

## Purification and Structure Elucidation of Novel Saponins from the Sea Cucumber *Actinopyga spinea viscera* Using HPCPC and Mass Spectrometry

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### Abstract

**Introduction:** Sea cucumbers, sometimes referred to as marine ginseng, produce an assortment of bioactive compounds with diverse functions, and are potential sources of active ingredients for nutraceutical, pharmaceutical and cosmeceutical products. This project aimed to identify and characterize novel bioactive compounds from the sea cucumber *Actinopyga spinea* Cherbonnier, 1980, with an emphasis on the triterpene glycosides, saponins.

**Methods and Results:** The sea cucumbers were extracted with 70% ethanol and this extract was purified by a liquid-liquid partition process and column chromatography using Amberlite XAD-4 resin, followed by iso-butanol extraction. The iso-butanol saponins-enriched mixture was further purified by high performance centrifugal partition chromatography (HPCPC). The resultant purified polar samples were analyzed using high performance liquid chromatography (HPLC) and matrix-assisted laser desorption/ionization time-of-flight mass spectrometry (MALDI-ToF/MS) and ESI-MS, and MS/MS to identify saponins and characterize their molecular structures. Further, the antifungal activity of saponins was examined against a few prevalent dermatophytes.

As a result, at least 45 saponins were tentatively identified in the sea cucumber *A. spinea* with a high structural diversity, including 20 new sulfated and non-sulfated triterpene glycosides, containing different aglycone and sugar moieties. The TLC profiles of the purified saponins mixture and MALDI analyses revealed that this species possesses a unique pattern of saponins. Further, the purified saponins showed the potent antifungal activity against the examined dermatophytes.

### Conclusions:

The high structural diversity and novelty of saponins from *A. spinea* with potential functional activities presents a great opportunity to exploit their applications for industrial, agricultural and pharmaceutical use.

**Key words:** Saponins; Sea cucumber; MALDI; Antifungal; dermatophytes; triterpene glycosides