass is added to 500 ccm. of tap water, and the mixture steamed for one-and-a-half hours, being stirred occasionally with a glass rod. It is then strained through a wire gauze screen, reaction set to pH 7.0, and sterilized in the autoclave at 15 lbs. pressure for 20 minutes. The final reaction will be found to have fallen to about pH 6.6.

Liver infusion made as above and added to an equal quantity of nutrient broth forms an excellent medium for blood cultures.

A liver-infusion-agar medium may be made as follows:

Liver infusion	500 ccm.
Washed agar-agar	20 gm.
Peptone	10 gm.
Sodium chloride	5 gm.
Tap water	500 ccm.

Reaction set to about pH 7.0 falls to about pH 6.6 after sterilizing.

MENINGITIS

An inflammatory affection of the membranes surrounding the brain and spinal cord.

May be (a) primary - the more important form and caused nearly always by the meningococcus (*N. meningitidis*). This is known as cerebro-spinal fever. Some primary cases are due to infection with *H. influenzae*, sporadically or in epidemics of influenza. This form simulates the meningococcal form closely.

- (b) Secondary to infection elsewhere, due to infection with
- (1) *Str. pneumoniae*, secondary to the pneumonias or middle ear disease
 - (2) haemolytic streptococci " " wounds of skull " " " "
 - (3) Myco-tuberculosis " " infection of lungs or elsewhere.
- Secondary form usually affect children and are nearly always fatal.

Cerebro-spinal meningitis

May be acute or chronic and may occur sporadically or epidemically. The clinical condition was first described in 1805, following an epidemic at Geneva. The meningococcus was first isolated from the acute infection and described by Weichselbaum in 1887 in Vienna. Epidemics have been described in most countries during the last hundred years. The disease is tending to increase in geographical distribution and in number of persons affected. Epidemics have low morbidity rate (0.01 to 0.5% of population at risk) and high mortality rate (70% on average or from 39% to 90%)

Age Incidence. More common in children especially 0-5 years of age

Occupational Incidence. More common in soldiers and miners (hence in males more than females)

Seasonal Incidence. More common in winter and spring (cold and damp weather)

Other predisposing factors probably (a) overcrowding indoors and (b) fatigue.

Mode of Spread of Infection

Endemic in large towns, with occasional sporadic cases.

Epidemics at intervals, with irregular spread, both as regards place and time intervals. Followed by remissions and intermissions.

Route of Infection

Reaches nasopharynx by air-borne infection, droplet infection from carriers, contaminated handkerchiefs, bedding etc., probably negligible factors owing to ease with which meningococcus is killed by drying. May or may not give rise to local signs of infection. Extension of infection to meninges then may occur but whether directly or by blood stream not yet known.

Diagnosis - by examination of

- (a) cerebro-spinal fluid, divided into three portions:
- (1) centrifuged deposit examined microscopically - supernatant used for precipitin test with type antisera.
 - (2) immediate plating - examination of plates for colonies of meningococci - preparation of suspensions for agglutination with type antisera, by slide or waterbath.
 - (3) incubation of spinal fluid with subsequent subcultivation and identification of colonies.
- (b) naso-pharyngeal swab plate - sometimes positive when spinal fluid negative - may give better growth than spinal plate for preparation of agglutination suspensions.

Meningococcus identified by cultural morphological fermentative and serological tests.

Blood culture (25%+ in 1st week), and demonstration of agglutinins in patient's serum not adopted as a routine.

Prophylaxis

Carriers. The carrier rate varies with time of year and with different communities and institutions, up to 20% of normal healthy civilians, though usually about 10%. In schools etc. often low, 2-5%. Carriers may be contact or non-contact, and may carry profusely or scantily. Contact carriers and those carrying profusely tend to carry longer than the others, for months or even years.

Prevention of Spread of Epidemic

1. Isolation of carriers not usually practicable owing to high carrier rate. When attempted has been shown to be successful. But when ever possible prevent carriers from coming into contact with youg children and expecially from sleeping in same bedrooms.
2. Reduce overcrowding as much as possible in sleeping quarters and ventilate adequately. Advise as far as possible an open-air life for this tends to reduce carrier rate considerably.
3. Nasal disinfection or treatment with immune serum for carriers generally regarded as useless.
4. Prophylactic vaccination up to the present has not given significant protection.

Serum treatment - depends for success on:

- (a) mode of preparation of antiserum and its standardization.
- (b) dose of antiserum employed.
- (c) route of injection.

Under favourable circumstances, good results obtained especially with Type I antiserum (mortality rate reduced by over 50%). Early administration essential. The beneficial effect of repeated lumbar puncture by itself difficult to assess, probably considerable.

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