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REVIEW ARTICLE

Naturally occurring didemnaketals: Structural elucidation, features, and pharmacological activities

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Abstract Didemnaketals are rare terpenoid class reported only in the marine ascidian *Didemnum* species. They possess important biological activities like HIV-1 protease inhibitor, protein kinase inhibition, antimicrobial, antiproliferative, and cytotoxic. A compilation of new naturally occurring didemnaketals reported during 1991–2014 is provided with available physical and spectral data: mp, $[\alpha]_D$, UV, IR, ^1H and ^{13}C NMR as well as biological activities and references.

Contents

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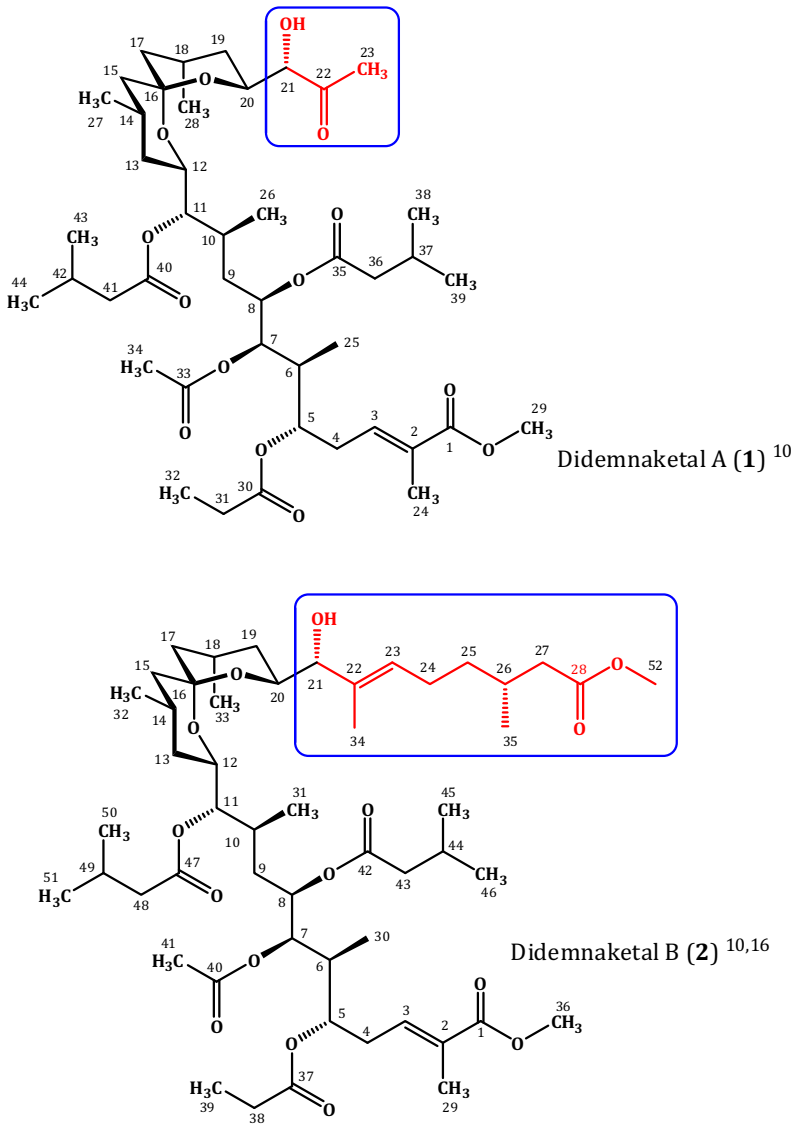

Figure 1

1. Introduction

The number of natural products isolated from marine organisms increases rapidly and many new compounds are discovered every year.[1] A large proportion of natural compounds have been isolated from marine invertebrates such as sponges, ascidians, bryozoans, and molluscs, and some of them are currently in clinical trials.[2] Ascidians or sea-squirts are cosmopolitan, exclusively marine invertebrates, which represent the most highly evolved group of animals commonly investigated by marine natural product chemists.[3] Attention has focused on ascidians because of their biologically active metabolites. The chemistry of ascidians has become one of the most active fields of marine natural products. It has been demonstrated that these sea creatures are prolific producers of unusual structures with significant bioactivities.[4] The compounds isolated from genus *Didemnum* are diverse and possess a wide range of biological activities such as antiplasmodial,[5] antiviral,[6] cytotoxic,[7] and protein kinase inhibitors.[8] Didemnaketals are very rare linear heptaprenoids, isolated from the marine *Didemnum* species. To date, seven spiroketals, didemnaketals **A**–**G** (**1**–**7**) (Fig. 1) were isolated from the marine *Didemnum* species collected from different geographical locations including Auluptagel Island Palau[9,10] and Nabq/Sharm El-Sheikh on the Egyptian Red Sea coast.[8,11] Two of them, didemnaketals **A** (**1**) and **B** (**2**) were reported as a result of oxidation and methanolysis of polar isoethonic ester, didemnaketal **C** (**3**) during long storage of the ascidian sample in MeOH.[9,10,12] While, didemnaketals **C**–**G** (**4**–**7**) were isolated from fresh samples of marine ascidian *Didemnum* species.[8,9,11] Here, we listed the didemnaketals that have appeared in the literature over the past few decades, with their biological activities, physical constants, spectral data, and references. For each compound these data were listed in the following order: name; structure; melting point (°C); optical rotation (concentration, solvent); UV (solvent, λ_{max} nm, log ε); IR (medium, absorption band