



IMPORTANCE OF SPONGE

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Sponges, or phylum Porifera, have several economic uses, including:

1- Biomedical research:

Sponges have been used in biomedical research as a source of new drugs and compounds, such as anticancer and anti-inflammatory agents.

2- Aquaculture:

Some species of sponges are farmed for their ability to filter water, making them useful in the aquaculture industry. They can be used to help keep aquaculture ponds clean, by removing excess nutrients from the water.

3- Cosmetics:

Sponges have been used in cosmetics for their ability to exfoliate and cleanse the skin.

4-Industrial uses:

Sponges have been used for cleaning and polishing surfaces, as well as for insulation and soundproofing. Art and crafts: Some species of sponges are used for decorative and craft purposes. Food: Some species of sponges are edible and have been used as a food source in some cultures

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6- Food:

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7- cosmetics:

One of the main advantages of using sponges in the cosmetics industry is their ability to evenly distribute and blend makeup products onto the skin. Sponges are designed to absorb excess product and seamlessly blend it into the skin, resulting in a natural and

airbrushed look. This makes them an essential tool for achieving a professional makeup application.

In addition to their blending capabilities, sponges also offer a hygienic way to apply makeup. Many cosmetic sponges are disposable or can be easily cleaned and sanitized, making them a more sanitary option compared to using fingers or brushes. This is especially important in the cosmetics industry, where hygiene and cleanliness are top priorities.

Furthermore, sponges come in various shapes and sizes to cater to different makeup application needs. For example, there are round sponges for applying foundation, wedge-shaped sponges for precise application, and flat sponges for blending larger areas of the face. This versatility makes them suitable for a wide range of makeup techniques and styles.

sponges play a vital role in the cosmetics industry by providing a practical and effective tool for applying and blending makeup products. Their ability to achieve a seamless and professional finish, along with their hygienic properties, makes them an essential component of any makeup artist's toolkit. extracted novel lysophosphatidylcholines from marine sponges with hypocholesterolemic properties and thereby aroused an interest of compounds from marine sponge due to short lifespan of conventional lysophosphatidylcholines.

- It is important to note that many species of sponges are also ecologically important, playing roles in their ecosystems such as filter feeders, habitats and ecosystem engineers. Some species of sponges are also considered as endangered, over-exploitation can lead to the depletion of these important species

2- Biological importance of sponges

Sponge grounds add structural complexity to those areas in the deep-sea where they occur, providing habitat and refugia to commercially important species, supporting food webs, and maintaining deep-sea biodiversity.

They play key roles in important biogeochemical cycles (silicon, carbon, and nitrogen) and in benthic-pelagic coupling (i.e., in connecting ecological processes occurring within the water column, or pelagic 'realm', with those taking place at (and within) the seabed, the benthic 'realm'). Sponges are believed to constitute an impressive sink for silicon and grazed carbon, and to act as a net source of particulate matter and nitrogen compounds, which may fuel deep-sea microbial and invertebrate communities.

Sponges and their associated microorganisms have also been identified as having significant biotechnological potential. They are the single richest and most prolific source of marine natural products with human health (i.e. pharmaceutical) applications. Thousands of 'sponge ground' compounds have been discovered to date, with many showing potent bioactivity and some, like baretin and ianthelline, possessing useful anti-fouling and anti-cancer properties. One of the most interesting potential applications is the use of the intricate silica-based skeletons of sponges in novel approaches to tissue engineering and regenerative medicine

3- Medical importance of sponges

• Anticancer agents

In the recent years, marine natural products bioprospecting has yielded a considerable number of drug candidates, most still being in preclinical or early clinical development, with only a limited number already in the market [17]. A typical example of marine anticancer drugs is eribulinmesylate, a derivative of halichondrin B isolated from the marine sponge

Sponges have been used in cancer treatment in many countries, including Japan, Germany, and the United States. In Japan, sea sponges have been used to extract substances that help treat cancer. While in Germany, a special sponge containing anti-tumor

substances was used to help treat cancer. In the United States, sponges have been used in chemotherapy procedures to absorb toxins and harmful substances from the body.

• **Antibacterial active agents**

Marine sponges are among the richest sources of interesting chemicals produced by marine organisms. Exploitation of bioactive metabolites by natural product chemist from marine sources by using antimicrobial or cytotoxic assays started back in 1970s. Later, various reputed pharmaceutical companies joined hands for this effort using more advance assay systems, including enzyme inhibition assays. As a result several new promising bioactive candidates have been discovered from marine sponges.

• **Anti-inflammatory compounds**

Marine organisms and microorganisms have provided a large proportion of the anti-inflammatory and natural antioxidants products over the last years. Reports suggest that marine invertebrates represent new marine resources for the isolation of novel agents which are active on inflammatory conditions have also been found in the literature

• **Antifungal compounds**

Marine sponges have been considered a gold mine for the discovery of marine natural products during the past 50 years. The need of new antifungals in clinical medicine due to various kinds of mycoses, in particular invasive mycoses have become serious health problems as their incidences has increased.

• **Sponge-derived immunosuppressive compounds and their efficacy**

Recently natural constituents isolated from marine sponges were tested for immunosuppressive activities and in the end of 1980s, deep water marine sponges resulted in isolation of pure compounds with immunosuppressive properties. Two important compounds: 4a-methyl-5a-cholest-8-en-3-ol and 4,5-dibromo-2-pyrrolic acid discovered by American scientist from deep water sponge

• Marine sponge-derived compounds with enzyme inhibitory activity

Derivatives of halenaquinone and xestoquinone showed various enzyme inhibitory activities besides the phosphatidylinositol 3-kinase and topoisomerase I and II inhibitory activities mentioned above. Compound xestoquinone inhibited both Ca²⁺ and K⁺-ATPase of skeletal muscle myosin [185]. SAR Investigations showed that halenaquinone and three synthetic analogs with a quinone structure significantly inhibited Ca²⁺ ATPase activity. In contrast, four xestoquinone analogs in which the quinone structure was converted to quinol dimethyl ether did not inhibit the Ca²⁺ ATPase activity.

• Sponge-derived antibiotics

Also, over the years marine sponges are considered as a rich source of natural products and metabolites for antibiotics possessing strong inhibitory against bacteria, fungi and microbes. Several studies revealed that many natural bioactive components isolated from various marine sponges can be useful for the production of new antibiotics and antimicrobial drugs. In the recent years many scientific studies provided evidences for marine sponge metabolites with efficient antibiotic, antibacterials and antimicrobial properties. Purpuroines A-J, halogenated alkaloids.

• Hypocholesterolemic compounds

In the last decade studies reported that marine sponges could have been a source of hypocholesterolemic compounds. For example, lysophosphatidylcholines and lyso-PAF analogs derived from *Spirastrella abata* are reported as successful inhibitors of cholesterol biosynthesis in vitro study [198, 199]. Zhao et al. [200] Sponges play a crucial role in the cosmetics industry, particularly in the application and blending of makeup products. Cosmetic sponges are versatile tools that are used for applying foundation, concealer, blush, and other makeup products to achieve a flawless and seamless finish.

♣ specific data on countries depending solely on the sponge industry for income might be limited, certain regions with rich marine ecosystems engage in sponge harvesting as a source of revenue. The Mediterranean, particularly Greece and Turkey, is known for natural sea sponge harvesting. These sponges are often used in various industries, including cosmetics and bath products. However, it's important to note that reliance on sponges as a primary source of income is generally limited, and many economies diversify across multiple sectors for sustainability.

