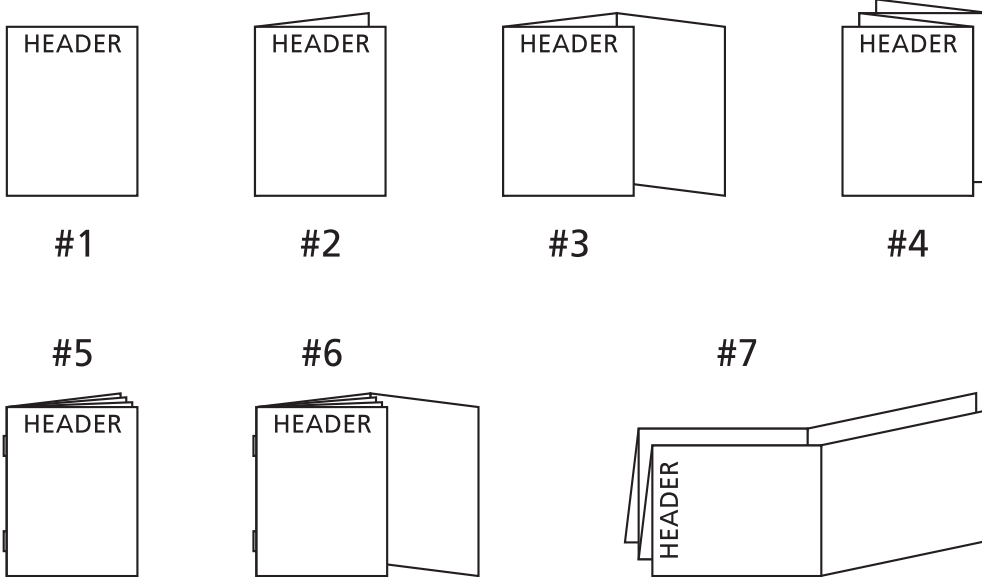



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Notes

- BD Cat. No. 211755, 211763
- Blank (Sheet) Size : Length: 11" Width: 2.75"
 Number of Pages: 2 Number of Sheets: 1
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- Style (see illustrations below): #1



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- Ink Colors: Printed two sides Yes No
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Part Number: S11931JAA		Category and Description Package Insert Difco Oxford or Modified Oxford Antimicrobial Supplement	Sheet: 1 of 3 Scale: 1:1	A



**DIFCO™ OXFORD MEDIUM BASE
DIFCO™ OXFORD ANTIMICROBIC SUPPLEMENT
DIFCO™ MODIFIED OXFORD
ANTIMICROBIC SUPPLEMENT**

INTENDED USE

Oxford Medium Base is a selective, solid medium used with Oxford Antimicrobial Supplement or Modified Oxford Antimicrobial Supplement for isolating and differentiating *Listeria monocytogenes* in foods.

SUMMARY AND EXPLANATION

First described in 1926 by Murray, Webb, and Swann,¹ *Listeria monocytogenes* is recognized as a problem of importance in public health, especially by the food and dairy industries. *L. monocytogenes* has been documented as the cause of food-associated illness in the Canadian Maritime Provinces, Boston and southern California. These outbreaks of listeriosis were notable because of the high case-fatality rate.²

The isolation and identification of *L. monocytogenes* has been difficult because of the need for a faster enrichment procedure and the lack of a suitable selective and differential medium for isolating the organism from suspected sources in mixed populations. Many common food contaminants such as the streptococci, *Bacillus* species, *Escherichia coli*, *Pseudomonas aeruginosa* and *Proteus vulgaris* interfere with the isolation of *Listeria monocytogenes*.³

The *Listeria* are short, gram-positive, non-sporeforming, motile rods. The organism can grow over a wide temperature range. It is characterized by its ability to hydrolyze esculin and by tolerance of salt, tumbling motility and beta hemolysis.

Presumptive identification of *Listeria* is based on the esculin hydrolysis reaction which can be seen as a darkening of the medium after incubation in Fraser Broth⁴ or on Oxford Medium Base.⁵ Motility can be observed as an umbrella-type growth in Motility Test Medium. A narrow zone of beta-hemolysis around and under *Listeria* colonies can be observed on blood agar (McBride *Listeria* Agar or Columbia Blood Agar Base).⁶

After successful isolation of the organism, final identification of *Listeria* is based on biochemical characterization and serological confirmation.

PRINCIPLES OF THE PROCEDURE

Oxford Medium Base is prepared according to the formulation of Curtis et al.⁵ who originally described the medium and its use in the selective isolation of *Listeria* from mixed cultures.

Differentiation is aided by including ferric ammonium citrate in the medium. Since all *Listeria* species hydrolyze esculin, the addition of ferric ions to the medium will detect the reaction. A blackening of the colony and surrounding medium in cultures containing esculin-hydrolyzing bacteria is the result of the formation of 6,7-dihydroxycoumarin which reacts with the ferric ions.⁴

Selectivity is provided by the presence of lithium chloride in the formula. The high salt tolerance of *Listeria* is utilized as a means to markedly inhibit growth of enterococci. Selectivity is increased by adding various antimicrobial agents to the base. Incorporating these agents into Oxford Medium Base will completely inhibit gram-negative organisms and most gram-positive organisms at 24 h incubation. The most widely recognized antimicrobial agent combinations are the Oxford Medium formulation⁵ which contains cycloheximide, colistin sulfate, acriflavine, cefotetan and fosfomycin (available as Oxford Antimicrobial Supplement) and the Modified Oxford Medium formulation⁶ which contains moxalactam and colistin methane sulfonate or colistin sulfate (available as Modified Oxford Antimicrobial Supplement).

In 1989, the United States Department of Agriculture⁵ recommended Modified Oxford medium for isolating and identifying *Listeria monocytogenes* from processed meat and poultry products. In 1990, the United States Food and Drug Administration⁶ recommended Oxford Medium for isolating *Listeria* from Enrichment Broth cultures.

FORMULA

Oxford Medium Base
Approximate Formula* Per Liter

Pancreatic Digest of Casein	8.9 g
Proteose Peptone No.3	4.4 g
Yeast Extract	4.4 g
Tryptic Digest of Beef Heart	2.7 g
Starch	0.9 g
Sodium Chloride	4.4 g
Esculin	1.0 g
Ferric Ammonium Citrate	0.5 g
Lithium Chloride	15.0 g
Agar	15.3 g

Final pH 7.2 ± 0.2 at 25°C

Five hundred grams will make 8.7 liters of medium.

Oxford Antimicrobial Supplement

Approximate Formula*
Per 10 mL Vial

Acriflavine	5.0 mg
Cefotetan	2.0 mg
Colistin Sulfate	20.0 mg
Cycloheximide	400.0 mg
Fosfomycin	10.0 mg

One rehydrated vial is added to one liter of basal medium.

Modified Oxford Antimicrobial Supplement

Approximate Formula*
Per 10 mL Vial

Colistin Sulfate	10.0 mg
Moxalactam	20.0 mg

One rehydrated vial is added to one liter of basal medium.

Precautions: For Laboratory Use.

WARNING - OXFORD MEDIUM BASE CAUSES IRRITATION.

Avoid contact with eyes, skin and clothing. Wash thoroughly after handling.

FIRST AID: IN CASE OF CONTACT, immediately flush eyes with plenty of water for at least 15 min. Call a physician. Flush skin with water. Wash clothing before reuse.

WARNING - OXFORD ANTIMICROBIC SUPPLEMENT IS HARMFUL IF SWALLOWED OR INHALED. MAY CAUSE IRRITATION. MAY CAUSE BIRTH DEFECTS. Avoid contact with eyes, skin and clothing. Do not breathe dust.

FIRST AID: IF SWALLOWED, induce vomiting. Call a physician. Never give anything by mouth to an unconscious person. IF INHALED, remove to fresh air. If not breathing, give artificial respiration, preferably mouth-to-mouth. If breathing is difficult, give oxygen. Call a physician. IN CASE OF CONTACT, immediately flush eyes with plenty of water for at least 15 min. Call a physician. Flush skin with water.

Follow proper, established laboratory procedures in handling and disposing of infectious materials.

Storage: Store Oxford Medium Base at 2 - 25°C. Store Oxford Antimicrobial Supplement, Modified Oxford Antimicrobial Supplement and prepared medium at 2 - 8°C.

Expiration Date: The expiration date applies to the product in its intact container when stored as directed. Do not use a product if it fails to yield expected results described in "User Quality Control."

Method of Preparation:

- To rehydrate the medium, suspend 57.5 g of the powder in 1 L of purified water. Mix thoroughly.
- Heat with frequent agitation and boil for 1 min to completely dissolve the powder.
- Autoclave at 121°C for 10 min. Cool to 45 - 50°C.
- To prepare OXFORD MEDIUM, aseptically rehydrate one vial of Oxford Antimicrobial Supplement with 5 mL reagent grade ethanol and 5 mL sterile purified water. Rotate in an end-over-end motion to dissolve completely. Add 10 mL to 1 L of molten (45 - 50°C) Oxford Medium Base. Mix thoroughly.

to dissolve completely. Add 10 mL to 1 L of molten (45 - 50°C) Oxford Medium Base. Mix thoroughly.

PROCEDURE

Growth of *Listeria* in culture media is generally slow and delicate, especially upon primary isolation. Attempts at direct isolation from positive specimens may fail. Selective enrichment and cold enrichment have both been determined to increase isolation rates.^{8,9}

Because cold enrichment procedures are lengthy and, therefore, not convenient for routine testing of food or biological specimens by microbiological laboratories, shortened enrichment procedures by isolating *Listeria* are necessary.¹⁰ UVM Modified *Listeria* Enrichment Broth,¹¹ *Listeria* Enrichment Broth¹² and Fraser Broth⁴ have been shown to be useful in isolation methods.

To isolate and identify *Listeria monocytogenes*, the following procedure is recommended.⁵

1. Enrich the sample in UVM Modified *Listeria* Enrichment or *Listeria* Enrichment Broth.
2. If desired, use Fraser Broth as a secondary enrichment to increase selectivity and differentiation before plating.
3. Inoculate Oxford Medium or Modified Medium with the enriched culture to isolate *Listeria* colonies.
4. Select esculin-positive colonies and confirm their identity by further biochemical testing.
5. Use macroscopic tube and rapid slide tests for definitive serological identification. For additional information, refer to the *Manual of Clinical Microbiology*.¹³

User Quality Control:

Identity Specifications OXFORD MEDIUM BASE

Dehydrated medium: tan, homogeneous, free-flowing
Reaction of 5.75% solution: pH 7.2 ± 0.2 at 25°C
Prepared plates: light to medium amber, slightly opalescent

	Oxford Antimicrobial Supplement	Modified Oxford Antimicrobial Supplement
Appearance:	yellow cake; yellow solution upon rehydration	white to off-white cake; colorless solution upon rehydration

Typical Cultural Response After 24 - 40 H at 35°C

Test Organism	Approximate Inoculum	Recovery on	
		Oxford Medium	Modified Oxford Medium
<i>Enterococcus faecalis</i> ATCC™ 29212	1,000 - 2,000 CFU	inhibited	inhibited
<i>Escherichia coli</i> ATCC™ 25922	1,000 - 2,000 CFU	inhibited	inhibited
<i>Listeria monocytogenes</i> ATCC™ 19114	100 - 1,000 CFU	good, esculin + (black colonies)	good, esculin + (black colonies)

The cultures listed above are the minimum that should be used for performance testing.

LIMITATIONS

1. Since *Listeria* species other than *L. monocytogenes* can grow on these media, an identification of *Listeria monocytogenes* must be confirmed by biochemical and serological testing.¹³
2. Antimicrobial agent solutions must be freshly prepared before each use or aliquoted and stored at -20°C or below.
3. Poor growth and a weak esculin reaction may be seen after 40 h incubation for some enterococci.

REFERENCES

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13. Bille, J., J. Rocourt and B. Swaminathan. 1999. *Listeria, Erysipelothrix and Kurthia*. In Murray, Baron, Pfaller, Tenover and Tenover (ed.). *Manual of clinical microbiology*, 7th ed. American Society for Microbiology, Washington, D.C.

AVAILABILITY

Cat. No.	Description
222530	Oxford Medium Base, 500 g.
222510	Oxford Medium Base, 2 kg.
211755	Oxford Antimicrobial Supplement, 6 x 10 mL.
211763	Modified Oxford Antimicrobial Supplement, 6 x 10 mL.
222120	LPM Agar Base, 500 g.
222110	LPM Agar Base, 2 kg.
212156	McBride <i>Listeria</i> Agar, 500 g.
222220	<i>Listeria</i> Enrichment Broth, 500 g.
222330	UVM Modified <i>Listeria</i> Enrichment Broth, 500 g.
211436	Motility Test Medium, 500 g.
223001	<i>Listeria</i> O Antiserum, Type 1, 1 mL.
223011	<i>Listeria</i> O Antiserum, Type 4, 1 mL.
223021	<i>Listeria</i> O Antiserum, Poly Types 1 & 4, 1 mL.