Antibacterial activity of biotransformation product: 1S-(2-benzofuranyl)-ethanol

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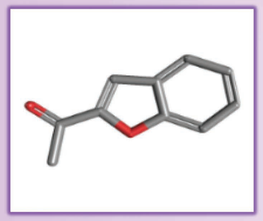
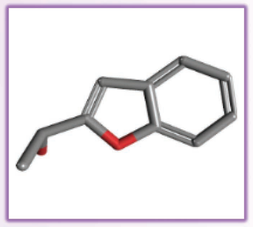
Abstract

The antibacterial activity of purified 1S-(2-benzofuranyl)-ethanol, prepared via a biotransformation reaction using carrot strips and benzofuran-2-yl-methylketone, was analyzed using a modified procedure of the disk diffusion method. Ordinary filter paper was cut into disks with a diameter of 2 cm and impregnated with 1S-(2-benzofuranyl)-ethanol in amounts ranging from 10 to 50 mg. The agar plates were inoculated with 20, 40, or 50 µL aliquots of a 5 mL overnight culture containing *E. Coli*, BL21. The plates were incubated for 2 hours at 37°C to allow the bacteria to grow before the impregnated disks were placed on the agar plates. Controls were established using 10 to 50 mg of benzofuran-2-yl-methylketone. Results indicated 1S-(2-benzofuranyl)-ethanol was about twice as potent an antibacterial agent as benzofuran-2-yl-methyl ketone.



benzofuran-2-yl methyl ketone (ketone)



(ℓ)-Benzonfuran-2-yl ethanol (alcohol)

Methods

- Overnight 5 mL cultures of BL21 were prepared.
- The ketone and alcohol were each dissolved in ethyl acetate so the concentration of each was 0.311 mg/µL.
- Filter paper disks (2 cm) were impregnated with 5-50 mg of either the ketone or alcohol.
- 30 µL aliquots of the 0.311 mg/µL solutions were placed on the disks, the solvent was allowed to evaporate, and the method was repeated until the desired amount was achieved.
- 20-40 µL of overnight culture were spread on to an agar plate.
- The bacteria were allowed to grow for 2 hr. at 37°C before the impregnated disks were place in the center of the agar plate.
- The plates were further incubated overnight at 37°C.
- The average distance of bacterial growth was measured.

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Former student collaborators: *Cheyenne Massengale and David DeClerck*

Results

Table 1. *Combined results of mass and growth inhibition distance (cm) of 20 and 40µl cultures .*

Mass (mg)	Alcohol inhibition (cm)	Ketone inhibition (cm)
9.55	0.50	0.27
19.1	0.69	0.33
28.6	0.65	0.38
38.0	0.68	0.30
46.7	0.65	0.33

Figure 1. Measuring the zone of inhibition

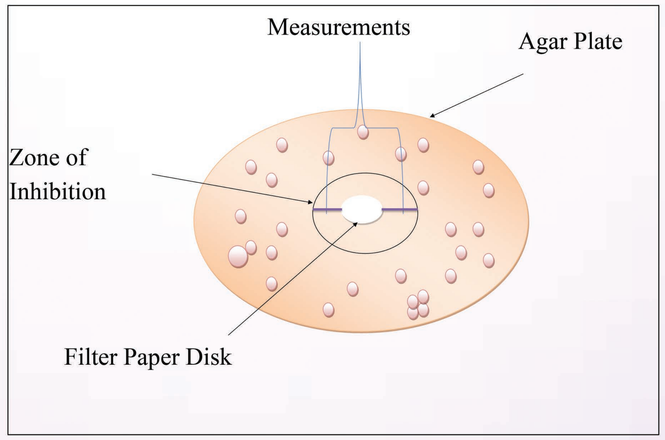

Figure 2. Sample of bacterial inhibition. Alcohol plate on left; ketone on right.

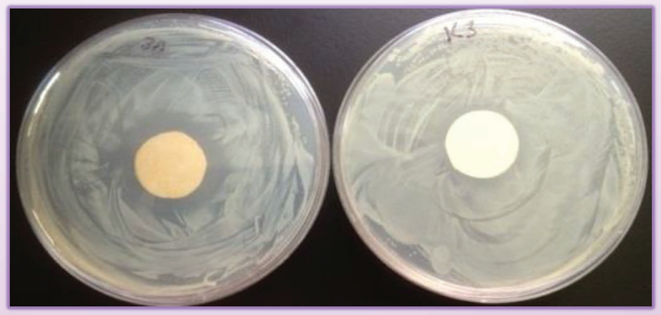

Figure 3. Comparison of bacterial inhibition between **alcohol** and **ketone**.

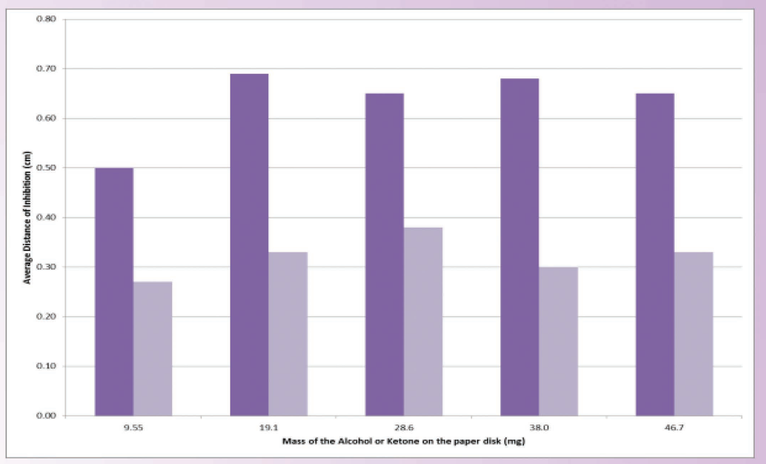

Table 2. *Comparison of antibacterial properties. Average distance of bacterial growth inhibition (cm) using 20 µl and 40 µl cultures and 5 to 50 mg of compound.*

Benzofuranyl-2-yl-methyl ketone	1S-(2-benzofuranyl)-ethanol
0.32 cm	0.63 cm
% difference	49%

Discussion/Conclusion

These studies indicate 1S-(2-benzofuranyl)-ethanol is 49% more antibacterial than benzofuran-2-yl-methyl ketone. Future plans include performing antifungal studies on 1S-(2-benzofuranyl)-ethanol and its prochiral starting material, benzofuran-2-yl-methyl ketone; and comparing the antimicrobial properties of other prochiral ketones and their corresponding stereospecific alcohol.

References

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