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BBL™ CHROMagar™ Family of Products

A Lean Approach to Testing

Helping all people
live healthy lives

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Anton van Leeuwenhoek—First to observe bacteria while examining different water sources

1913
Introduced first line of peptones—Bacto™ Peptone

1935
BBL founded

1952
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1960
Introduction of commercially-prepared plated media

1997
BD acquires Difco Laboratories

2003
BD launches BBL™ CHROMagar™ family of products

2004
BD launches BBL™ CHROMagar™ MRSA

2006
BD launches BBL™ CHROMagar™ Orientation TSA II I Plate™

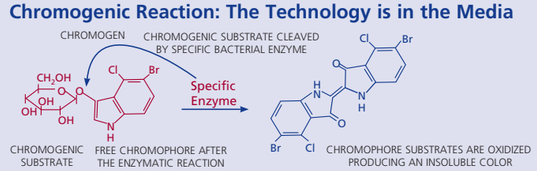
BD Diagnostics has been manufacturing BBL™ prepared media products for over 40 years. In that time we have gained a wealth of knowledge that remains the cornerstone of the high quality BBL brand. From the first introduction of Thioglycollate medium and proprietary peptones such as Trypticase™, to the development of media products such as Mycobactosel™ L-J, all the way to our patented Stacker™ Petri dish designs and formulations, like GC-Lect™ and ssA™, our history as leaders in microbiology is without equal. These are just a few of the many great milestones that BD Diagnostics and BBL can point to with pride.

BBL™ CHROMagar™ products are designed to:

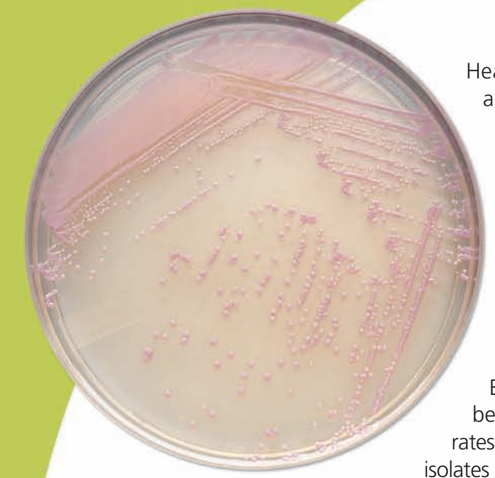
- Streamline identifications
- Provide enhanced differentiation of pathogens
- Allow microbiologists to realize material and labor reductions in the laboratory

We are very excited about the potential for streamlined workflow and cost savings that BBL CHROMagar media can bring to your lab. Stay tuned because there are many more formulations to come.

Chromogenic Reaction: The Technology is in the Media



The BBL CHROMagar family of products utilize a chromogen mix that consists of artificial substrates (chromogens) that release differently colored compounds upon degradation by specific microbial enzymes, thus assuring the direct differentiation of certain species or the detection of certain groups of organisms with only a minimum of confirmatory tests.



Healthcare-associated infections (HAIs) have become a major global health issue, particularly in the U.S. where there are an estimated two million HAIs every year.[1] These preventable HAIs lead to an estimated 90,000 patient deaths and are burdening the healthcare system with over $4.5 billion in treatment costs and excess hospital stay days.[1]

Of all the HAIs, those caused by *Staphylococcus aureus* are the most troublesome. Rates of infection caused by *S. aureus* have increased during the past two decades in North America and many European countries. Bacteremia due to *S. aureus* has been reported to be associated with higher mortality rates (15-60%).[2] Resistance to methicillin among *S. aureus* isolates is also a growing problem: up to 60% of nosocomial infections in patients in the intensive care unit (ICU) are due to methicillin-resistant *S. aureus* (MRSA).[3] Use of active surveillance cultures to identify colonized patients is an important part of any infection control strategy.

BBL™ CHROMagar™ MRSA is designed for the qualitative, direct detection of nasal colonization by MRSA. Swab samples are taken from the anterior nares of patients and healthcare workers to screen for MRSA colonization. The introduction of BBL CHROMagar MRSA provides laboratorians with many benefits compared to traditional MRSA screening algorithms:

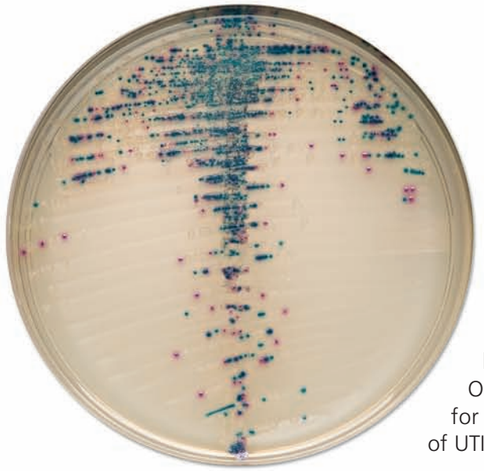
- Rapid results—direct detection and identification of most MRSA in as little as 24 hours without confirmatory testing.[4]
- Fewer total coagulase and latex tests performed saves money.
- Reduces the number of susceptibility tests performed on non-MRSA isolates.
- Less labor required than traditional MRSA algorithms—which use multiple plates and reagents.
- Unique combination of chromogenic substrates and a cephalosporin to provide a familiar and simple method to perform MRSA testing.
- 96% agreement of MRSA and 97% agreement of MSSA compared to *mec*A PCR.[5]
- Greater recovery—8% greater recovery than traditional screening algorithms.

[1] Centers for Disease Control and Prevention. 2006. CDC available at www.cdc.gov/ncidod/dhqp/healthDis.html
[2] Cosgrove, S.E. et al. 2003. Clin. Infect. Dis. *36*:53-59.
[3] National Nosocomial Infections Surveillance (NNIS) System. 2004. Am. J. Infect. Control *32*:470-485.
[4] BD Data on file, mauve colonies at 48 hours require a confirmatory coagulase test.
[5] BD Data on file.

Cat. No.	Description	Unit
215084	BBL™ CHROMagar™ MRSA	20 Plates
215181	BBL™ CHROMagar™ MRSA	100 Plates

BBL CHROMagar MRSA

BBL CHROMagar Orientation

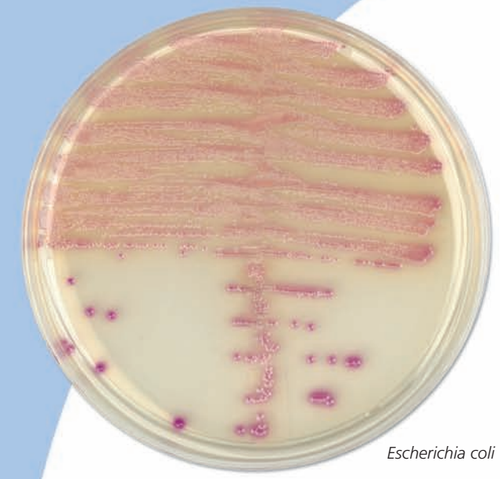


BBL™ CHROMagar™ Orientation medium is a nonselective, differential medium for presumptively identifying bacterial isolates from primary clinical specimens. Specially selected peptones supply the nutrients in BBL CHROMagar Orientation medium. Clinical studies have demonstrated that CHROMagar Orientation medium is an ideal medium for use in differentiation and enumeration of UTI pathogens.

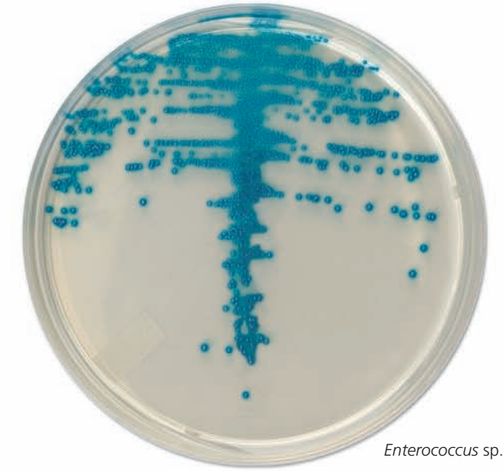
- Increases laboratory efficiency and decreases material costs 50-75% by reducing the number of plates to inoculate, incubate and read.
- Enhances visual differentiation of colonies, resulting in less time spent subculturing mixed infections. Allows for earlier set up of susceptibility testing.
- Improves detection of mixed urine cultures for quicker assessment of contaminated samples, decreasing work-up time.
- Identifies *E. coli* and *Enterococcus* from the primary plate—confirmatory testing is not required. Immediately resolves approximately 80% of positive urines.[1]
- Provides presumptive identification of *Staphylococcus saprophyticus* for more efficient screening of suspect urine samples.
- Allows isolation and presumptive identification of both gram-positive and gram-negative pathogens with a single plate.
- Inhibits the swarming of *Proteus* spp. with a unique BBL formulation.

[1] In accordance with CLSI document M35. Abbreviated Identification of Bacteria and Yeast approved guideline.

Cat. No.	Description	Unit
254102	BBL™ CHROMagar™ Orientation	20 Plates
215081	BBL™ CHROMagar™ Orientation	100 Plates



Escherichia coli



Enterococcus sp.

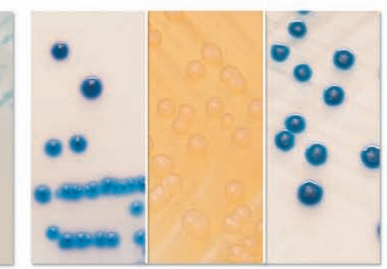
Identify *E. coli* and *Enterococcus* sp. from the primary plate—confirmatory testing is not required.[1] These two organisms represent approximately 80% of urinary tract infections.

[1] In accordance with CLSI document M35. Abbreviated Identification of Bacteria and Yeast approved guideline.

Staphylococcus aureus

Staphylococcus saprophyticus | *Streptococcus agalactiae*

Differentiation and presumptive identification of *S. saprophyticus* and *S. agalactiae* enable more streamlined screening of female urine cultures.

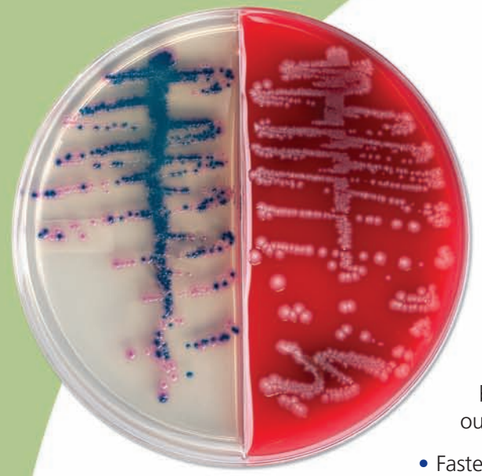


Enterobacter cloacae | *Proteus* sp. | *Klebsiella pneumoniae*

BBL™ CHROMagar™ Orientation Gram-Positives and Gram-Negatives[1]

Organism	Total no. of isolates	No. (%) of isolates with described color	Description of pigment and/or morphology of colonies
Escherichia coli	**429**	**425 (99)** **4 (1)**	**pink** **beige**
***Enterococcus* spp.**	**213**	**213 (100)**	**blue or turquoise, small**
Staphylococcus saprophyticus	**6**	**6 (100)**	**pink opaque**
Streptococcus agalactiae	**36**	**36 (100)**	**light blue, pin-like**
***Citrobacter* spp.**	**16**	**14 (87.5)** **2 (22.5)**	**metallic blue with or without pink halo** **pink**
***Enterobacter* spp.**	**17**	**17 (100)**	**metallic blue with or without pink halo**
Klebsiella	**96**	**96 (100)**	**metallic blue with or without pink halo**
Morganella morganii	**7**	**7 (100)**	**colorless to beige with brown halo**
Proteus mirabilis	**61**	**61 (100)**	**beige with brown halo**
Proteus vulgaris	**5**	**3 (60)** **2 (40)**	**beige with brown halo** **blue-green with brown halo**
***Providencia* spp.**	**16**	**16 (100)**	**beige with brown halo**
Acinetobacter spp.	2	2 (100)	beige
Candida spp.	31	31 (100)	white, creamy, convex
Hafnia alvei	3	2 (66.7) 1 (33.3)	beige pink with blue halo
Pseudomonas spp.	57	53 (93) 4 (7)	transparent, yellow to green serrated edge, diffused beige with or without green halo
Salmonella spp.	1	1 (100)	beige
Serratia marcescens	6	6 (100)	blue-green
Staphylococcus spp.	19	19 (100)	golden opaque, white, pink

[1] Piccoli, P., P. Ricordi, M. Scagnelli, and C. Scarparo. 2002. Comparative evaluation of two commercial chromogenic media for detection and presumptive identification of urinary tract pathogens. European Journal of Clinical Microbiology and Infectious Disease. *21*:287.



BD Diagnostics has combined two products to formulate the new **BBL™ CHROMagar™ Orientation / TSA II I Plate™** for urine cultures.

As today's laboratories are challenged to do more with less, this new format supports **Lean** microbiology processes in the following ways:

- Reduces reagent and identification panel usage[1] by resolving up to 80% of positive urine cultures without performing additional confirmatory testing.
- Faster, visual identification of common urinary pathogens (*Escherichia coli* and *Enterococcus*) improving turnaround time for positives.
- Colorimetric detection of mixed cultures allows for faster assessment of sample integrity and detection of improperly collected samples.
- Standardizes urine culture processing to a single catalog number.

[1] In accordance with CLSI document M35. Abbreviated Identification of Bacteria and Yeast approved guideline.

Cat. No.	Description	Unit
222239	BBL™ CHROMagar™ Orientation / TSA II I Plate™	100 Plates

BBL CHROMagar Orientation / TSA II I Plate

BBL CHROMagar O157

Escherichia coli serotype O157:H7 is a human pathogen associated with hemorrhagic colitis. Traditionally, this organism has been differentiated from its nonpathogenic counterparts using media containing sorbitol. *E. coli* O157:H7 will ferment sorbitol slowly, or not at all.

BBL™ CHROMagar™ O157 was developed to meet the needs of microbiologists requiring a better medium for isolation and differentiation of *E. coli* O157. This medium has been designed for use as a primary plate for stool cultures and is an ideal medium for screening food samples for *E. coli* O157. BBL CHROMagar O157 provides additional benefits:

- Reduces costs of subculturing, biochemical identification and latex testing of false-positive organisms isolated from MacConkey Agar with Sorbitol and SMAC CT media.[1]
- Is compatible with latex agglutination testing for confirmation, reducing turnaround time and saving valuable technician time.
- Provides more efficient use of technologist time when screening stool cultures.
- Detects *E. coli* O157 using a highly specific chromogenic reaction, limiting false results associated with detection of *E. coli* O157 by sorbitol fermentation.
- Distinguishes *E. coli* O157 (mauve colonies) from *E. coli* non-O157 (blue colonies) with a color reaction for clearer differentiation of toxigenic strains.
- Inhibits most *Proteus*, *Pseudomonas* and *Aeromonas* strains using specialized selective agents.

CHROMagar O157[1]	Sensitivity	Specificity
CHROMagar O157	98%	100%
SMAC	96%	80%
SMAC-CT	100%	93%

[1] Data on file, BD Diagnostics.

Cat. No.	Description	Unit
214984	BBL™ CHROMagar™ O157	20 Plates

BBL CHROMagar Staph aureus

BBL™ CHROMagar™ Staph aureus is a chromogenic medium which utilizes an enzymatic reaction that produces easy-to-identify mauve-colored colonies with the growth of *Staphylococcus aureus*. Other staphylococcal isolates produce cream-colored to white colonies on this medium. Traditionally, *S. aureus* isolates have been identified using Mannitol Salt agar to determine mannitol fermentation and TSA II Sheep Blood Agar to exhibit a zone of beta hemolysis. BBL CHROMagar Staph aureus is designed for use as a primary plate when testing for *S. aureus* in clinical or industrial specimens. BBL CHROMagar Staph aureus is highly effective in differentiating organisms with atypical appearance or weak hemolysis making it an ideal medium for *Staphylococcus* surveillance.[1] Additional benefits include:

- Allows for performance of susceptibility testing directly from the medium, reducing turnaround time and saving valuable tech time.
- Eliminates the need for subculture to a nonselective medium, reducing consumable material costs and improving workflow.
- Isolates and identifies *Staphylococcus aureus* from clinical sources without the use of confirmatory testing.[2]
- Shows increased recovery by 11% when compared to conventional media, as demonstrated in a recent clinical study.[1]

CHROMagar Staph aureus[3]	Sensitivity	Specificity
CHROMagar Staph aureus	99.5%	99.2%

[1] Lema et al., The Johns Hopkins Medical Institutions. Comparison of the BBL™ CHROMagar™ Staph aureus agar medium to conventional media for detection of *Staphylococcus aureus* in clinical respiratory samples. Journal of Clinical Microbiology. *42*:3566-3569.

[2] In accordance with CLSI document M35. Abbreviated Identification of Bacteria and Yeast approved guideline.

[3] Data on file, BD Diagnostics.

Cat. No.	Description	Unit
214982	BBL™ CHROMagar™ Staph aureus	20 Plates

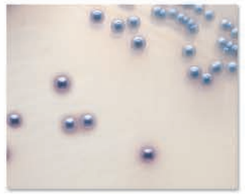
BBL CHROMagar Candida

BBL™ CHROMagar™ Candida is a nutritive medium for isolating and differentiating yeasts from primary culture of clinical specimens. BBL CHROMagar Candida has gained wide acceptance through the years by many leading mycologists. BBL CHROMagar Candida differentiates selected yeasts by color morphology, most other yeast isolates will appear in their natural white/cream colony color. This ability to isolate, identify and differentiate mixed yeast cultures has provided many microbiology laboratories the opportunity to operate more cost effectively. Additional benefits:

- Decreases turnaround time for yeast isolates by up to 48 hours when used as a primary plate.
- Reduces the amount of yeast identification panels used in the lab, thereby increasing workflow efficiency and lowering overall costs of yeast workup.
- Differentiates mixed yeast isolates from clinical specimens allowing for more-rapid-result turnaround time.
- Allows for presumptive identification of three of the most commonly isolated clinical yeasts, *C. albicans*, *C. tropicalis* and *C. krusei*.
- Inhibits normal bacterial flora (using chloramphenicol) making it an ideal medium for primary yeast culture of urine, genital and throat samples.

Cat. No.	Description	Unit
254093	BBL™ CHROMagar™ Candida	20 Plates

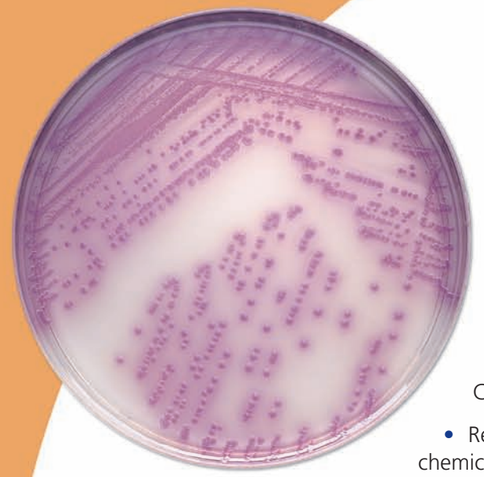
C. albicans



C. tropicalis

C. krusei

BBL CHROMagar Salmonella



BBL™ CHROMagar™ Salmonella was developed for use in *Salmonella* screening of either clinical or industrial samples. BBL CHROMagar Salmonella can be used with or without pre-enrichment broth media. As with any *Salmonella* isolation procedure, pre-enrichment with a broth (i.e., Selenite F or GN Broth) will increase recovery of *Salmonella* spp. Additional benefits of BBL CHROMagar Salmonella are:

- Reduces consumable costs associated with biochemical identification and agglutination testing of false-positive isolates.
- Allows for serotyping and slide agglutination directly from the plate for more efficient use of technologists' time.
- Reduces the time needed for confirmatory biochemical and serological tests by up to one day as compared to Hektoen Enteric Agar.
- Detects *Salmonella* with a highly specific chromogenic reaction, minimizing interference from hydrogen sulfide (H_2S)-producing colonies such as *Proteus* and *Citrobacter* spp. This reaction results in a significant reduction of false positives.
- Differentiates low levels of *Salmonella* in cultures containing mixed coliform bacteria, which helps to streamline detection of pathogenic organisms.

Cat. No.	Description	Unit
214983	BBL™ CHROMagar™ Salmonella	20 Plates

BBL™ CHROMagar™ Proof Sources

BBL™ CHROMagar™ Orientation

D'Souza and Baron, Stanford University Medical School. Practical bench comparison of BBL CHROMagar Orientation and standard two-plate media for urine cultures. Journal of Clinical Microbiology. *42*:60-64.

Fahr, A., R. Hammann and K. Hengstler. 1997. Evaluation of BBL CHROMagar Orientation medium for detection and presumptive identification of urinary tract pathogens. Journal of Clinical Microbiology. *35*:2773-2777.

Piccoli, P., P. Ricordi, M. Scagnelli, and C. Scarparo. 2002. Comparative evaluation of two commercial chromogenic media for detection and presumptive identification of urinary tract pathogens. European Journal of Clinical Microbiology and Infectious Disease. *21*:283-289.

2005 ASM poster. Brosnikoff et al., Medical Microbiology Laboratory, University of Alberta Hospital, Edmonton, Alberta, Canada. Isolation of uropathogens on chromogenic agar versus standard dipslides from urine collected with and without preservative.

2005 ASM poster. Whittier and Della-Latta, Columbia University Medical Center, New York, NY. Evaluation of BBL CHROMagar Orientation agar for routine urine cultures in a high volume clinical laboratory.

2004 ASM poster C-089. Cruz et al., Toronto Medical Laboratories and Mount Sinai Hospital, Toronto, ON, Canada. Cost effectiveness of BBL CHROMagar Orientation medium for routine urine cultures.

2004 ASM poster. DeJulius et al., Cleveland Clinic Foundation, Cleveland, Ohio. Use of BBL CHROMagar Orientation Media for the identification and enumeration of urinary tract pathogens: Comparision to routine culture techniques.

2004 ASM poster. Skulnick et al., Department of Microbiology, TML/Mount Sinai Hospital, University of Toronto, Toronto, ON, Canada. Cost effectiveness of BBL CHROMagar Orientation medium for routine urine cultures.

2004 ASM poster. Ritter et al., BD Diagnostics, Sparks, MD. The ability of BBL CHROMagar Orientation to recover *Corynebacterium urealyticum*.

BBL™ CHROMagar™ Staph aureus

Lema et al., The Johns Hopkins Medical Institutions. Comparison of the BBL CHROMagar Staph aureus agar medium to conventional media for detection of *Staphylococcus aureus* in clinical respiratory samples. Journal of Clinical Microbiology. *42*:3566-3569.

2003 ICAAC poster D-1681. D'Souza and Baron, Stanford University Medical School. BBL CHROMagar Staph aureus is superior to mannitol salt for detection of *Staphylococcus aureus* in complex mixed infections.

BBL™ CHROMagar™ O157

2004 ASM poster C-315. Vetterli, Children's Hospital & Research Center at Oakland, Oakland, CA. Comparison of BBL CHROMagar O157 to sorbitol macconkey for recovery of *E. coli* O157 in stool cultures.

BBL™ CHROMagar™ Candida

Baqui, A., T. Brenner, W. Falkler, JR., M. Jabra-Rizk, T. Meiller, W. Merz and M. Romagnoli. 2001. Evaluation of a reformulated CHROMagar Candida. Journal of Clinical Microbiology. *39*:2015-2016.

Freydiére, A., F. Parant, J. Perry, M. Piens and H. Raberin. 2003. Routine use of a one minute trehalse and maltase test for the identification of *Candida glabrata* in four laboratories. Journal of Clinical Pathology *56*:687-689.

2005 ASM poster. Paritpokee et al., Section of Clinical Microbiology, Department of Clinical Pathology. The Cleveland Clinic Foundation, Cleveland, Ohio. Rapid identification of yeast isolates using BD BBL CHROMagar Candida.

2004 ASM poster C-102. Morhaime et al., Cornell Medical Center, New York-Presbyterian Hospital, New York, NY. Growth characteristics of moulds on CHROMagar Candida medium.

2004 ASM poster C-105. Scognamiglio et al., Cornell Medical Center, New York-Presbyterian Hospital, New York, NY. Evaluation of a new commercially available rapid assimilation of trehalose (RAT) test for the identification of *Candida glabrata*.

2003 ASM poster C-268. Larone et al., Weill Cornell Medical Center. BBL CHROMagar Candida as the sole primary medium for the isolation of yeasts and as a source medium for the rapid assimilation of trehalose (RAT) test.

BBL™ CHROMagar™ MRSA

2005 ASM poster. Flayhart et al., The Johns Hopkins Medical Institutions, Baltimore, MD. Enhanced detection of methicillin resistant *Staphylococcus aureus* using chromogenic MRSA media compared to traditional culture methods.

2005 ASM poster. Kircher et al., BD Diagnostics, Sparks, MD. Reliability of coagulase testing from BBL CHROMagar MRSA.

2005 ASM poster. Lema et al., The Johns Hopkins Medical Institutions, Baltimore, MD. The ability of BBL CHROMagar MRSA to detect community-associated methicillin resistant *S. aureus*.

2004 ASM poster. Kircher et al., BD Diagnostics, Sparks, MD. Detection of methicillin-resistant *Staphylococcus aureus* using a new medium, BBL CHROMagar MRSA, compared to current methods.

2004 ASM poster C-034. Walther et al., The Johns Hopkins Hospital, Baltimore, MD. Comparison of two prototypes of BBL CHROMagar MRSA to conventional media for the detection of methicillin resistant *Staphylococcus aureus* in clinical samples.

BBL™ CHROMagar™ Salmonella

Eigner, U., A. Fahr, R. Hammann and R. Reissbrodt. 2001. Evaluation of a new chromogenic medium for the isolation and presumptive identification of *Salmonella* species from stool specimens. European Journal of Clinical Microbiology Infectious Disease. *20*:558:565.