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Communication

Isatindigodiphindoside, an alkaloid glycoside with a new diphenylpropylindole skeleton from the root of *Isatis indigotica*

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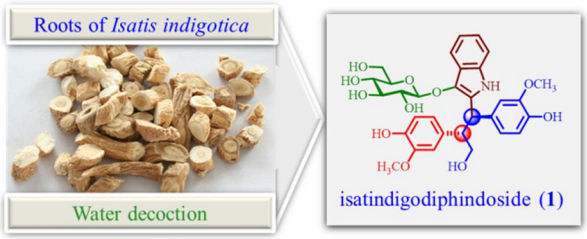
ABSTRACT

A novel indole alkaloid glycoside with an unprecedented 2-(diphenylpropyl)indole skeleton, isatindigodiphindoside (**1**), was isolated from an aqueous extract of the roots of *Isatis indigotica*. The structure was determined by extensive spectroscopic studies, especially by 2D NMR data analysis combined with enzymatic hydrolysis and ECD calculations. Plausible biosynthetic pathways of compound **1** are also discussed.

Graphical abstract



A novel indole alkaloid glycoside with an unprecedented 2-(diphenylpropyl)-indole skeleton, isatindigodiphindoside (**1**), was isolated from an aqueous extract of the roots of *Isatis indigotica*. The structure was determined by extensive spectroscopic studies, especially by 2D NMR data analysis combined with enzymatic hydrolysis and ECD calculations. Plausible biosynthetic pathways of compound **1** are also discussed.

Isatis indigotica Fort. is widely cultivated to meet demands of medicinal utilization in China. Its dried roots and leaves, named “ban lan gen” and “da qing ye” in Chinese, respectively, are among the most popular herbal drugs in traditional Chinese medicine for the treatment of influenza [1]. Many formulations containing “ban lan gen” and/or “da qing ye” are marketed and recorded in Chinese Pharmacopoeia [2]. In history and at present these formulations play a crucial role to treat and prevent influenza during influenza pandemics in China. Clinical efficacy of these herbal medicines has long attracted attentions of pharmacologists and chemists to search their mechanisms and bioactive constituents. Pharmacological studies showed that extracts of these medicines exhibited a broad spectrum of activities, including antiviral, anti-endotoxic, antinociceptive, anti-inflammatory, and antipyretic effects and cytotoxicity against leukemia cells [3-6]. Meanwhile, different types of chemical constituents with various biological activities were isolated from the extracts, such as alkaloids, lignans, and epigoitrin [7-9] *etc.*, of which indole alkaloids are the main active constituents. However, previous chemical studies were mainly carried out on the ethanol and methanol extracts of the drug materials. This is not in accordance with the practical application of the herbal medicines by decocting with water. Therefore, as part of a program to access the chemical diversity of Chinese traditional medicines and study their biological effects, especially focusing on minor constituents [10-29], we systematically

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