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Marine Source Drug Used In Cosmetics

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Abstract:

Over the past ten years, the market for cosmetics derived from marine sources has grown at an incredible rate. A prospective source of new bioactive chemicals for the creation of novel cosmetic ingredients is marine resources. However, while creating cosmetic components, sustainability concerns also become a factor to be taken into account. The fishing, farming, and processing sectors of the fisheries industry produce a lot of waste that contains precious materials that can be used as powerful sources of components for cosmeceuticals. The marine by-product has a number of bioactive compounds that could be isolated and used as a powerful element in cosmetic goods. Those bioactive compounds (for instance, chitin from crustacean waste and collagen from fish waste) could be used in skin barrier, hair care, and anti-photoaging and anti-wrinkle treatments.

This review attempts to address the potential active elements for cosmetics that are generated from marine by-products and talk about how those active chemicals might be able to enhance human beauty. The potential and difficulty of utilizing marine byproducts in the direction of the developing idea of sustainable blue cosmetics are also covered in this review.

Keywords:

Cosmetics, marine cosmetics, medicinal usage, metabolites, organisms, skin health, and skin care

Introduction:

Appearance and personal care play an important role in the modern lifestyle, attracting an increasing number of consumers towards products used to enhance or alter the appearance of skin, hair, and nails [1]. The cosmetics market is extremely dynamic and new products are constantly launched at an exceptionally fast rate, while new concepts are continuously emerging and new terms are being coined [2,3]. The global market for cosmetic and cosmeceutical products was forecasted to reach 463.5 billion USD by 2027 Presently, many synthetic chemicals are used in cosmetic products even though many of them do not fully meet consumer expectations [1,5,6,7]. Consequently, the demand for cosmetics containing natural ingredients is rapidly increasing, as they are promoted as green, safer, and sustainable materials. The oceans host a huge biodiversity, with more thanAs a result of their promotion as sustainable, safer, and greener materials, the market for cosmetics made with natural components is growing quickly. With over 250,000 species described and many more to be found, the oceans are home to an enormous amount of biodiversity [3, 4]. Numerous habitats, sometimes in harsh settings,

have been discovered thanks to ocean exploration in recent decades [5]. They are home to diverse species that generate a vast array of active compounds [6]. Over 25,000 novel chemicals with biological activity have been discovered [7]. One of the main sources of active substances among marine creatures is bacteria and algae. For instance, the cosmetics industry is very interested in the lipid content of microalgae. Lipids can make up as much as 90% of a species' dry weight [8,9]. Colorants, specifically carotenoids (β-carotene, lycopene, and cryptoxanthin), vitamins A, B1, B2, B6, B12, and C [10], canthaxantin, astaxanthin, lutein, and phycobiliproteins are also found in microalgae. Marine life is a very diverse group in the oceans, and it is a great place to find and extract biologically active molecules that might be used as fine chemicals, pharmaceuticals, nutritional supplements, cosmetics, cosmeceuticals, enzymes, and more [1]. As secondary metabolites, bioactive compounds derived from marine organisms have a variety of functional activities that can be exploited to the creation of innovative pharmaceuticals and cosmetics. Globally, the cosmetics sector is expanding. Regulation No 1223/2009 of the European Commission (EC) has been in effect since July 2013.Cosmetics are defined as any material or combination that is meant to come into contact with the external body parts (epidermis, hair, nails, lips, and external genital organs) or with the teeth and oral cavity mucous membranes with the sole or primary goal of cleaning, smelling, or protecting them, as well as altering their appearance or maintaining their condition. From Galenic's perspective, cosmetics are essentially sophisticated, stable, and uniform mixtures that are made by combining one basic element with another into a formulation. These components fall into three main groups: additives, excipients, and active principles. Utilizing marine algae to produce natural products for the environment and industry is a rapidly expanding industry. Because of their higher biological value and improved cultivation methods, these natural products are predicted to become highly competitive in the market. However, maintaining healthy skin is difficult because of a number of harmful factors that can result in cosmetic problems that alter the skin's overall complexion. Age may make wrinkles, skin laxity, aberrant pigmentation, and dryness more noticeable. These conditions can be caused by toxic oxidative molecules that come from both the inside and the outside. Dryness in young skin is typically brought on by low humidity, which interferes with normal desquamation and disrupts the stratum corneum 9's natural moisturizing factor production. Laxity and dryness are also exacerbated by an aging-related decrease in essential dermal skin matrix molecules.10, 11. In order to address these issues, there is a rising and unmet need for novel active ingredients in cosmetics. There are more and more reports on the study and characterisation of active ingredients from biologically derived materials, especially those obtained from plants 12–15. Because of its unparalleled biological and chemical richness, the marine environment is also emerging as a prospective source of materials for cosmetics 16–18

Definition:

Marine cosmetics are made with an active component derived from marine sources

History of marine source:

Around 6000 BCE, the Egyptians were the first people to wear makeup. Because they believed that beauty was next to godliness and that it appealed to the gods, men and women from all social backgrounds utilized cosmetics. Given that 70% of the earth is formed of water, it should not be surprising that manufacturers are searching for new freshwater and ocean-based component supplies. The waters have borne most of the biological activity on Earth. Life originated in the water, and the earliest living things are thought to have emerged from the "primordial soup." Numerous marine species with a diverse variety of physiologies and adaptations can be found there. As early as 700 million years ago, plants might have begun to populate the land. About 470 million years ago is when the earliest fossils of land plants were found. The earliest terrestrial plants most likely looked like liverworts, which are contemporary plants. The study of blooming vascular plant species and marine algae that inhabit the littoral zone, intertidal zone shorelines, coastal wetlands, and even low-salinity brackish water in estuaries is known as marine botany.

Bryostatin 1:

Has a Bristol Mayers Squibb license. Under a contract with Bristol-Mayers, the NCI is currently testing it in Phase II human clinical trials after it just finished Phase I clinical trials in the US. Bryostatin 1 can be utilized in conjunction with taxol responsive cancer treatments, such as those for lung, ovarian, and breast malignancies.

Didemnin B

The Caribbean tunicate Tridemnum solidum (Didemnidae) yielded several similar depsipeptides, including didemnin B. Later, it was discovered to exhibit antiviral, antineoplastic, and eventually immunosuppressive properties. Phase II research is being conducted in the US and Europe to ascertain the anticancer potential of dehydrodidemnin B, a close relative of didemnin B that was isolated from the Mediterranean tunicate Aplidium albicans.

Discodermolide

The polyhydroxylated lactone discodermolide was extracted from the deep-sea sponge Discodermia ssp. Descodermolide is a cytotoxic and immunosuppressive drug. The mechanism of discodermolide's ability to stabilize microtubules has been studied. This chemical was licensed by Novartis Pharma AG in 1998 to be developed as a potential cancer therapy agent.

Ziconitide (Conotoxin MVIIV)

The 25 amino acid peptide ziconitide is found in the venom of the predatory snail Conus magnus. It stops the release of neurotransmitters by attaching itself to presynaptic calcium channels and blocking them. Elan Pharmaceuticals has a license for it under the brand Prialt. In a critical area of the spinal cord, primate inhibits nerve impulses.

Some Active Ingredients from marine sources used in cosmetics:

1) Marine sponges

2) Marine turtles

3) Shark fish

4) Seaweed

5) Coral 6. Jellyfish

7) Hydras

8) Sea fennel

9) Phytoplankton

Natural product:

Plants, animals, and microbes are the sources or producers of natural products. Their production may occasionally be restricted to a particular species, genus, taxon, or organism [1]. Natural products are good candidates for cosmetic applications because they have higher chemical diversity, better specificity, and higher binding efficiency than non-natural compounds [23]

Marine organisms have evolved various mechanisms to adapt to the harsh conditions of the marine environment, which results in the production of various bioactive compounds.

Many of these substances have the potential to significantly enhance human health and well-being, even though marine organisms use them for communication, reproduction, and protection [4,5]. The phylum that produces marine natural products (i.e., Porifera, Chordata, Cnidaria, echinoderms, algae, bacteria, fungi, Arthropoda, and phytoplankton) can be used to group them based on their chemical structures (i.e., mycosporine-like amino acids, polysaccharides, carotenoids, polyphenolic compounds, fatty acids, peptides, terpenes, and alkaloids) [6]. In order to facilitate the reproduction, replication, and isolation of bioactive compounds, it is crucial to accurately identify the taxon of macro- and microorganisms when choosing compounds for pharmacological and cosmetic applications.

Marine Natural Products by Phylum:

1) **Marine sponges:**

One natural resource that is replenishable is the sea sponge. The sea sponges are ideal for the most sensitive skin types because they are extremely absorbent, produce a luxurious lather, and have a soft texture. Because natural sponges are more abrasion-resistant than synthetic ones, they are stronger and last longer.

In fact, natural sea sponges contain enzymes that prevent the growth of bacteria, mold, and mildew. Additionally, because they absorb and retain more water without getting wet, natural sea sponges are improved for cleaning and bathing. Sponges are primarily used to clean the face and body, whereas these are primarily used to clean the sensitive skin of infants additionally employed as a skin-whitening agent.

2) Echinoderms

Numerous well-known marine animals, including various species of sea cucumbers and starfish, belong to the phylum Echinodermata. Sea cucumbers are used commercially as dried powders and extracts because of their special ability to heal wounds Sea cucumbers and their compounds are widely available on the market in toothpaste, ointments, body lotions, facial skin cleansers, and food supplements. Sea cucumber extracts have been added to Carbopol® gel and applied topically to diabetic foot ulcers for 12 weeks to evaluate their ability to soothe the skin. Because of their high saponin content, sea cucumber extracts have also been linked to anti-inflammatory qualities by preventing the production of tumor necrosis factor (TNF-↵).

3) Algae:

The phyla Rhodophyceae (red algae), Phaeophyceae (brown algae), and Chlorophyceae (green algae) are among the aquatic photosynthetic organisms that make up the algae taxon, also referred to as macroalgae or seaweeds. Corallina officinalis, a red algae species, has uses in cosmetics because of its antioxidant properties and ability to protect against UV and infrared radiation. The Phaeophyceae phylum's brown macroalgae are utilized in cosmetics as a source of minerals, vitamins, amino acids, lipids, sugars, and other substances. For instance, the brown algae Macrocystis pyrifera is used as an emulsion stabilizer and thickening agent in cosmetics. Additionally, green algae are utilized as pigments or as a source of vitamins, sterols, and phenolic compounds for cosmetic purposes. Therefore, Chlorophyceae-derived ingredients can be found in face masks, eye balms, moisturizers, and anti-stretch mark creams. Sunscreen , face peelers, firming ointments, purgative gels, anti-aging products, etc.

4) Bacteria:

Precisely was previously mentioned, microorganisms like bacteria can provide a cost-effective and sustainable source of MAAs, carotenoids, and fatty acids for cosmetics. For example, methylene chloride, a well-known tyrosinase inhibitor and skin-whitening agent, has been demonstrated to be produced by Pseudomonas sp.

5) Corals:

When it comes to cosmetics, corals are nothing new. Because of their mineral content and generally favorable textural and physicochemical properties, they have been widely used for many years as mineral suppliers and as powders (e.g., as skin scrubbers). Furthermore, because of its anti-aging, anti-acne, antioxidant, and photo-shielding qualities, coral powder has also been used.

6) Sea Mud:

Known to have health benefits, sea water is a rich source of minerals (such as potassium, magnesium, sulfates, sodium, calcium, and chlorides) that are used in skin care products. Deep-sea water, which is found in harsh environments (such as high pressure, near-freezing temperatures, and little to no light), has characteristics that have a significant influence on skin health.

In addition to being high in salts and minerals, sea mud has antibacterial properties against a variety of bacterial strains, including Escherichia coli, S. aureus, P. acnes, and Candida albicans. It has also been used in numerous cosmetic formulations and has shown particular benefit for psoriasis and other conditions. It has been demonstrated to have anti-aging and acne-preventive qualities, balance the pH of the skin, and encourage skin repair and hydration through water retention. Additionally, sea mud has been used in face masks, where it has been demonstrated to tighten the skin while cleansing and energizing it.

7) Porifera:

Marine sponges are invertebrates that are attached to the ocean floor and are members of the phylum Porifera. They create a number of substances to deter predators, draw in food, and prevent the growth and attacks of invasive species. Therefore, a wealth of natural products with a variety of chemical structures and bioactive qualities, including antimicrobial ones, can be found in marine sponges. Microbes create new chemicals that are useful for cosmetics as well as for sponge symbiosis, survival, and metabolite production. These microbes can be altered to take advantage of the production of compounds of interest through metabolic networks, pathway reconstruction, gene and enzyme engineering, and other means.

8) Chordata:

The phylum Chordata contains over 3000 species of ascidians, or sea-squirts, which typically coexist in protected areas in symbiotic relationships. Many ascidians can accumulate heavy metals as a chemical defense mechanism against predators and infectious microbes. This is very helpful ecologically to protect against negative effects in aquaculture. The two most prevalent natural products that ascidians produce are peptides and alkaloids.

9) Cnidaria:

Because it has been studied less than other phylums, the Cnidaria phylum has been disregarded in the development of natural products. Benthic cnidarians are the primary source of known natural products in this phylum, though some have also been isolated from pelagic cnidarians, such as Scyphomedusae. Collagen, fatty acids, and other substances derived from their crude venom, including glyco- and phosphoproteins, are present in these Cnidaria species. Although they greatly hinder human activity along the coast, scyphomedusae—such as Rhopilema esculentum, Rhizostoma pulmo, and Aaurelia aurita—are very common in China and other Southeast Asian countries and offer numerous health benefits when incorporated into the diet. Due primarily to their antioxidant and anti-photoaging properties, numerous studies are expanding our understanding of the health benefits of Cnidaria as food supplements, cosmetic ingredients, and for use in biomedical and biomaterial applications.

10) Fungi:

A variety of marine fungi have recently been found in areas from the deep sea to the coast. Deep-sea fungi have, of course, received less attention because they are more difficult to reach, but they appear to be abundant and relevant sources of bioactive compounds for the development of cosmetics. For example, it has been demonstrated that the genus Acremonium, which is present in sponges, mangroves, and seawater, produces hydroquinone derivatives with notable antioxidant activity that surpasses that of synthetic hydroquinone derivatives like butylated hydroxytoluene (BHT).

11) Red and brown seaweed,

Algae, kelp, egg wrack, kombu/konbu, sea spaghetti, wakame, nori, dulse/dillisk, sea lettuce, sea grass, carrageenin, and Irish moss are some other names for seaweed. For centuries, seaweed has been used to enhance circulation and balance natural moisture levels in bath, body, and skincare products. This can lessen the appearance of cellulite and restore the skin's tone and texture. Seaweed has long been utilized for its ability to detoxify and promote skin healing. Mineral salts, amino acids, and vitamins A, C, B1, B12, E, K, and D are all abundant in seaweed. Richly hydrating and skin-promoting, the lipid, protein, mineral, and vitamin content is easily absorbed.

Seaweed extract is primarily used for skin and body care; it protects skin health, whitens skin, prevents acne, and slows down the aging process. It can stimulate the skin's damaged cells to regenerate. It has the ability to cleanse, detoxify, tone, and moisturize the skin.

12) Shark fish:

The liver oil of shark fish is a common ingredient in sun tan lotion, moisturizers, deodorants, lip balms, lipsticks, perfumes, shampoos, and other cosmetics. It is also a rich source of omega 3 fatty acids and other substances known as squalenes or squalane. "Squalene" is a substance derived from shark liver oil that is found in many commercially produced brands of moisturizer, sunscreen, lipstick, and eye makeup. The moisturizing qualities of the oily organic compound make it a popular addition to many beauty products, along with its derivative squalane.

13) Marine Turtles:

Although it has been suggested that the original inhabitants of the Americas used turtle oil for skin care for a long time, it wasn't until the 1930s that it made a significant appearance in Western skin creams. The use of animal extracts and serums, known as opotherapy or organotherapy, appears to have originated in Europe and may have resulted from the same German and French studies that introduced hormones and other tissue extracts into skin creams.

The primary method of extracting turtle oil, which is high in vitamin E, is heating the fat. The oil is then used to make cosmetics. Preparations for cosmetic procedures are underway in England.such as in lotions, skin care products, nail care products, and bath soaps.

14) Jellyfish:

A compound that is essential for certain medications and cosmetics is abundant in the mucus that jellyfish produce. Cosmetic Design claims that by employing jellyfish in the production of anti-aging beauty products, the cosmetics industry can intervene and contribute to the growth of the fish population. The anti-aging properties of jellyfish are strong. In order to treat and prevent DNA damage and encourage our skin cells to act young again and regenerate, scientists have replicated the jellyfish cells in the peptide juvefoxo and combined them with skincare creams.

15) Hydras:

Hydras are primarily composed of a gel that is utilized in all preparations that contain proteins and antioxidants. Hydras are primarily used in the manufacturing of lip gloss, lipsticks, and numerous other lip-related products.

Additionally, it is used to cleanse the skin, remove makeup without causing any negative reactions, and moisturize the skin. It contains vitamins C and E, which are used in moisturizing creams and sunscreen lotions to protect against UV rays. It contains a lot of emollient olive oil.

16) Sea Fennel:

Sea fennel has been shown to prevent wrinkles and skin stressors caused by modern life, such as UV light, alcohol pollution, and cigarette smoke, because it contains the antioxidant and antiaging trifecta (vitamins A, C, and E). "It also has chlorogenic acid, which is an effective antioxidant," indicating that this understated seaside plant is a potent skin protector. Your skin's tone will improve as a result of the powerful stem cells' regulation of keratin regeneration.

17) Phytoplankton:

Diatoms, cyanobacteria, and dinoflagellates are a few of the many important and varied organisms that make up phytoplankton. Lipids and omega-3 fatty acids are abundant in them. The skin's protective layer is renewed and

cells are encouraged to produce more pro-ceramides. Therefore, phytoplankton's anti-aging, anti-wrinkling, and skin-whitening and toning qualities can be utilized. For example, cyanobacteria extracts have garnered interest for study in the creation of cosmetics aimed at preventing skin aging.

Table:

Combined Of Marine Sources & Cosmetics Products:

Sr. No	Marine Sources	Biological sources	Chemical Constitutive	Cosmetics property/Products
1)	Marine Sponges	Marine sponges of the genus Stelletta are well known as rich sources of diverse and complex biologically relevant natural products	alkaloids, terpenoids, peptides, lipids, and steroids.	Body & face wash Baby products Skin whitening products
2)	Seaweeds	Seaweed, or macroalgae, refers to thousands of species of macroscopic, multicellular, marine algae	50 % carbohydrates, 1–3 % lipids, and 7–38 % minerals.	Skin moisturizing Anti-acne products, Anti-ageing products ,Skin toning. Detoxifying property (Skin healer)
3)	Shark Fish	Shark liver oil is the fixed oil obtained from the fresh and healthy livers of shark fish Hypoprion brevirostris, belonging to family Carcharhinidae.	PUFA, squalene, alkylglycerols, and trivial levels of free fatty acid, sterol, pristane, and wax ester.	Moisturizer Deodorant Sun tan lotion Lip balm, lipstick, eye makeup Shampoo Perfumes
4)	Marine trutle	Sea turtles (superfamily Chelonioidea), sometimes called marine turtles, are reptiles of the order.		Bathing soaps Skin lotion and cream Nail cream
5)	Coral	the phylum Cnidaria, the class Anthozoa includes corals, anemones, sea pens and seafans	calcium carbonate (CaCO3)	Anti-oxidant Anti-ageing and anti-acne In lipsticks, powder

				and deodorant
6)	Jelly Fish	Jellyfish belong to the phylum Cnidaria. Jellyfish belong to the family Cyaneidae.	Protein was the main component of the jellyfish body tissue (82 ± 4% of macromolecules.	Anti-ageing property
7)	Hydras	Hydra vulgaris, the fresh-water polyp, is a small freshwater. Family Hydridae.	fibrous proteins, like collagen and heparan sulphate proteoglycans.	Lipsticks, Lip gloss ,Moisturizer Makeup remover Sunscreen lotion
8)	Phytoplankton	Phytoplankton growth depends on the availability of carbon dioxide, sunlight, and nutrients.	proteins (Prt), carbohydrates (Cbh), lipids (Lip), phosphorus compounds (Pho), opal (Opa) and total chlorophylls (Chl).	Skin toning Skin wrinkling Skin whitening Skin ageing

Advantage of Marine Source Used in Cosmetics:

1) Marine ingredients are becoming more popular in skin care because they provide a number of advantages and are more environmentally friendly and scientifically advanced.

2) Marine ingredients have anti-aging properties, UV and antioxidant protection, and the ability to supply vitamins and minerals to the skin.

3) Over the past few decades, the process of harvesting and preserving marine ingredients has grown increasingly complex, contributing to the creation of more environmentally friendly and efficient ingredients.

4) Because the body's ideal mineral balance is found in sea water, the human body requires daily replacements of elements like zinc, phosphorous, calcium, and magnesium.

5) The marine drug contains a wealth of chemical and biological diversity.

6) Marine ingredients have antioxidant properties that have been used in skin-care products to prevent or even restore the damage caused by environmental factors, such as UV rays and low humidity, as well as damage allied with the aging process.

7) Marine consequent proteins which can provide equivalents to collagen and gelatin without the associated risks are becoming more popular among consumers because of their abundant health beneficial effects.

8) Most marine bioactive peptides are currently underutilized. While fish and shellfish are possibly the most evident sources of such proteins and peptides, there is also scope for further development of proteins and peptides from source like algae, sea cucumber and mollusks.

9) The anti-oxidant properties help the skin cells in fighting all the free radicals that are produced as a result of radiation and chemical exposure to sun.

10) It helps in restoring the normal hydration of skin cells that prevent the signs of aging and protect against wrinkle formation.

11) Promotes natural cleansing of skin by opening pores; there by helps in restoring shining clear skin besides rehydration and regeneration skin cells

Disadvantage of Marine Sources in cosmetics:

1) Expensive:

Despite the fact that applying makeup has many advantages, it is very costly. Although some products might be the most suitable for your skin type, not everyone can afford them due to their high cost. It may be feasible to use it for a month, but after the product expires, the price may make the person reluctant to buy it again.

It's crucial to select the appropriate product for your skin type. Extreme dryness and negative skin reactions can result from people with dry skin using products that are not suitable for their skin type. Similarly, using the incorrect products can result in increased oil production in people with oily skin.

2) Smells Bad:

Fragrances are a common ingredient in makeup products, giving them a pleasing scent. But everyone has a different sense of smell, so some people might enjoy it while others might not.

3) Oily or dry skin can lead to breakouts:

4) Color Changes:

Most women have the bad habit of wearing makeup to bed. Pollutants and sun rays can alter the collagen in your skin, changing the color of your skin.

5) Eye Infections:

If makeup products that are applied around the eyes, like foundation, concealer, mascara, eyeliner, and eyeshadow, contains a lot of irritating ingredients, they may cause eye infections.

6) Adverse Health Benefits:

Certain potent ingredients used in cosmetics may be detrimental to general health. Therefore, if it is not appropriate, the person must refrain.

Conclusion:

Special compounds are produced by marine organisms. Cosmetics with health benefits for the body that come from marine sources . It is made up of numerous phytochemical components that have been isolated from different marine resources. Understanding marine natural products and their potential for cosmetic use is made possible by the current advancements. Cosmetic companies have been interested in marine-based ingredients for a while.

Because of their anti-inflammatory, anti-pigmentation, and antioxidant properties, as well as their capacity to replenish the skin's trans-epidermal water loss, secondary metabolites and marine biopolymers derived from marine macro- and microorganisms have been identified as valuable ingredients for cosmetic products.

Cosmetics are items made to clean, protect, and alter the way our bodies look on the outside. Water, emulsifiers, preservatives, thickeners, moisturizers, colors, and fragrances are the main components found in the majority of cosmetics.

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