

A Review of Extraction, Isolation, and Separation Techniques for Bufadenolides from *Bryophyllum Pinnatum*

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Abstract: *Bryophyllum pinnatum*, a succulent plant with a rich ethnomedicinal history, has garnered significant attention for its bioactive compounds, particularly bufadienolides. These cardiac glycosides possess potent pharmacological properties, including cardiogenic, anti-inflammatory, and anticancer activities. This review delves into the diverse techniques employed for the extraction, isolation, and separation of bufadienolides from *B. pinnatum*. We critically assess various methods, such as maceration, Soxhlet extraction, ultrasound-assisted extraction, and supercritical fluid extraction, in terms of their efficiency, selectivity, and environmental impact. Additionally, we explore chromatographic techniques, including thin-layer chromatography, high-performance liquid chromatography, and gas chromatography-mass spectrometry, for the purification and characterization of bufadienolides. By providing a comprehensive overview of these methodologies, this review aims to facilitate future research on *B. pinnatum* and the development of novel therapeutic agents based on its bioactive compounds.

Keywords: *Bryophyllum pinnatum*, bufadienolides, extraction, isolation, separation, chromatography, phytochemistry