NOVEL SEMI-SYNTHETIC ANTIBACTERIAL AGENTS AGAINST *Staphylococcus aureus* AND *Bacillus cereus*

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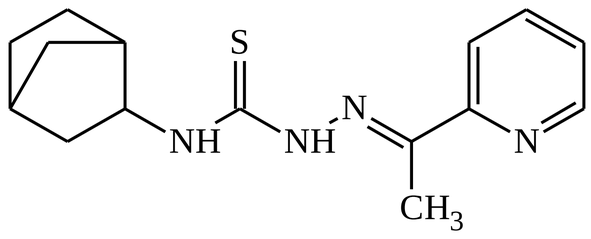
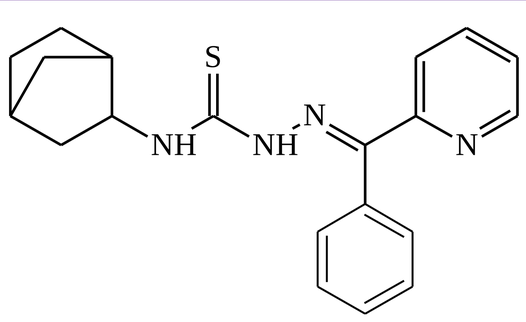
Introduction

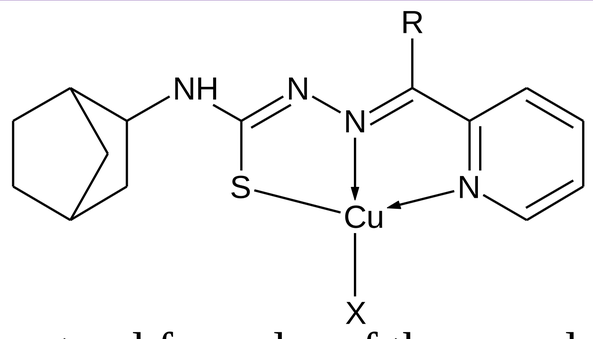
Antibiotic resistance is one of the most serious threats to human health, food security and development today. New resistance mechanisms are emerging and spreading everywhere, threatening our ability to treat common infectious diseases. In this work, new semi-synthetic agents were synthesized based on a derivative of the natural compound Camphor, thiosemicarbazide and 2-acetyl/2-benzoylpyridine.



2-Acetylpyridine N^4-norbornylthiosemicarbazone (HL^1)



2-Benzoylpyridine N^4-norbornylthiosemicarbazone (HL^2)

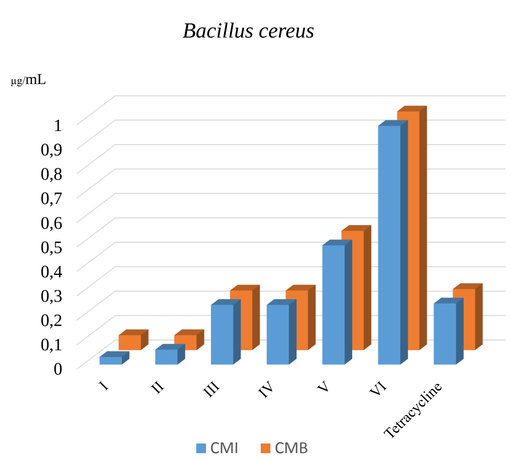


The structural formulas of the complexes, where

R - Me, Ph; X = Cl^-, NO_3^-, Cl_2CHCOO^-

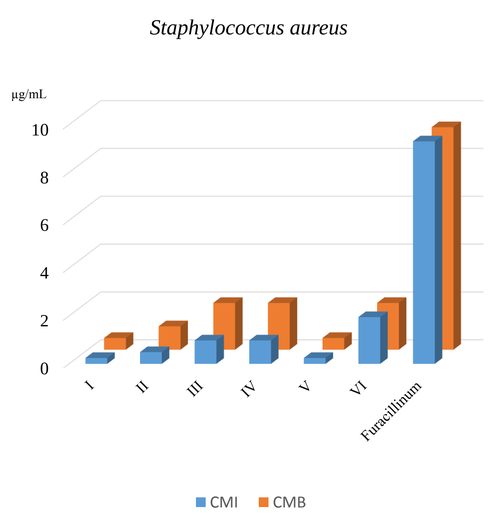
Materials and Methods

For this purpose, thiosemicarbazones were synthesized in two steps. At the first step the N^4-norbornylthiosemicarbazide was dissolved in ethanol with 2-acetylpyridine/2-benzoylpyridine. Concentrated hydrochloric acid was added to the obtained solution. At the second step the obtained 2-acetylpyridine hydrochloride N^4-norbornylthiosemicarbazone (HL^1) and 2-benzoylpyridine hydrochloride N^4-norbornylthiosemicarbazone (HL^2) were dissolved in ethanol and neutralized with an aqueous solution of Na_2CO_3. Then extraction with chloroform was done. The resulting substances were studied using FT-IR and NMR ^1H, ^{13}C spectroscopy. The copper(II) coordination compounds were obtained by reaction between HL^1 or HL^2 and copper(II) nitrate trihydrate, copper(II) chloride dihydrate, and copper(II) dicloroacetate. The complexes $[Cu(L^{1,2})X]$ (X = NO_3^- (**I**, **VI**), Cl^- (**II**, **V**), $CHCl_2COO^-$ (**III**, **VI**)) were studied by elemental analysis, FT-IR spectroscopy and molar conductivity.



Results: Antibacterial activity

The antibacterial activities against Gram-positive microorganisms: *Staphylococcus aureus* and *Bacillus cereus* were studied for the obtained substances. The results showed that 2-benzoylpyridine N^4-norbornylthiosemicarbazone (HL^2) is inactive one, and its copper(II) coordination compounds are 8 times less active than complexes with HL^1 against *Staphylococcus aureus* and 32 times less active against *Bacillus cereus*.



Conclusions

In this work the six new copper(II) complexes with 2-acetylpyridine/2-benzoylpyridine N^4-norbornylthiosemicarbazone were synthesized and studied with different physical methods. The study of antibacterial activity showed that the obtained complexes in many cases surpass the activity of Furacillinum and are practically on the same level as Tetracycline, that are used in medicine. Also it was shown that the 2-benzoylpyridine fragment in the composition of thiosemicarbazone reduces the antibacterial activity of its copper(II) complexes.

Acknowledgments

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