Dioxymethylene xanthones in higher plants

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Introduction: Xanthones are a group of secondary metabolites found in a limited number of higher plant families. They have been obtained mainly from about 150 plants associated with four families: Clusiaceae, Gentianaceae, Moraceae and Polygalaceae. Their chemotaxonomic importance in some families and their pharmacological properties have raised out great interest. The 1,3-benzodioxole system is found in numerous and structurally diverse groups of natural substances. The importance of natural products bearing this structural feature is related to their significant biological activities due to the particular nature of the bicyclic system, which introduces new stereoelectronic effects (ie, torsional angle, absence of significative steric repulsion between oxygen atoms, and the anomeric effect through the methylene group). The presence of a catecolic aromatic ring protected as an acetal group, increases the importance of these substances. This work is part of a larger project focused on the study of substances with the 1,3-benzodioxole system.

Methodology: Data from 1940 to 2010 were obtained in the literature about the natural occurrence of xanthones, which were classified according to: (1) its distribution among vegetal classes, subclasses, orders and families, and (2) four xanthone categories, namely: general xanthones, ortho-dioxygenated xanthones, ortho-hydroxy-methoxy xanthones and dioxymethylene xanthones.

Results: More than 740 natural xanthones are known, and from this universe, only 22 are dioxymethylene xanthones. The study of the xanthones distribution in higher plants showed an extremely restrict profile of occurrence. The genera with the largest number of records of dioxymethylene xanthones is Polygala. They were also identified in the genera Bredemeyera, Kielmeyera, Hypericum, Frasera, Premna e Caraipa.

Conclusion: These are important findings related to the occurrence of dioxymethylene xanthones in higher plants, indicating that so far, the production of this kind of substances is restricted to a group of 7 genera.