SI Microbiology - Full Discipline Demo

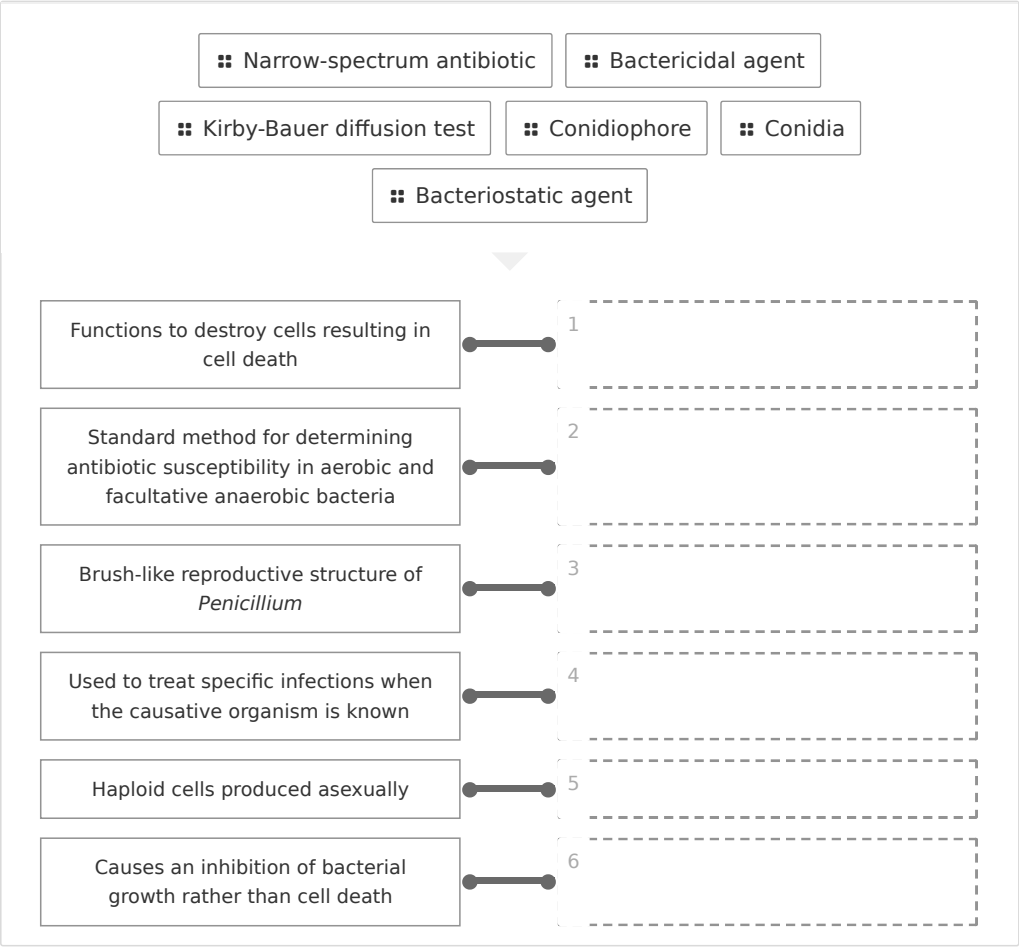
Kirby-Bauer Diffusion Testing

Final Report - Answer Guide

Institution	Science Interactive University
Session	SI Microbiology - Full Discipline Demo
Course	SI Microbiology - Full Discipline Demo
Instructor	Sales SI Demo

Test Your Knowledge

Match each term to the best description.

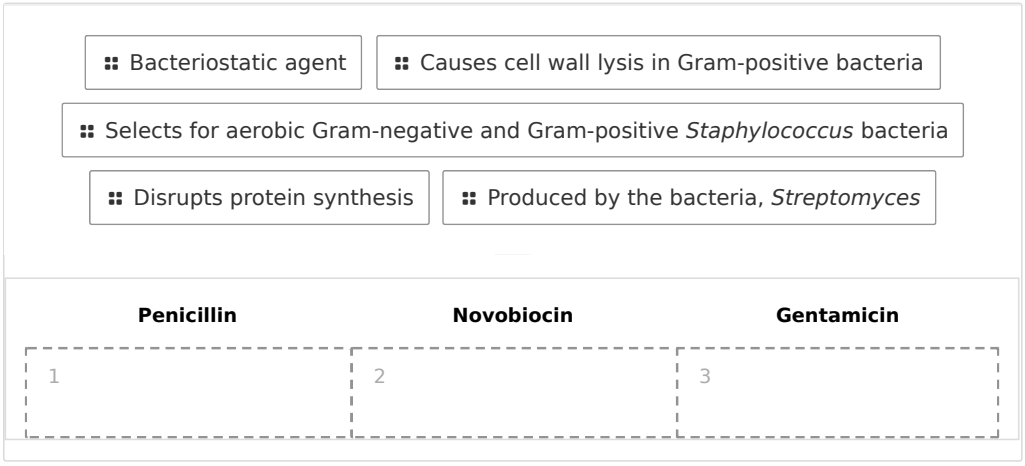


Correct answers:

1 Bactericidal agent 2 Kirby-Bauer diffusion test 3 Conidiophore

4 Narrow-spectrum antibiotic 5 Conidia 6 Bacteriostatic agent

Classify each phrase as unique to penicillin, novobiocin, or gentamicin.



Correct answers:

1 Causes cell wall lysis in Gram-positive bacteria

2 Bacteriostatic agent Produced by the bacteria, *Streptomyces*

3

Selects for aerobic Gram-negative and Gram-positive *Staphylococcus* bacteria

Disrupts protein synthesis

Exploration

Antimicrobial agents are synthetic substances developed in the laboratory that mimic the effects of antibiotics.

- True ✔
- False

____ is a bacteriostatic, narrow-spectrum antibiotic that targets DNA gyrase in some Gram-positive bacteria

- Penicillin
- Novobiocin ✔
- Gentamicin
- Tetracycline

The effective zone of inhibition is the same for all antibiotics.

- True
- False ✔

____ are haploid spores that create the dusty appearance of Penicillium.

- Aerial hyphae
- Gentamicin
- Subsurface hyphae
- Conidia ✔

Exercise 1

How did your susceptibility prediction compare to the Kirby-Bauer diffusion testing results? Reference Panel 1 and Photo 1 in your explanation.

Student explanations should relate experimental results recorded in Photo 1 with their predictions recorded in Panel 1. Predictions, if based on Exploration content, should be that *S. epidermidis* would be susceptible to all three antibiotics. Results recorded in Photo 1 should confirm this prediction by illustrating zones of inhibition around each disk.

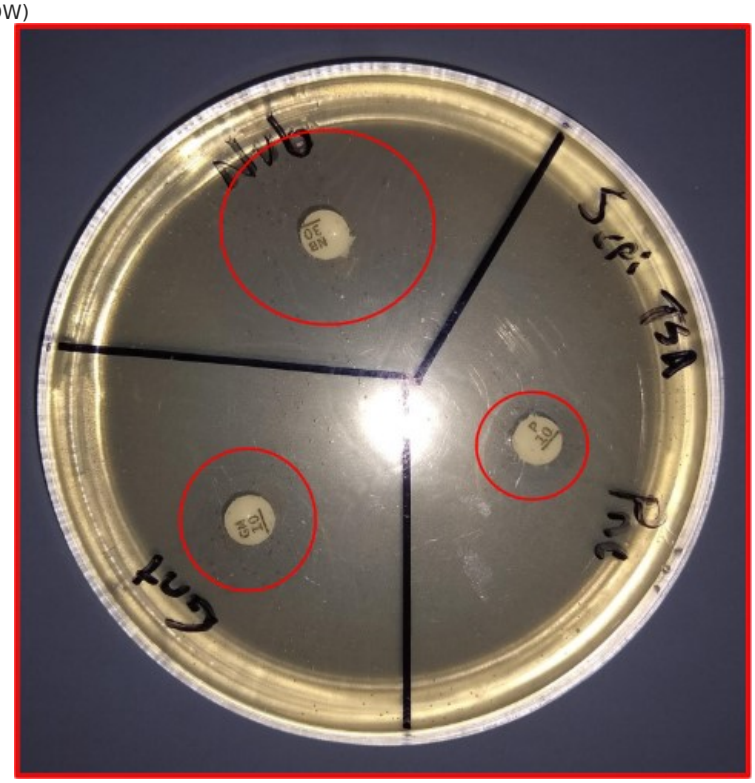
Did the susceptibility of *S. epidermidis* differ for each of the antibiotics? Reference Data Table 1 in your explanation.

Internal testing resulted in Novobiocin producing the highest level of susceptibility and largest zone of inhibition in *S. epidermidis* followed by gentamicin and then penicillin as recorded in Data Table 1.

Panel 1: Susceptibility Prediction
(SAMPLE ANSWER BELOW)

The Exploration information for this lesson indicates that *S. epidermidis* will be susceptible to each of the antibiotics.

Photo 1: Plate after Incubation
(SAMPLE ANSWER BELOW)



Data Table 1: Zone of Inhibition Measurements
(SAMPLE ANSWER BELOW)

Antibiotic	Zone of Inhibition (mm)
Novobiocin	32
Penicillin	12
Gentamicin	21

Exercise 2

What is the function of the conidia labeled in Photo 2?

Conidia are spores produced during asexual reproduction that disperse and germinate upon encountering favorable conditions to form new hyphae. Conidia give *Penicillium* a dusty appearance.

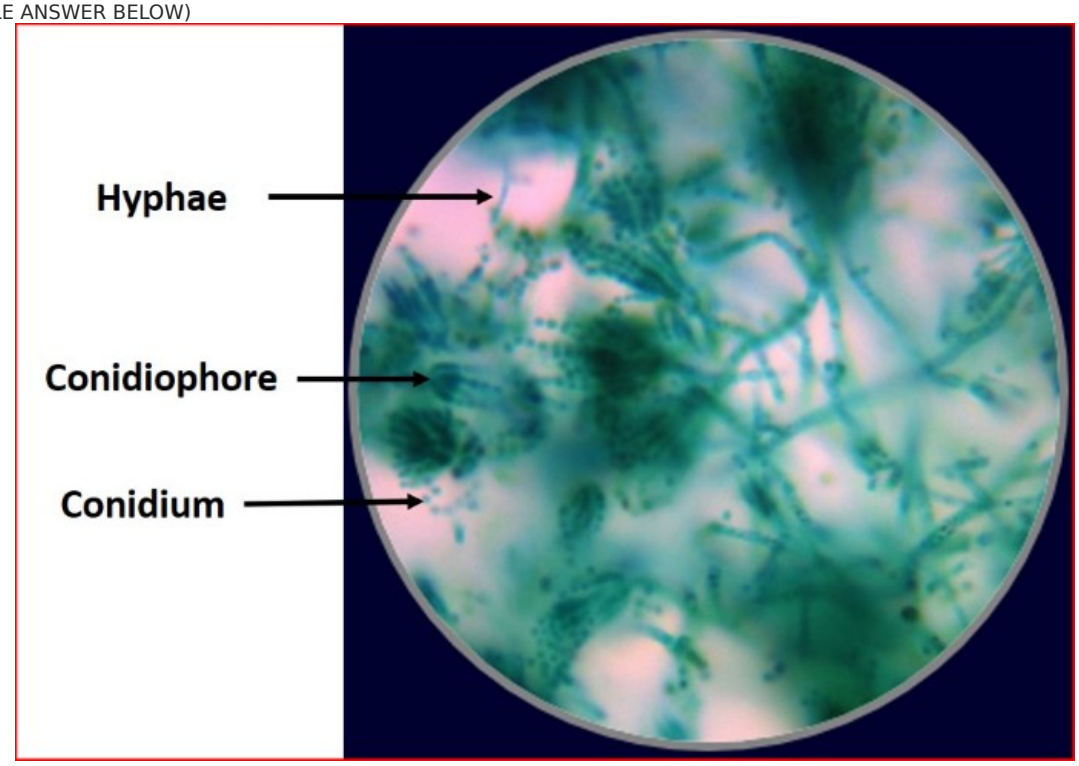
What antibiotic is produced by the fungus examined in this exercise? How does the antibiotic function?

The fungus *Penicillium* produces the antibiotic penicillin. Penicillin is a bactericidal, narrow-spectrum drug that lyses the cell wall of Gram-positive bacteria leading to cell death.

What would you expect to occur if you streaked 1/2 of an agar plate with *S. epidermidis* and the other half with *Penicillium* and then incubated for one week? Relate this prediction to your results in Exercise 1.

S. epidermidis growth would be inhibited by *Penicillium* based on the results of Exercise 1 where *S. epidermidis* was shown sensitive to penicillin. In a week's time, the fungi would most likely overtake the plate and there be no evidence of *S. epidermidis*.

Photo 2: Penicillium with Conidia
(SAMPLE ANSWER BELOW)



Data Table 2: Slide Magnification
(SAMPLE ANSWER BELOW)

Slide	Magnification
Penicillium	600x

Competency Review

Bacteriostatic agents cause an inhibition of bacterial growth rather than cell death.

- [x] True ✔
- [ ] False

____ is a genus of organisms that produces antibiotics.

- [ ] *Bacillus*
- [ ] *Cephalosporium*
- [ ] *Streptomyces*
- [x] All of the above ✔

_____ is a bactericidal, narrow-spectrum antibiotic that targets aerobic, Gram-negative bacteria and Gram-positive *Staphylococcus*.

- [ ] Penicillin
- [x] Gentamicin ✔
- [ ] Novobiocin
- [ ] Tetracycline

____ disrupts the formation of bacterial cell walls.

- Penicillin ✔
- Gentamicin
- Novobiocin
- Tetracycline

The diameter of the zone of inhibition is dependent on the sensitivity of a microorganism to a particular antibiotic and the physical properties of the antibiotic.

- True ✔
- False

***Penicillium* exist as mats of hyphal cells topped by brush-like reproductive structures called conidiophores.**

- True ✔
- False

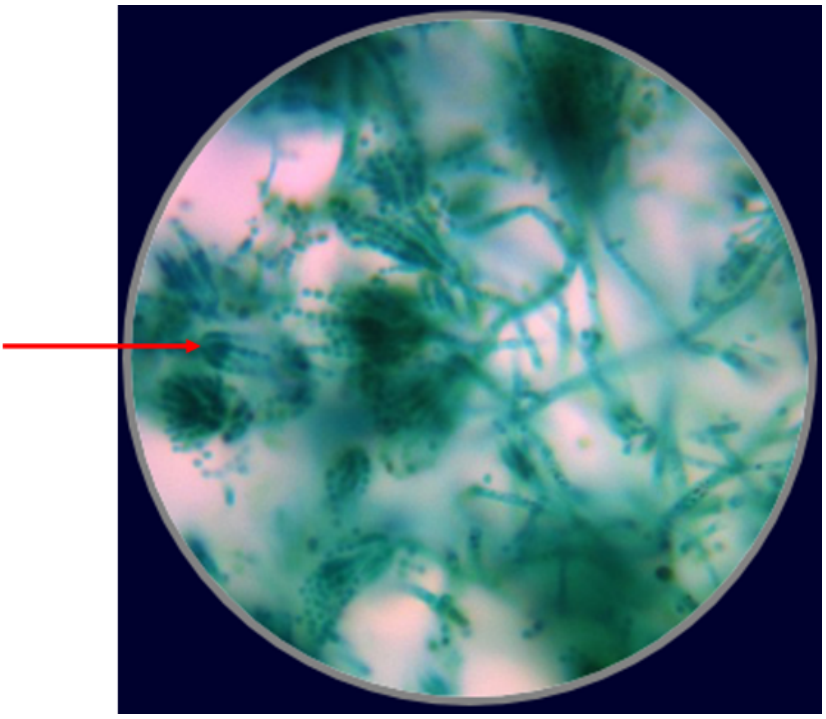
Kirby-Bauer diffusion test agar plates are inoculated with a bacterial sample using a(n) ____.

- inoculating loop
- inoculating needle
- L-shaped spreader ✔
- Durham tube

***S. epidermidis* is susceptible to ____.**

- penicillin
- gentamicin
- novobiocin
- All of the above ✔

The arrow in the micrograph of *Penicillium* below is pointing to a _____.



- subsurface hypha
- flagellum
- conidiophore ✔
- spirochaete

Extension Questions

In this laboratory, the Kirby-Bauer diffusion test was used to test the susceptibility of *S. epidermidis* to penicillin, novobiocin, and gentamicin. Apply your knowledge of these antibiotics to predict the results of using *E. coli*, a Gram-negative species, instead of *S. epidermidis*. Explain your answer. (SAMPLE ANSWER BELOW)

E. coli should show susceptibility to gentamicin and resistance to penicillin and novobiocin. *E. coli* is a Gram-negative bacteria and gentamicin selects for Gram-negative microbes. Penicillin and novobiocin select primarily for Gram-positive bacteria and should not be effective against the Gram-negative *E. coli*.