Abstract

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Title of Thesis: Interactions of alkaloids with transition metals I.

Copper is one of the essential trace elements that are necessary for the proper functioning of the organism. Copper is a significant component of many enzymes that affect various metabolic processes in the human body. It is important that the level of copper in the body is regulated because its deficit or excess lead to a variety of pathological conditions.

Alkaloids are secondary plant metabolites that are distinguished by numerous biological activities. In this thesis the copper-chelating and copper-reducing activity of eleven isoquinoline alkaloids was measured: boldine, isocorydine, (+)-bulbocapnine, (+)-corydine, glaucine, (-)-sinoacutine, (-)-californidine, (-)-escholtzine, platycerine, (-)-fumaricine, and (+)-parfumine. Alkaloid activity was measured at four (patho) physiological pH values by a verified spectrophotometric method using two indicators: bathocuproinedisulfonic acid disodium salt and hematoxylin. Based on the results, structure-effect relationships were derived.

The results show that none of the tested substances was able to chelate copper ions. In contrast, all the alkaloids show copper reducing activity. The structure-activity relationship suggests that as the number of hydroxyl groups in the alkaloid skeleton increases, its reducing activity increases. The highest activity shows alkaloid boldin, which contains two hydroxyl groups in the structure. On the other hand, the lowest activity show alkaloids which lack the hydroxyl group in the molecule (californidine, escholtzin, glaucin.)

Key words: alkaloids, copper, chelation, reduction