

CHAPTER I

INTRODUCTION



It is known that 71% of earth's surface is aquatic area (Antony, 1988) and among the earth's animal species, over 1,000,000 species in 30 phyla, 500,000 species are estimated to live in the aquatic environment. This number will increase with the exploration of marine organisms (Yoshiro, 1979). It is found that 95% of marine organisms are invertebrates such as protozoa, porifera, coelenterata, platyhelminthes, echinodermata, mollusca, annelida, and arthropoda (Robert, 1980). In view of marine natural products investigation has been found various novel secondary metabolites (Ireland, *et al.*, 1988) and different from terrestrial natural products which were found before. Furthermore it is found that there were approximately 25% of marine natural products isolated from the sponges during 1977 to 1985. The marine natural products in term of secondary metabolites from sponges were reviewed and decided that (Bergquist and Wills, 1983)

- Terpenoids; The largest class of compounds from sponges such as linear furanoterpenes, isoprenyl quinols, linear sesqui- and sesterterpenes and diterpenes are found most often. Most of these compounds have shown biological activity to antimicrobial and sea urchin eggs lethality test of some sort (Cariello, Nicola, and Zaneti, 1980; Cariello, *et al.*, 1982).

- Steroids; They are major components and comprise several new sterols present in minor and trace amounts may offer important clues to biosynthesis or dietary pathways of the major compounds.

- Amino Acid Derived Metabolites; They may be subdivided into those which are biogenetically related to tryptophane and tyrosine, respectively.

- Peptide Alkaloids, Peptides, and Proteins; They are various types and reviewed by Krebs (1986).
- Nucleosides
- Alkaloids and other Heterocyclic Compounds; Such as pyrrole derivative, bromine-containing alkaloids, pyrrole ring in combination with a guanidine moiety, isoindole derivative, isoquinolines.
- Macrolides
- Phenols and Aromatic Ethers
- Carboxylic acids; saturated, unsaturated, α -methoxy- and methyl branched fatty acid as well as phospholipid - bound fatty acid from various sponges have been investigated (Bergquist, *et al.*, 1984; Lawson, *et al.*, 1984).
- Miscellaneous other compounds; such as several high molecular weight polyacetylenes, glycerol ether, pentacyclic polyketide have been isolated from sponges.

Sponges, Phylum Porifera, comprises the most primitive multicellular animals represents a rich source for discovery of natural compounds, most of them with considerable biological activity. Thus, sponges are one of the most interesting animals in which organic chemists have paid attention. The results of sponge's body are organized around a system of pores, channels, and chambers which is sedentary and feeding on their food by filtering the microplanktons from sea water passing through them. It is generally suspected that the upper size limit of particles inhaled is about 50 μ m, that a wide range of smaller cells such as bacteria, diatoms, fungi, and dinoflagellates can be retained. This characteristic behavior provides that sponges can be great reservoirs collecting the metabolites from marine microorganisms. So, unusual metabolites which were produced by the microorganisms can be found in sponges (Hirata, 1986).

Although the marine invertebrates are a rich source of biologically active compounds, only a few percentages of these animals have been investigated. Especially, the investigation of marine natural products in Thailand has been studied

for their chemical constituents in a few years. In addition that sponges collected from different locations may contain different constituents although they are in the same genus or species. Because they are dependent on different environments and communities. Thus, the biological significance of many bioactive compounds remains unknown and remains for challenging research topic. Fortunately, Thailand possesses coastlines beside along the Andaman Sea and the East and West coast of the Gulf of Thailand (Surin,1989). These long coastlines provide a large variety and abundance of marine lives. Thus, marine natural products research began with organisms from intertidal and shallow subtidal environments, where samples are accessible by wading and snorkeling (Daphne 1988).

In this work, *Biemna fortis* (Topsent) a Thai sponge which was collected from Si-Chang Island, Chonburi Province, was selected to investigate its constituents. Furthermore, the methanol and hexane extracts from this sponge showed significant cytotoxic against tumor cell line and the methanol extract also showed sea urchin egg lethality test. Therefore, we paid attention to isolate and purify the constituents in methanol extract. with two main objectives as followings :

- (i) to isolate and purify the constituents from *Biemna fortis* (Topsent).
- (ii) to identify and elucidate the chemical structure of the isolated compounds.