# "IMPORTANCE OF MARINE BIOACTIVES FOR HERBAL COSMETICS"

A PROJECT WORK (BP812PW) SUBMITTED TO

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**Bachelor of Pharmacy** 

BY

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Semester VIII

UNDER THE GUIDANCE OF

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# CERTIFICATE

This is to certify that Project Work (BP812PW) entitled "Importance of marine bioactives for herbal cosmetics" is the bonafide work carried out by DIMPAL MAURYA (18BPH020), KHUSHBU PATEL (18BPH038), PRIYANSHI PATEL (18BPH072), PUJA PRADHAN (18BPH074), YASHRAJ BHAMBHANI (18BPH104), B.Pharm semester VIII under my guidance and supervision in the Institute of Pharmacy, Nirma University, Ahmedabad during the academic year 2021-2022. This work is up to my satisfaction.

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# CERTIFICATE OF SIMILARITY OF WORK

This is to undertake that the B.Pharm. Project work (BP812PW) entitled "Comparison of Stability indicating forced degradation study of Amlodipine besylate by UV spectroscopy and Microwave-assisted degradation." Submitted by DIMPAL MAURYA (18BPH020), KHUSHBU (18BPH038), PRIYANSHI PATEL PATEL (18BPH072), PUJA PRADHAN (18BPH074), YASHRAJ BHAMBHANI (18BPH104), ,B.Pharm. Semester VIII is a bonafide review/research work carried out by us at the Institute of Pharmacy, Nirma University under the guidance of "Dr. Priti J. Mehta". We are aware about the rules and regulations of Plagiarism policy of Nirma University, Ahmedabad. According to that, the review/research work carried out by us is not reported anywhere as per best of our Knowledge.

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# DECLARATION

We, DIMPAL MAURYA (18BPH020), KHUSHBU PATEL (18BPH038), PRIYANSHI PATEL (18BPH072), PUJA PRADHAN (18BPH074), YASHRAJ BHAMBHANI (18BPH104), students of VIII<sup>th</sup> Semester of B.Pharm at Institute of Pharmacy, Nirma University, hereby declare that our project work (BP812PW) entitled "Comparison of Stability indicating forced degradation study of Amlodipine besylate by UV spectroscopy and Microwave-assisted degradation" is a result of culmination of our sincere efforts. We declare that the submitted project is done solely by us and to the best of our knowledge, no such work is done by any other person for the award of degree or diploma or for any other means. We also declare that all the information was collected from various primary sources (journals, patents, etc.) has been duly acknowledged in this project report.

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# ABSTRACT

With changing times cosmetic industry has seen tremendous growth in all ways. This has started due to increased demand and public awareness. Many research's have been ongoing all around the world for better and efficient sources to innovate these products. One such area of interest is within Marine life. 70% of out earth's surface is covered with water and is home to innumerable lifeforms with flora and fauna. Considerations are made in extracting various bioactive compounds from these sources. Products made from these sources come into Herbal cosmetic products which themselves have created a huge market due to large number of benefits. Natural cosmetic products play many important role in maintaining good skin health. They act as humectants, anti-aging, protectants, beautifiers, etc. Marine sources are huge source of bioactive molecules having these properties. This article reviews some of the most common and unique marine sources and their bioactive compound which they possess that are being used and have a huge potential to get used in the cosmetic market in herbal formulations, along with the future aspects of the same.

## 1. INTRODUCTION :

Oceans cover around 70% of the world's surface and are possessed by more than 250,000 species depicted of having numerous effects and many more different species still to be found. The marine climate provides a gigantic asset that gives plentiful bioactive substances as food, cosmeceuticals, and pharmaceuticals items.



Fig. 1

As of late, much consideration has been paid to getting bioactive proteins and peptides from different marine life forms, including fish, green growth, scavengers, and wipes, for cosmeceutical and drug applications. Ocean investigation in past many years permitted the revelation of a huge number of natural surroundings now and again in outrageous conditions.





They have an assortment of creatures that produce a wide scope of dynamic particles . In excess of 25,000 new naturally dynamic mixtures have been distinguished. Among

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marine organic entities, microbes and green growth comprise a significant wellspring of dynamic fixings. For instance, lipids present in microalgae are beneficial in the beauty care products area.

A few animal varieties aggregate approximately 90% of lipids as their dry body weight. Microalgae are similarly a wellspring of shades, specifically carotenoids, of nutrients such as A, B1, B2, B6, B12 and C, canthaxanthin, astaxanthin, lutein and phycobiliproteins. Marine bioactive proteins and peptides, contingent upon their designs and amino corrosive groupings, show a wide scope of organic exercises including cancer prevention agent, antimicrobial, anticancer, immunomodulatory, antihypertensive, anticoagulant, and hostile to diabetic impacts.

Herbal Products have created their own market due to its benefits and lack of adverse reaction here is an graph that shows the valuation of the herbal cosmetics industry in the coming future. Many more people are inclining towards the herbal products to their efficacy and the lack of side effects which is a major problem that is to be taken care while when manufacturing a pharmaceutical cosmetics products.

The natural cosmetics industry will become a \$54.5B industry by the year 2027 and will grow exponentially from there on this only includes the cosmetics products derived from marine source whereas pharmaceutical active ingredients derived from the marine products is very high. The Active ingredients derived from seaweeds, Bacteria, algae have life saving active ingredients still to discover.





#### 1. For the maintainance of Moisture in the Skin:-

For the maintainance of the moisture in the skin and to keep it from drying the humectant are utilized as to forestall the deficiency of moisture in the skin. Marine life forms produce a few atoms with saturating properties, for example, polysaccharides, fatty acids and proteins that are generally utilized in the skin. The trans-epidermal water loss is forestalled by the body because of the presence of Omega 6 polyunsaturated unsaturated fat. To forestall the loss the Extracts of *Laminaria* (Algae) are utilized in the huge number. Ocean growth wealthy in serine, for example, Undaria pinnatifida and microalgae of the variety Thalassiosira are likewise utilized as saturating specialists. Ectoine is an osmoprotecant created by a few bacterial animal groups because of osmotic pressure produced it was first disconnected from Ectothiorhodospira halochloris. Ectoine has a comparable properties that of glycerol to tie the water atoms and go about as an osmoprotectant. It likewise further develops skin aggravation and is additionally being explored for the treatment of moderate atopic dematitits.

> Cosmetic Products Containing Micro Alag



Fig.4

#### 2. For the prevention of skin aging:-

Skin maturing is firmly connected with extracellular network degradation in both epidermal and dermal layer natural variables assume an indispensable part alongside the

#### IMPORTANCE OF MARINE BIOACTIVES FOR HERBAL COSMETICS

Ultraviolet Exposure, Smoking. Carotenoids are the dynamic elements for the counteraction of skin maturing. Carotenoids have yellowish orangish liposoluble shades got from particles of isoprene and are made out of eight parts of carbon molecules where single and twofold links substitute. Unlike others  $\beta$ -carotene has an amazing ability in forestalling responsive species of oxygen arrangement. Beta carotene is the primary pigment created with the help of halotolerant microalga namely Dunaliella salina which has the ability to deliver over 10 percent of  $\beta$ -carotene contrast with its dry weight.

Astaxanthin is used in prevention of maturing cells additionally depend on its striking cancer prevention agent property. Haematococcus pluvialis is the most extravagant wellspring of normal astaxanthin. Two interesting carotenoids with significant cancer prevention agent activity namely saproxanthin and myxol were disconnected from the category of types of seawater microscopic organisms having a place with the family Flavobacteriaceae. Be that as it may, more examinations are expected before their utilization in surface level details. Bioactive substances that are hostile to maturing additionally incorporate the polysaccharides they are usually gotten from the Microalgae and various marine bacteria. This blend further develops underlying skin properties with the help of expanded type 1 collagen amalgamation.

Hyaluronic corrosive is a significant part of the skin extracellular grid . Inducers of hyaluronic corrosive combination are usually utilized in the enemy of maturing care. A fluid concentrate of the earthy colored alga Macrocystis pyrifera that has a place with the Laminariaceae family is accessible for that reason. Syndecan-4 is another important protein for the extracellular framework which can be activated by M. pyrifera concentrate. The minerals present in the ocean water bodies are widely believed to have helpful effects. Ocean water strikingly contains minerals that are favourable for the skin. Besides, ocean salts can remarkably be utilized in beauty care products for healthy skin. Remote ocean water would provide benefits to overall health as well as skin health with a favourable effect on atopic dermatitis. Medical advantages are professed in connection

with the minerals present in the ocean water body in addition to the behaviour of ocean water origin.

Mud in the ocean holds various supplements and minerals which have been utilized in health management of skin, not only that restorative item plans for helpful impacts and remedial effects on psoriasis and other skin originated messes. Ocean mud aids with hydration, balances skin pH, advances skin inflammation fix and anticipation, and displays against maturing properties. Nonetheless, ocean water and ocean mud can contain poisonous components that happen normally or because of contamination and must consequently be dependent upon severe control. Prominently, ocean mud can entangle weighty metals because of dirt's high cationic trade limit and positive or negative surface charge. In this way, metal pollutants, for example, nickel and chrome can be available in surface level items containing regular fixings.

#### 3. For the photoprotection of the skin:-

Tissue consists of three layers comprising skin; in particular epidermis, dermis, and hypodermis which touches the surface and provides boundary. Skin is harmed by different natural variables for example synthetics, bright ultraviolet radiation, and contamination. Photograph maturing of the skin is due to ultraviolet radiations.





The significant impacts of photograph maturing incorporates the allowance of vitamin D blend, and skin pigmentation changes, also impeding consequences of hardening of skin,

tanning alongside photograph instigated skin maturing and photograph carcinogenesis connected with bright radiation-prompted immunosuppression.

A few marine living beings, remarkably photosynthetic creatures, produce UV-retaining mixtures, for example, scytonemins, mycosporines, mycosporine-like amino acids, and carotenoids to shield themselves from UV radiation. Additionally, notwithstanding their huge promise to the biomass and sea life, Microbial parts used in making the UV channels have been ineffectively examined. A significant wellspring of photographic defensive mixtures are the marine life forms.

#### Amino Acids which are like Mycosporine :-

These are intracellular water dissolvable boring blends considered in various marine and freshwater animals. Freshwater microalga Aphanizomenon flos aquae is a certifiable model which contains MAAs. MAAs are made from a cyclohexenone or cycloheximide chromophore. These are connected by imine linkages through their middle part, prompting a blend of reverberating tautomers answerable in retention of UV. The UV radiation is recaptured by MAA with 310 nm and releases this energy as intensity radiation to the general climate. MAAs union happens in growths, microscopic organisms, cyanobacteria, phytoplankton and green growth. The assurance effectiveness of MAAs against UV relies additionally upon the area of these mixtures in the cell. MAAs situated in the cytoplasm give a restricted assurance against UV while extracellular MAAs comprise a more viable safeguard.

#### Scytonemin:-

Arranged in the extracellular sheath of some cyanobacteria species, scytonemin is an UVA inducible shade. Scytonemin can destroy less than and equal to 90% of UV-A radiation inside the cells with the help of its phenomenal ingestion of the above UV range. It likewise combines in the UV-B range. Pressure from oxidation is connected with UV-An openness can likewise set off amalgamation of scytonemin.

#### 4. For the Prevention of Hyperpigmentation:-

It is a typical side effect of maturing and ongoing bright (UV) openness, frequently showing up as strange earthy colored patches of skin, especially in regions regularly presented to the sun. Melanin union contains Tyrosinase as a critical protein and its

inhibitors are effectively looked for. Various regular mixtures from marine organic entities have previously been utilized as tyrosinase inhibitors, albeit some of them (hydroquinones) adversely affected human wellbeing. Till now there are no research on the skin brightening compound with the help of new marine microorganisms.



Fig.6

An exceptionally compelling chemical namely zeaxanthin is acquired from and is extracted from nannochloropsis oculata. Chlorella concentrate would likewise decrease skin pigmentation by over 10% in the bright skin area. 7-phloroeckol is a phlorotannin removed from E. cava earthy colored ocean growth giving benefit as a skin-brightening specialist of tyrosinase movement.

Marine minuscule organic entities have still not been comprehensively focused as a wellspring of skin-lighting up compounds. In any case, the marine microorganism Pseudomonas was found to convey the tyrosinase inhibitor methylene chloride, which diminished the pigmentation of human melanocytes. The marine bacterium Thalassotalea sp. PP2-459, disengaged from a bivalve, is similarly portrayed to make a N-acyl dehydrotyrosine auxiliaries tyrosinase inhibitor of the thalassotalic acids. Astaxanthin, which has a spot with the carotenoids family, in like manner presents interesting depigmentation properties. It would give an affirmation to skin from age spots by

diminishing melanin creation by 40%. The greater part of skin glowing intensities utilized in beauty care products are as yet given by earthbound creatures, in this manner opening new open doors for marine skin brightening particles research in beauty care products.

Pistacia lentiscus is a customary helpful halophyte plant of the Mediterranean area, flowing in saline circumstances. P. lentiscus leaves contain flavonoids, phenolic acids like catechin,  $\beta$ -glucogallin, quercitrin gallate, gallic destructive and epicatechin. Gallic destructive and epicatechins, catechins are responsible for the strong tyrosinase limitation breaking point of P. lentiscus and could thus be convincing in the treatment of hyperpigmentation.

Sea Sponges: The ocean wipe is a sustainable regular asset. The ocean wipes are exceptionally retentive, make a lavish foam, are delicately finished and are appropriate for the most sagacious skin. Normal wipes are more grounded and last longer than manufactured wipes since they are more impervious to scraped area. Regular ocean wipes really have catalysts in them yet obstruct the development of form, mold and microorganisms. Likewise regular ocean wipes are upgraded for washing and tidying on the grounds that they absorb and lock moisture without doused. Principally wipes are mainly utilized in cleaning the body as well as face as long as these are widely utilized on children to remove their dead skin. And furthermore utilized in brightening compounds for the skin.

Ocean growth:Kelp in particular hearty hued kelp, red sea development, green development, egg wrack, kombu, sea noodles, wakame, nori, sea plants, carrageenin, and Irish vegetation. Kelp is used in shower, skincare things and body items from now onward, indefinitely quite a while to additionally foster stream and balance customary clamminess levels. This can help with restoring the surface and tone of the skin and reduce the presence of cellulite. By and large Seaweed has been used for its detoxifying properties and as a manual for skin recovering. Kelp is copious in mineral salts, amino acids and Vitamins. The lipid, protein, mineral and supplement substances are easy to absorb and present a sumptuously hydrating and skin empowering treatment. The essential usage of kelp independently is for skin and body care; it goes about as Skin

Health Protection, Skin Whitening, unfriendly to skin aggravation, against developing. It can vitalize restoration of hurt skin cells. It can detoxify and cleanse, tone the skin and soak.

Shark fish: Liver oil present in shark fish is significantly affluent in 3 omega unsaturated fats, this as well as in checked squalenes found in various things, for example, creams, antiperspirants, hued bar for lips, smells, shampoos and different magnificence care items. Many financially outlined brands of cream, sunscreen, lipstick and eye beauty care products contain a compound got from shark liver oil known as "squalene". The smooth normal compound (close by squalane, a subordinate) is leaned toward development to various brilliance things because of its soaking properties.

Marine Turtles: It is said tha turtle oil was used for quite a while for sound skin by the primary tenants of the Americas; it didn't notice its course into Western skin creams, in any huge way, until the 1930s. The preparation seems to have started in Europe and maybe rose up out of comparable German and French assessment into the use of animal serums and concentrates - opotherapy/organotherapy - that lead to the introduction of synthetic compounds and other tissue isolates in skin creams. For the most part turtle oil is removed by warming the fat and the oil is eliminated which is being used in the preparation of magnificence care items, where the oil is well off in Vit-E. Once more in England it is being started there in superficial game plans like in washing cleaning agents, balms, skins creams and nail creams, etc

Coral: Powders derived from corals have been utilized in various corrective items, promoted abundant and also exceptional. Cleaning skin and providing minor elements to it has been utilized. The forthcoming for involving fossilized coral powder as one more viable material for supportive applications maintained by its physical, substance and textural characteristics, as well as its minor component content. Falsely coral powder is a pure material, made generally out of calcium carbonate. In any case, this normal marine coral powder could contain an additional 74 minor components, with nonattendance of profound metals. This coral powder is used to safeguard from UV radiation and goes similarly threatening to oxidant, against developing and unfriendly to skin irritation. It is used to smoothen the skin, in lipstick courses of action, powders and antiperspirants.

Jellyfish: Organic liquid molded by jellyfish is wealthy in a compound that is vital for specific magnificence care items and prescriptions. According to Cosmetic Design, the restorative business can step in and assist with extending the fish stock by including jellyfish in the gathering of antagonistic to developing wonderfulness things. Jellyfish have major areas of strength for an of developing properties. Specialists have rehashed the cells from the jellyfish inside the peptide, juvefoxo and joined inside skincare creams. Yet again it endeavors to treat and hinder DNA hurt and persuade our skin cells to act young and recuperate.

Hydras:Hydras in a general sense contain a gel which is used in all plans which involves cell fortifications and proteins. Primarily hydras are used in availability of lipsticks, lip sparkle and various things associated with lips. What's more, besides used to clean skin and used as a beauty care products remover with essentially no reaction and moreover as cream. It contains Vitamin-C and Vitamin-E which is used in sunscreen ointments to protect from UV radiation and soaking cream. It is rich in olive oil with emollient properties.

Phytoplankton: Extract of phytoplankton, wealthy in lipids and omega-3 unsaturated fats energise the cells and deliver cerebrosides, reinforce cell attachment, reestablishes the skin's defensive obstruction. Essentially utilized for skin conditioning, skin brightening, against wrinkling and maturing and so forth.

Ocean Fennel: They contain the cancer prevention agent and age reducing factor. It additionally has chlorogenic corrosive, which is a viable cell reinforcement, making these unpretentious oceanside plants a strong skin defender. The powerful undifferentiated organisms likewise direct the recovery of keratin on the skin for toning of the human skin.

#### Marine benefits on beauty care products

• Marine fixings are gaining fame in healthy skin because they offer an assortment of advantages, further developed deductively and eco-accommodating.

• Marine fixings can assist with giving nutrients and minerals to skin, UV and cell reinforcement security, hostile to maturing advantages and that's just the beginning.

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• The collecting and safeguarding of marine fixings has become more many-sided throughout recent many years, assisting with making more successful as well as greater climate cordial fixings.

•The human body continually needs different materials like zinc, phosphorous, calcium and magnesium reliably in light of the fact that sea water contains the body's pristine harmony of minerals.

• Marine medicine is a rich wellspring of natural and compound assortment.

• Marine trimmings are threatening to oxidant properties that have been used in skin wellbeing the executives things to prevent or try and restore the damage achieved by normal factors, for instance, UV bars and low moistness, as well as mischief lined up with the developing framework.

• Marines coming about proteins which can give partners to collagen and gelatin without the connected risks are ending up being all the more notable among clients by virtue of their abundant prosperity and profitable effects.

• Most marine bioactive peptides are at this point underutilized. While fish and shellfish are possibly the clearest wellsprings of such proteins and peptides, there is also scope for extra headway of proteins and peptides from sources like green development, sea cucumber and mollusks.

• The counter oxidant properties help the skin cells in combating all of the free fanatics that are made due to radiation and engineered receptiveness to sun.

• It helps in restoring the normal hydration of skin cells that hinder the signs of developing and protect against wrinkle advancement.

• Propels normal cleansing of skin by opening pores; thereby helps in restoring shining clear skin other than rehydration and recuperation skin cells.

#### **Disadvantages of Marine Cosmetics:-**

- They restricted clinical application regions.
- Their digestion is muddled in the body.
- Environment and beginning ward sub-atomic weight and construction.
- They share unfortunate Solubility for all intents and purpose solvents.

• There is an exceptionally High gamble of disappointment during improvement wherein many promising marine mixtures have fizzled during this course of advancement.

#### 2. SEAWEED AS SOURCE FOR MARINE BIOACTIVE

#### 2.1. Source :

Marine macroalgae, sometimes known as seaweeds, are plant-like creatures which grow on solid substrates such as pebbles, rocks, dead corals, shells, and plant material in deepsea areas up to 180 metres deep, in estuaries, and also in black water, and are attached to the bottom in comparatively shallow rocky coastal areas, especially where they are exposed at low tide, constituting one of the ocean's most important living resources.

Common name: - Macro algae

#### 2.2. Characteristics :

Seaweeds are multicellular marine plants that thrive at the ocean's surface. As a result, they are a benthic organism that can be found near or in marine sedimentary ecosystems, such as the foreshore and abyssal depths. A seawater environment, light that can penetrate the bottom since it is needed for photosynthesis, and a substrate to connect to are some of the basic requirements for seaweeds to flourish. Nonetheless, other species, such as Sargassum species, are classified as seaweed but are free-floating.



Fig.7

A thallus body, or undifferentiated vegetative tissue, is found in most seaweeds.

As a result, they lack genuine stems, leaves, and roots. The vascular system of a real stem, leaves, and roots would be similar to that of higher plants. Despite this, the body of a macro algal resembles that of most terrestrial plants.

#### 2.3. Classfication:

Seaweeds can be classified into three broad groups based on pigmentation: brown Algae, red Alga and green algae.

#### **Red algae**

One of the three forms of seaweeds with a beautiful red colour is red algae, or Rhodophyta.

Red algae can only be found in maritime environments. Red seaweeds are typically smaller, ranging in length from a few centimetres to a metre. The presence of phycoerythrin, a type of photosynthetic pigment, is responsible for the red colour.



Fig.8

Chlorophyll a, chlorophyll d, -carotene, and phycocyanin are also found in red algae.

In addition, unlike brown and green algae, red algae can thrive in deeper water. Because of their propensity to absorb blue light, this is the case. They're mostly made up of multicellular organisms. Cellulose and sulphated phycocolloids make up the cell wall.

Examples:- Irish moss, coralline algae, dulse.

Seaweed	Compound	Properties and Technical Function
Red algae	Carrageenan	Thickening, viscosifying, stabilizer,
		sensory enhancer, moisturizing,
		Anticoagulant, antinociceptive
		and anti-inflammatory agent
	Agar	Emulsion stabilizer, gelling,
		thickening agent, Antioxidant,
		colorant, dye, antioxidant, anti-
		inflammatory, radical scavenging
		agent
	Bromophenols	Antioxidant, antimicrobial,
		antithrombotic agent
	Sterols	Anti-allergic, anti-inflammatory,
		antioxidant, radical
		scavenger agent

Table 1

#### **Brown algae**

Brown algae, often known as Phaeophyta ('dark plants,') are the most common seaweeds. Brown seaweeds are typically huge, ranging in size from 20-meter-long gigantic kelp to thick, leather-like seaweeds 2-4 metres long and smaller species 30-60 cm long. They are made up entirely of multicellular organisms.





Because of the presence of a unique combination of photosynthetic pigments such as chlorophyll a, chlorophyll c, fucoxanthin, -carotene, and xanthophylls, they have a distinctive brown to yellow colour. Brown algae are primarily marine and can be found in temperate and arctic waters. Cellulose and non-sulphated phycocolloids make up the cell wall.

Examples:- Kelp, rockweed, sargassum

Seaweed	Compound	Properties and Technical Function
Brown algae	Alginate	Emulsifier, viscosifying, moisturizing, chelating, colloids, gelling, immunostimulating, protective colloid agent
	Fucoidan	Antioxidant, anti-cellulite, antiviral, anti-inflammatory, antiaging, anti- photoaging, elastase, tyrosinase

	inhibitor agent
Laminaran	Antioxidant, anti-cellulite, anti-
Pigments	inflammatory agent, Antioxidant,
	UV protector, colorant, and dye
	agent
	Phlorotannins, Collagen-producing
	enhancer, antioxidants, antiaging,
Phlorotannins	anti-allergic, chelating, UV
	protection, anti-histaminic, anti-
	wrinkling, hair growth promoter
	agent

#### Table 2

#### **Green Algae**

Green algae, also known as Chlorophyta, can be found in both freshwater and marine environments. Furthermore, some green algae can be seen in the damp soil. Green algae have three different cellular organisation patterns: unicellular, colonial, and multicellular.



Fig.10

Chlorophyll a, chlorophyll b, and xanthophylls are found in them. They are mostly unicellular in nature. Cellulose is one of the components of the cell wall. Green seaweeds are small as well, with a size range similar to red seaweeds.

Example:- sea lettuce

seaweed	Compound	Properties and Technical Function
Green algae	Ulvan	Antioxidant, chelating, gelling,
		moisturizing, protective agent
	Chlorophylls	antioxidant, antibacterial,
		deodorizing,
		tissue growth stimulating, colorant
		agent
	Fatty acids	Antioxidant, cytoprotective agent
	Carotenoids	Anti-inflammatory, antiaging,
		antioxidant, tyrosinase inhibitor,
		anti-photoaging agents, radical
		scavengers, colorant agent

Table 3

#### 2.4. Seaweed bioactive compunds:

Seaweed bioactive compounds with skincare potentials.

(A) Eckol (B) Fucophloroethol (C) Dieckol (D) 6,6 Bieckol (E) Fucodiphloroethol G
(F) 7-phloroeckol (G) Fucoxanthin (H) phlorofucofuroeckol (I) Fucosterol (J)
Sargahydroquinoic acid (K) Laminarin (L) Porphyra 334, (M) Sargachromenol (N)
Astaxanthin (O) Shinorine



Fig. 11











#### 2.5. Potential Use of Seaweed Skincare:

- Regulates oil production : Some seaweed has been proven to reduce oil production, while others have been shown to reduce acne-causing bacteria, making it a possible anti-acne component.
- Reduces the appearance of fine lines and wrinkles : Seaweeds like Laminaria Digitata are contains high amount of amino acids (like glycine) and natural antioxidants (like vitamin C), which help to boost collagen formation and give the appearance of plumper, younger-looking skin.
- Heals acne, rosacea, and sensitive skin : It has anti-inflammatory effects as well as natural minerals including as magnesium and zinc, which have been shown to help reduce redness in sensitive and hypersensitive skin. It also creates a protective layer that protects the skin from harsh environmental conditions.
- Brightens the skin : Seaweed can help with dark spots by altering either pigment formation or pigment transport in the skin.
- Exfoliates dead skin cells : Corallina officinalis (a red seaweed that generates calcium carbonate) has detoxifying properties that help to gently remove dead, loose skin cells from the surface of the skin.
- Moisturizes the skin : Seaweed is high in polysaccharides like alginic acid, which serve to trap moisture into our skin, as well as vital fatty acids that help maintain our skin's barrier.
- Anti-bacterial properties : Its antibacterial capabilities make it an excellent component for treating acne and ageing symptoms.

Some studies about cosmetic treatments with algae

Active	Source
component	
Adipolysis and s	kin appearance enhancer
Fucoxanthin	Brown algae
	Undaria pinnatifida
Sulfated poly-	Fucus vesiculosus
saccharide:	
fucoidan	
Aqueous extract	Fucus vesiculosus,
	F. lumbricalis
Hydroglyceric	Laminaria digitata
extract	
Hydroglycolic	Pelvetia canaliculata
extract	
Oily extract	Gelidium cartilagineum
rich in	
rhodysterol	

Table 4

### 2.6. Marketed formulation:



*Fig.* 14 The Body Shop Seaweed Oil Control Gel Cream(50ml)

Major ingredients:

Algae Extract, Hydrolyzed Wheat Protein, Xanthan Gum, Propylene Glycol Alginate, Benzyl Salicylate, Benzyl Alcohol, Hydrolyzed Algin, Sesamum Indicum Seed Oil, Glycine Soja Oil, Fucus Vesiculosus Extract



*Fig.15* Biotique bio seaweed anti-fatigue eye gel

Main ingredients :-

Punarnava Root, Behda Fruit Pulp, Badam Oil, Jaiphal Oil, Madhu, Chinnai ghas Plant, Kheera Juice

### 3. MARINE SPONGES AS SOURCE FOR MARINE BIOACTIVE

#### 3.1. Source :

Marine Sponges live on the ocean floor or are attached to rocks, coral, shells, and marine animals as substrates. It can be found in a variety of environments, from shallow intertidal zones and coral reefs to the deep sea. Throughout the world, they can be found in oceans and freshwater lakes.

Common name:-

Sea sponges, Phylum Porifera



Fig.16

#### 3.2. Characteristics:

Marine sponges are plant-like sessile creatures. A sponge is a multicellular organism that lives in the sea. When they are young, they attach themselves to a rock, shell, or seafloor and stay there for the rest of their life. They reside in tidal pools and on the ocean floor when the larval attaches itself to a surface and spends the remainder of its life there. Sponge have been discovered on ocean levels as deep as 8,800 metres (5.5 miles). Marine sponges have a round, flat, encrusting, vase-like shape.

#### <u> 3.3. Species :</u>

The phylum Porifera is divided into five classes and has a large number of species.

Calcarea (Calcareous sponges)

Demospongiae (Horny sponges)

Hexactinellida (Glass sponges)

Homoscleromorpha (Includes about 100 species of encrusting sponges)

Porifera incertae sedis (Sponges whose classification has not yet been defined)

#### <u>3.4.</u> Types of sea sponges that are used in skincare:

- i. Mediterranean Silk
- extremely dense, with a velvety, smooth texture
- Exfoliation with a gentle touch





- Natural cleansing without the use of cleanser.
- Ideal for newborns and small children with sensitive skin.
- Makeup can be applied and removed using this silk.
- ii. Honeycomb Wool
- Thick, compact, fluffy, and flexible
- They produce a thick lather because they are porous and buoyant.
- It works well as a bath sponge.



Fig.18

#### iii. Yellow Sea Sponges

- Sponge with a thicker texture that exfoliates well.

-Although not as soft as the previous two varieties, it is useful for exfoliating on a regular basis.



Fig. 19

#### 3.5. Bioactive compounds used in skincare

Carotenoids, such as carotene and lycopene, have a photoprotective action, as mentioned in the introductory section, showing various cosmetic uses. The presence of carotenoids in the formulation offers it anti-aging capabilities. The carotenoid extract of a Strep-tomyces strain (AQBWWS1) linked with the sponge Callyspongia diffusa obtained from Kerala's west coast was studied by Dharmaraj and co-authors (India). Its chemical analysis
indicated the presence of lycopene, which has been identified as a possible cosmetic component.



Fig.20

The growth inhibition effectiveness of certain pathogens often implicated in skin diseases was investigated, together with the anti-oxidant properties.For example, Ageloline A, a chlorinated quinolone discovered from Streptomyces sp. SBT345, a bacterial symbiont of the Mediterranean sponge Agelas oroides, has been studied for its radical scavenging and anti-microbial activities, as well as its antiaging characteristics. It includes a variety of minerals that help to nourish the skin, especially calcium, magnesium, sodium, iron, zinc, and potassium.It also contain iodine and marine minerals, which are recognised for their purifying and cleaning qualities.

#### 3.6. Merits of natural marine sponges:

Bacterial growth is naturally inhibited by marine sponges. They are safer for the environment, and they are more sturdy, long-lasting, and cost-effective. They are completely biodegradable. They are a sustainably obtained natural resource that will not keep odours and will promote a more thorough and less aggressive cleaning due to their delicate textures.

30.

Benefits of marine sponges:-

Sea sponges have nutrients that nourish and enhance the skin. Calcium, magnesium, sodium, iron, zinc, and potassium are some of these minerals. Gentle exfoliation is provided by sea sponges. Exfoliation eliminates dead skin cells, revealing younger, more vibrant skin beneath. Sea sponges produce cleanser foam, allowing you to use less cleanser; they absorb and hold a lot of water without leaking; and they may be used to cleanse your skin without soap.

Their most well-known application is in personal hygiene, as they are extremely delicate, making them perfect for grooming babies during their first few months of existence. When using sea sponges, even adults and persons with sensitive skin appreciate the quality and pleasure they acquire. Natural sea sponges are recommended by dermatologists for particularly sensitive and allergy-prone skin. They contain iodine and sea minerals, which are known for their cleansing and detoxifying properties, as well as their ability to remove dead skin cells and improve skin health.

The uses of marine sponges are numerous and varied. Bathing is the most common application, and it is also suitable for youngsters. Sea sponges are a hypo-allergenic and toxin-free alternative for washing fragile skin since they are not only soft, absorbent, and resilient, but they are also hypo-allergenic .People can also use it to remove make-up from your face. Natural sea sponges may produce a thick, dense lather and store a lot of soap. Unlike manufactured sponges, sea sponges are naturally antibacterial and selfcleaning (because of their pore structure).It also used in Body and face wash, Baby products and Skin whitening product.

## 3.7. Marketed formulation:



## Fig.21 BABY BUDDY NATURAL BATH SPONGE



#### Fig.22 REJUVV FACIAL NATURAL SPONGES

### 4. SEA MUD AS SOURCE FOR MARINE BIOACTIVE

### 4.1. Introduction :

Sea mud is obtained from very old sediments or red-brown soils which had been swept by large marine bodies and have been present in them since long time. It is very famous for having good therapeutic and cosmetic properties with rare different compositions of minerals and abstracts used in formulating herbal cosmacuetical products and formulations.



Fig.23

#### 4.2. Bioactive composition :

Different nutrients, minerals and even antibacterial components are derived from marine mud. Minerals for example which are expressed in **Oxides**: Silicon Dioxide, Calcium Oxide, Magnesium Oxide, Sodium Oxide, Potassium Oxide, Iron (III) Oxide, Aluminium Oxide, Phosphorous Pentoxide, Titanium (IV) Oxide, Sulfur Trioxide, Manganese(II) Oxide, Zirconium Dioxide, Chromium(III) Oxide, Zinc Oxide, Nickel(II) Oxide, Copper Oxide, Indium (III) Oxide, Chloride, and Bromide, Aluminium silicate are active components playing active role in cosmetic industry.

### 4.3. Targeted mechanism of action :

#### 4.3.1. Cosmetical or topical use-

All kinds of dry, oily and normal skin types can derive benefit from sea mud, esp. Dead Sea mineral mud. The mud works by cleaning skin's surface, pores of impurities, purging them by extracting non-living or dead cells and essentially balance the skin's oil production and pH value. Internal heat is produced by Sea Mud, which stimulates circulation and reduces the appearance of cellulite. It also speeds up the skin's detoxification process by gently pulling out visible and

invisible pollutants including air pollution, allergies, dust, and filth on the surface and in the tissues. When the mud dries, it has a gentle tugging effect that sucks out excess oil, tightens, and exfoliates dead skin, revealing a healthy layer of skin beneath. Sea Mud's moisturising and firming characteristics help to relieve itching and inflammation, as well as the symptoms of skin conditions such dryness, acne, eczema, and psoriasis. It also improves skin suppleness, minimises the appearance of pores, and minimises the appearance of fine lines and wrinkles making them appear smooth.

A coating of Dead Sea Mineral Mud on the skin along with keeping the skin soft, it also keeps the body moist and doesn't let the moisture go away from the skin, which raises internal moisture levels. The skin receives an increase in blood flow and energy as a result of this. The time interval for which the mask is applied, as well as the heat it generates, these two factors help to increase and facilitate nutrient absorption by the skin. This gives the skin a rose sheen. The minerals have an anti-oxidant property is important and works as a cleanser of the body to restores its natural balance. The anti-microbial activity of the salt and sulphide contributes to the mud's capacity to minimise the onset and appearance of acne by preventing pathogens which have detrimental effects on skin.

#### 4.3.2 Application on Hair-

By increasing circulation, Sea Mineral Mud moisturises and nourishes the scalp and roots. By strengthening and boosting the health of hair follicles, which decrease and grow smaller with age, the possibility of hair loss is minimised. Hair is deprived of nutrients and oxygen as a result of shrinkage, which has a detrimental influence on the hair protein required for growth which becomes a reason for hair loss.

Problems like dryness, dandruff, hair loss, damage, loss of shine due to dull hair start getting reduced and slowly eliminated ass the mud cleanses and moisturizes the scalp. Dead Sea Mineral Mud is also said to be excellent at removing environmental pollutants from the air which are taken up by the hair.

### 4.4. Extraction :

Healing mud is stored in natural mineral water for further aging. In general, the maturation process involves the oxidation and reduction of sludge over a year. This process can vary slightly from mud to mud.

The shades of organic sea mud harvested vary between different shades of grey, depending on the weather and the time of harvest. The summer months produce light grey mud and the winter months produce dark grey mud.

Due to its rich sulphur content, its characteristic scent is naturally stimulating. The finished product is sand-free and sand-free; resulting in a soft, smooth, fine, sticky clay-like paste. The pH of sea mineral mud is between 7.5 and 8.9.

### 4.5. Cosmetic Products:

Products include bath salts, mineral mud soaps, mineral peeling soaps, hand and body lotions, eye cream, cleansing mud masks, body butter, body exfoliates, acne lotions, sunscreens, lightening cream with sun protection factor (SPF), collagen firming creams with SPF, firming night creams, scalp masks, antidandruff and numerous other shampoos, and products that have an 'anti-wrinkle effect'.

Sea mud Mask for face and body is very rich and constitutes of more than 27 natural minerals. It prevents inflammation and is considered to be an effective cosmetic product. Dead Sea mud is made up of three main parts.

1. The crystal part is composed of crystals of calcium, magnesium and bromine salts and at least 20 elements necessary to provide life processes.

2. The colloidal part is composed of ferrous sulphate, which gives the mud a greyish black colour.

3. The organic part is composed of organic acids and other products that contain bacteria necessary for body function.

### 4.6. Market formulations:



Fig.24



Fig.25



Fig.26

### 5. SHARK SPECIES AS SOURCE FOR MARINE BIOACTIVE

### 5.1. Introduction :

Deep sea sharks are found living about 900 m under the sea where sunlight and oxygen are not found easily and can be considered negligible. Different shark species are used greatly in cosmetic industry as they are the biggest and richest source of squalene, which is a triterpene obtained from shark liver oil. Squalene is stored in these sharks and loses weight due to the lack of a swim bladder.

The density of their bodies in fats and oils. Squalene, which is mainly stored in the liver of sharks, has a specific density of 0.855 and is lighter than water. The ability of this species to withstand high pressures at this depth is due to squalene. Squalene extracts oxygen from the water present in the body and sends it to cells, increasing physiological activity, strength and durability. The most abundant amount of squalene is found in the shark Centrophorus moluccensis (synonym). Centrophorus scalpratus) is abundant in the Indian Ocean, especially in the Andaman and Nicobar Islands.

Shark species	Squalene liver content (%)
Centroscymnuscrepidater	35.7-59.4
Centroscymnusowstoni	37153.1
Centroscymnuscoelolepis	31.1-47.1
Deaniacalcea	43.4-66.1
Etmopterusbaxteri	14.3-51.5
Etmopterusgranulosus	50.3-60.5
Deaniacalcea	69.6

Table 5

### 5.2. Bioactive compound :

Deep sea shark liver oil is very rich in omega 3 fatty acids and other labeled squalene or squalane, along with many products along with moisturizers, deodorants, sunscreens, lip balms, lipsticks, perfumes, shampoos and other cosmetics. Included in. Many commercial brands of moisturizers, sunscreens, lipsticks and eye makeup contain compounds derived from shark liver oil known as "squalene". Oily organic compounds (and containing the derivative squalane) are popular additives in many

cosmetological products due to their moisturizing properties. Squalene is a long carbon chain molecule and tends to be hydrophobic. It is of particular interest to the industry as it can be used to transport fat-soluble compounds in an effective and economical way. Squalene is involved in the formation of steroid hormones, bile acids, steroids, and sterols synthesized via the mevalonic acid acid pathway. Uppala L (2015) A Review on Active Ingredients from Marine Sources used in Cosmetics. SOJ Pharm Pharm Sci,



Fig.27

#### 5.3. Importance in cosmetic :

Human epidermal sebum is consistent of triacylglycerides, free fatty acids (57%), wax esters (26%) and squalene (12%). The use of compounds in human sebum as cosmetic squalene reduces the likelihood of allergies10 and is highly regarded in the cosmetics industry for its emollients and antioxidant properties. Squalene prevents oxidative damage from H2O2 and protects against oxidative DNA damage. Alcohol causes lipid peroxidation, while squalene reduces the retina of the fetus during pregnancy. Squalene lowers serum cholesterol levels because this triterpenoid can act as a substrate for HMGCoA reductase (3-hydroxy 3-methylglutaryl-CoA). Squalene was studied years ago and reported its biological activity as an antioxidant.

#### 5.3.1. Squalene and skin care:

Squalene is very largely used in formulations as an effective skin moisturizer and to prevent the formation of wrinkles and wrinkles on the skin associated with the aging process and cancer. A variety of cosmetics incorporating squalene are available in markets around the world. In addition to being odourless and colourless, it has high spreadability, light consistency, stability at all ambient temperatures, non-greasy texture, fast transdermal absorption, restoration of skin suppleness, creation of moisture barriers; it has properties such as cracked and cracked skin healing and antibacterial properties. The ability to promote cell regeneration makes squalene an excellent skin protectant. Squalene is applied to anti-aging, anti-wrinkle, eczema, damaged hair, dry scalp and brittle nails.

#### 5.3.2 <u>Squalene as antioxidant :</u>

Squalene is the first-class evidently going on antioxidant which don't have any recognized facet effects. Squalene has precise capacity to hold oxygen at some stage in the frame with out the assist of hemoglobin. Being exceptionally unsaturated, it carries 6 double bonds, and is extraordinarily reactive to get into an oxidized state. Can be delivered to beauty arrangements due to their sports in opposition to loose radicals. Squalene isn't always very at risk of peroxidation and looks to defend pores and skin from lipid peroxidation because of publicity of UV radiation and different oxidative damage. Human

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frame produces some of peroxides generated through autoxidation of fats found in ingredients consumed. These peroxides which can be loose radicals produce a massive amount of carbonyl compounds dangerous to human frame. But cells own their very own protection mechanisms which includes antioxidants. Antioxidants are very essential for fitness and that they get oxidized at their rate and save you damages through carbonyls.

### 5.4. Market formulation



Fig.28

## 6. SEA TURTLE AS SOURCE FOR MARINE BIOACTIVE

### 6.1. Classification:

Sea turtles are classified into seven genera by scientists.



Fig.29

Loggerheah (Caretta caretta)



The loggerhead sea turtle is the most commonly seen of all the sea turtles that nest in the United States. In the United States, the loggerhead sea turtle was listed as threatened under the Endangered Species Act in 1978, and it is the only sea turtle species not categorised endangered. The bulk of loggerhead nesting occurs in two locations across the world:

Masirah Island, Oman, in the middle east, and the southeastern coast of the United States.

### <u>Green turtle</u> (*Chelonia mydas*) *Fig.31*



Green turtles are an endangered species all throughout the world, but they continue to breed in large numbers on Florida's east coast. In 1978, the Endangered Species Act designated the green sea turtle as an endangered species in the United States. STC has had a study programme in Tortuguero, Costa Rica, since 1959, and it is the largest nesting site in the Western Hemisphere. While

the nesting population in Suriname may be steady and growing in Tortuguero, there is inadequate data from other nesting sites to assess a global trend in the species.

### Leatherback (Dermochelys coriacea)

The leatherback is the sea turtle's champion: it is the largest, dives the deepest, and travels the greatest distance of any sea turtle. In 1970, the Endangered Species Act designated the leatherback as an endangered species in the United States. Mexico, Costa Rica, Malaysia,



Fig.32

India, Sri Lanka, Thailand, Trinidad & Tobago, and Papua New Guinea have all seen population declines. Over the previous 12 years, nesting along Mexico's Pacific coast has decreased by 22% per year. Leatherback turtle nesting has increased recently on Florida's central and south-eastern coasts.

Hawksbill (Eretmochelys imbricata)

#### IMPORTANCE OF MARINE BIOACTIVES FOR HERBAL COSMETICS

Fig.33



The status of the hawksbill turtle in the United States has remained unchanged since it was designated as endangered under the Endangered Species Act in 1970. Because it is a single nester, estimating population trends or estimations is challenging. Yemen, northeastern Australia, the Red Sea, and Oman were the only known seemingly stable

populations in 1983. Despite the fact that they can be found in American waters, they seldom nest in North America. Hawksbills nest on beaches all around the Caribbean, but they are no longer found in considerable numbers anywhere.

#### Fig.34



#### Kemp's ridley (Lepidochelys kempii)

The Kemp's ridley sea turtle is the most endangered of all sea turtles, and it was designated as endangered across its habitat in the United States under the Endangered Species Act in 1970. The Kemp's ridley's sole important

breeding place is a tiny stretch of sand near Rancho Nuevo, Mexico. Kemp's ridleys build arribadas (arrival the Pacific coasts of Mexico and Costa Rica appear to be steady or growing), which are large, coordinated nesting colonies. Kemp's ridleys arribada occurs at regular intervals between April and June.

### Olive ridley (Lepidochelys olivacea)

Since 1967, the nesting population in the western North Atlantic (Surinam and surrounding regions) has decreased by more than 80%. Playa Nancite, Costa Rica, has



similarly shown declines, Gahirmatha, in India's Bhitarkanika Wildlife Sanctuary, has the greatest nesting population in the Indian Ocean, with an average of 398,000 females nesting each year.





Fig.36

Only the northern coast of Australia and the Gulf of Papua, New Guinea are home to Australian flatback turtles, which live in coastal coral reef and grassy shallows. The shell is waxy and smooth, and it is readily destroyed.

**Leatherback, green and hawksbill sea turtles** are targeted for oil; a single leatherback turtle can produce 40 litres. The oil is also said to prevent signs of aging.

It was first used in **creams and lotions in the Americas** in the 1930s. The most famous use of turtle oil was in a cream developed by Estee Lauder in 1957 that sold for \$115 a jar

Today, the ban on turtle products

has caused manufacturers to

discontinue the use of turtle oil.

Eicosapentaenoic acid and



Fig.37

docosahexaenoic acid is important

constituent in turtle oil.

### 6.2. Bioactive compound :

Turtle oil

Turtle oil is a highly sought-after product. It is derived from the carapace of leatherbacks (Dermochelys coriacea), which is exposed to sunlight for many days before being used as a day and night facial lotion to combat dryness, prevent wrinkles, and help restore fresh attractiveness to your skin.

Although the native people of the Americas had long utilised turtle oil for skin treatment, it was not widely employed in Western skin creams until the 1930s. The technique appears to have originated in Europe, and it may have stemmed from Hormones and other tissue extracts were used in skin creams as a result of the same German and French research into the use of animal serums and extracts

(opotherapy/organotherapy).Typically, turtle oil is produced by heating the fat and extracting the oil, which is then utilised in the creation of cosmetics due to the oil's high Vitamin-E content. It is being used in cosmetic preparations such as bathing soaps, lotions, and skin creams in England.

### 6.3. Extraction :

Turtle oil may be extracted in a number of methods, including extracting turtle fats with a supercritical fluid at low temperatures to get turtle raw oil, and refining turtle oil using a degelatinizing, decolorizing, and dewaxing process. The invention's supercritical fluid is

CO2 or propane, at a temperature of 30DEG -C120DEG C and a pressure of 430MPa; the first stage separation temperature is 40DEG -C80 DEG C, at a pressure of 488MPa; and the second stage separation temperature is 40DEG C- 80DEG C, at a pressure of 26MPa. The degelatinizing technique in the claimed invention is hydrated degumming, in which water accounts for 10% to 30% of the oil and a common salt accounts for 0.13 percent of the oil at the same time. Turtle oil prepared by supercritical extraction, degelatinizing, and decolourizing, dewaxing processes according to said method in the invention has a good colour with a low peroxide number, a high content of unsaturated fatty acids, no solvent residue, low impurity content, and a high recovery ratio.

### A method for preparing turtle oil

At 110-115°C, the fat from a turtle's internal organ is decocted.

Under normal pressure, the oil melts completely, and the remaining oil is filtered out.

20 percent fuller's earth is added to the clear oil, which is then decolored at  $90^{\circ}$  C for 60 minutes before being deodocozed under vacuum (600 mg Hg) for at least 90 minutes and 0.02 percent vitamin E added.

The finished turtle oil has a faint yellow hue.

### The preparation of oil-in-water type containing or turtle oil is as follows:

INGREDIENT	QUANTITY
Hexadecanol	120 g
Lauryl sodium sulphate	10 g
White Vaseline Tortoise oil	120 g
Nipagin A (ethyl paraben) Glycerine Distilled water	1g 50ml q.s.100g

Table 6

6.4. Application action of turtle oil :

### Anti-itching Action:

0.5% turtle oil can use to get anti itching action.

This function can be used to treat a wide range of skin and mucomembrane pruritus (itching) induced by chemical, physical (light and heat, for example) and environmental causes (mosquito bite or insect sting).

Turtle oil having therapeutic effect on psoriasis.

After smearing, 0.5% After two weeks of therapy in turtle oil test animals, the characteristic pathologic alterations of psoriasis are clearly improved. The thickness of the epithelial prickle-cell layer is becoming closer to normal. Leukocytic infiltration is reduced, and leukocyte production returns to normal.

Turtle oil can be used to treat fire burns and/or scalds:

After being spread on a rat with a second-degree burn, turtle oil showed signs of reducing local inflammation, boosting epithelia repair and proliferation, speeding wound healing, and reducing scar formation.

### Protective effect of turtle oil against ultraviolet (UV) radiation:

Rats with a depilated area of 40 cm2 are exposed to a 30W UV light at a distance of 50 cm for 18 hours in a row.

The animals must be coated with 0.5 percent turtle oil in preparation.

Turtle oil and have an obvious protective (inhibitory) activity against UV radiation, according to the above-mentioned laboratory data. It also indicates that it has a sunburn prevention (inhibitory) activity, indicating that it can be utilised to protect the skin against unfavourable reactions produced by the sun.

### 6.5. Cosmetic products :

Turtle oils were used in a variety of cosmetics and toiletries in the 1930s, including fragrances, soaps, face creams, cleansers, hand creams, eyelash conditioners, and mascaras. Although the majority of the enterprises who employed it were minors rather than majors, they may have thought that turtle oil would help them break into the congested cosmetics industry during the Depression's most difficult years.

Most turtle oil creams made in the 1930s contained less than than 10 per cent of the oil with many creams being less than 5 per cent (deNavarre & Ruszkowski, 1933, p. 17). Two recipes for turtle oil creams are given below :

Diglycol stearate	11.6 g.
Mineral oil, white	31.5 g.
Lanolin	4.7 g.
Water, distilled	49.75 g.
Petrolatum, white	1.65 g.
Turtle oil	0.5 g.
Perfume	0.3 g.
Table 7	

Emulsify at 75-78°C., perfume at 50°C., stir until cooled at 38°C. If you wish to thin this down, add mineral oil.

(Manufacturing Perfumer, 1937)

Turtle Oil (Pale Deodorized)	10
Diglycol Stearate	10
Liquid Paraffin	30
Lanolin Absorption Base	9
Perfume	1
Water (distilled)	40

#### Table 8

Procedure:

Melt the fats and wax in a 170°F oven and whisk in the hot water. When the batch has cooled to around 120°F, the Perfume is added with slow stirring, following which the stirring mechanism may be turned off and the mixture allowed to cool.

### (Ash & Ash, 1977, p. 302)

Clearly, if the oil was to be of any value as a 'skin nutrient', greater quantities than these would needed in a formulation.





### 7. JELLY FISH AS SOURCE FOR MARINE BIOACTIVE

#### 7.1. Introduction:

Cnidaria is an animal phylum that includes jellyfish, sea anemones, and corals, among others. There are more than 10,000 different species of Cnidaria, although only around 4,000 of them are Medusazoa, or jellyfish. There are four major groups of jellyfish among the 4,000.

**SCYPHOZOA** are the most well-known jellyfish, accounting for the majority of the larger and more colourful jellies that interact with humans. They are frequently referred to as "real jellyfish" because of this. There are at least 200 species of Scyphozoa, which spend the most of their life in the medusa body shape.

**HYDROZOA** :they are not the same as "real jellyfish." Colonial siphonophores are made up of several specialised individuals termed zooids who are genetically similar since they all emerge from a single fertilised egg. The swimming medusa stages of this group are frequently tiny and inconspicuous. In 2016, researchers discovered what they believe to be a new Crossota hydrozoan species deep beneath the Mariana Trench, at a depth of 12,140 feet (3,700 metres). This Crossota jellyfish, which floats in the water column like a bright spacecraft, is an anomaly to most hydrozoans in that it will spend the most of its life as a giant medusa. Hydrozoa has over 3,700 different species.

**CUBOZOA**, is called for its box-like bells. The sea wasp (Chironex fleckeri), for example, produces some of the most lethal venom known. Cubozoan jellyfish have a more evolved neurological system than other jellyfish, with sophisticated eyes, corneas, and retinas. At least 36 species have been identified.

**STAUROZOA** are stalked jellyfish that dwell clinging to rocks or seaweed rather of floating through the water like other jellies. They have a trumpet-like form and like to survive in cold water. Around 50 staurozoan species exist, several of which are

remarkable for their unusual blend of beauty and concealment.Jellies may be found in all seas, in both shallow and deep water, and some can live in freshwater.



## **Types of Jellyfish**

Fig.39

Table 9

### 7.2. Bioactive :

### What exactly is Collagen?

Collagen is a kind of protein fibre found in tendons, ligaments, bones, muscles, cartilage, and the skin. It creates a mesh with elastin that provides the skin structure, strength, and elasticity. It is the material that effectively binds your body together.

Its healing and regenerating capabilities have made it popular in the medical industry. Years of study on the effects of jellyfish collagen on human skin for the goals of healing and regeneration have been conducted. Collagen peptides produced from the jellyfish Rhopilema esculentum have been shown in experiments to speed wound healing.

### 7.3. Use:

We utilise jellyfish collagen for a variety of reasons.

Can aid in the improvement of skin elasticity and dermal tone.

To preserve and improve the skin barrier, it has significant film forming characteristics.

Amino acids and polypeptides are high in this product to assist develop dermal density, promote skin brightness, offer environmental defences, and improve skin hydration

### 7.4. Collagen Extraction:

Extraction method for collagen



Acid-assisted extraction

Fig.40

Pepsin-assisted extraction

Physical-aided acid-assisted extraction method(used for collagen extraction from jelly fish)

### Acid-assisted extraction

conventional acid extraction of collagen from jellyfish tissues is done (2000). Jellyfish tissues is extracted with 0.1M NaOH after being rinsed with distilled water. The insoluble tissue was resuspended in 0.5M acetic acid (1:1000 w/v), and acid-soluble proteins are extracted for three days with 0.5M acetic acid, which is repeated twice. The extracts was dialyzed against 0.02M Na2HPO4 for a long time The 0.9 M NaC1-precipitable fraction

(acid-soluble collagen) is redissolved in 0.5 M acetic acid, dialyzed against 0.1 M acetic acid, and then lyophilized.after filtering and compressing the insoluble mesogloea with cheesecloth. The precipitates is collected and dissolved in 0.5 M acetic acid after centrifugation at 6,000g for 30 minutes at 4°C. Solid NaCl was added to the supernatant after centrifugation at 20,000g for 1 hour, resulting in a final concentration of 0.9 M. The acid-soluble collagen fraction (precipitable at 0.9 M NaC1) is redissolved in 0.5 M acetic acid, dialyzed against 0.1 M acetic acid, and lyophilized.

### **Pepsin-assisted extraction**

conventional pepsin extraction of collagen from jellyfish tissues is done. Jellyfish tissues were extracted with 0.1M NaOH after being rinsed with distilled water. The insoluble matter is resuspended in 0.5M acetic acid (1:100 w/v) and digested for 48 hours at 4°C with 10% (w/v) pepsin . The pepsin-solubilized collagen is centrifuged at 20 000g for 1 hour before being dialyzed for three days against 0.02M Na2HPO4 (pH 7.2). The resulting precipitate is dissolved in 0.5M acetic acid and salted out by adding NaCl to a final concentration of 1.0M after centrifugation at 20 000g for 1 hour. After centrifugation at 20 000g for 1 hour, the precipitate is dissolved in 0.5 M acetic acid, dialyzed against 0.1 M acetic acid, and lyophilized.

#### Physical-aided acid-assisted extraction method

Jellyfish tissues are washed in distilled water and extracted three times with 0.1M NaOH. The insoluble tissue are resuspended and carefully mixed (1:1, w/v) in 0.5M acetic acid . After 15 minutes of sonication, the suspension is vigorously mixed for 1 hour at 4°C. Soluble extracts are combined and dialyzed extensively against a 0.02M phosphate buffer solution at pH 7.2. (1:10, v:v).

Collagen is salted off by resolving the precipitate in 0.5M acetic acid and adding NaCl to a final concentration of 0.9M.

The isolated precipitate is purified further by dissolving in 0.5M acetic acid and dialysis against 0.1M acetic acid, 0.05M acetic acid, and 0.025M acetic acid.

When the dialyzed collagen slurry is lyophilized, pure collagen was recovered.

### 7.5. Marketed formulation :

Jellyfish Collagen is a core ingredient in three of product



CLEANSING GEL

## EYE RESTORE VOISTURISER

Fig.41

# 8. PROPERTIES OF SOME INGREDIENTS FROM MARINE SOURCES WITH COSMETIC USE

Active component	Source	
Surfactants, emulsifiers, thickeners, stabilizers, moisturizers, and gelling agents		
Acid- and/or pepsin-	Fish species, Illex coindetii (squid), deep-sea redfish, threadfin	
soluble collagen	bream, walleye pollock, brownstripe red snapper, or unicorn	
	leatherjacket	
Alginates	Brown algae	
Bile acids	Myroides	
Carrageenans	Red algae	
	Myroides, Streptomyces, Yarrowia, Rhodotorula, Halomonas	
Chitosan and chitin	Sea animals as annelida, mollusca, coelenterata, and	
	crustaceans (lobster, crab, shrimp, prawn, and krill),	
	microorganisms such as green algae, yeast (`-type), fungi (cell	
	walls), brown algae, spores, chytridiaceae, ascomydes, and	
	blastocladiaceae	
Collagen	Scylla serrata; Chondrosia reniformis; bivalve molluscs; Ircina	
	fusca, Takifugu rubripes skin	
Exopolysaccharides	Bacillus, Planococcus, Cyanothece	
Gelatin	Species of fishes	
lipids - glyco	Halomonas	
Peptides- lipo	Bacillus, Nocardiopsis alba	
Phycocyanin	Cyanobacteria	
-phycoerythrin	Porphyridium cruentum	
R-phycoerythrin	Corallina elongata	
Astaxanthin	Penaeus semisulcatus	

Table 10

### 9. FUTURE ASPECTS

The maritime environment is home to a large number of macro and microorganisms that use undiscovered metabolic activities to enable their survival in this diverse and often perilous environment. This unique environment aids the production of a variety of secondary metabolites that act as chemical defences and have a wide range of antibacterial bioactivities. Only seven marine-derived metabolites have been licenced as pharmaceuticals to date, despite their structural and stereochemical diversity, while 12 MNPs (or derivatives thereof) are now undergoing clinical trials at various levels.

As previously noted, none of the newly discovered marine natural chemicals have yet to be tested in humans, but a few are in the early phases of development. MNPs are making slow progress toward clinical trials due to a number of roadblocks that are preventing their development as therapeutic medicines. One of the most crucial criterion is "constant supply." Large quantities of a substance are required for biological investigations to assess the location of action, specific targets, drug selectivity, and cytotoxicity. Regardless of a functionally promising chemical's potential applications, researchers have a significant challenge in that preclinical development takes several hundred grammes of the compound, whereas clinical trials require multi kilogramme amounts. One of the most major hurdles in the development of MNP for therapeutic use is often this. Synthetic chemists around the world, on the other hand, are continuing to develop synthetic and semi-synthetic techniques in order to meet the requirements for progressing these molecules to the preclinical stage and eventual commercialization for commercial or therapeutic usage.

MNPs can be chemically altered to create 'drug-like' molecules employing various biosteric structural components. In addition, to address the issue of macroorganism supply sustainability, improvements in mariculture (farming an organism's growth in its natural habitat) and aquaculture (culturing an organism under artificial conditions) have been undertaken. On the other hand, the unique and sometimes exclusive conditions of the sea make cultivating and maintaining isolated samples extremely difficult, if not impossible.

The preclinical pipeline also requires considerable mechanistic and pharmacokinetic research to generate customised MNPs, which is a difficult yet fascinating endeavour in and of itself. Despite these challenges, the preclinical pipeline continues to provide hundreds of novel bioactive marine compounds with therapeutic potential to researchers. The marine pharmaceutical pipeline remains active globally, and it now appears to have enough momentum to bring further antimicrobial medications to market in the foreseeable future. Various marine compounds have a high level of efficiency against diseases, and their exploitation and application will undoubtedly continue to grow.

Genome mining has ushered in a new era in natural product development, bringing renewed hope to the ongoing search for new antibacterial chemicals. This technique enables researchers to tap into the real biosynthetic potential found in a wide range of marine microorganisms, providing vital information into not only biosynthetic, but also evolutionary and defensive tactics used by these organisms in the ocean. Collaborations including marine natural product chemistry, organic chemistry, medicinal chemistry, pharmacology, biology, bioinformatics, and other disciplines will help to ensure and enable an increase in the number of marine natural product antimicrobial medicines hitting the market.

#### IMPORTANCE OF MARINE BIOACTIVES FOR HERBAL COSMETICS



Fig.42



Fig.43

60.

### **<u>10.</u>** CONCLUSION

Marine invertebrates (Porifera, Cnidaria, Mollusca, Arthropoda, Echinodermata, and others) are one of the major groups of biological organisms (Porifera, Cnidaria, Mollusca, Arthropoda, Echinodermata, and others) that have provided a significant number of natural products and secondary metabolites with pharmacological properties and led to the development of novel drugs. Marine sponges of the phylum Porifera are the most dominant group of marine invertebrates, having discovered a huge number of natural products that have been utilised as a model for developing therapeutic medications. These natural compounds have antibacterial, antioxidant, antihypertensive, anticoagulant, anticancer, anti-inflammatory, wound healing, and immunological modulator activities, among other medical qualities. As a result, marine sponges are thought to be a rich source of chemical diversity and health benefits for generating medication candidates, cosmetics, nutritional supplements, and molecular probes that can be used to help humans live longer and healthier lives. The most important and frequently cited reviews for marine sponge compounds were included in this review, as well as chosen studies of the most important bioactive and promising natural components and secondary metabolites from marine sponges published in the recent five years.

Microalgae and cyanobacteria are great sources of a wide range of bioactive chemicals. Polysaccharides, carotenoids, lipids, and proteins, for example, are known to provide a variety of health benefits.

Microalgae and its nutraceutical-derived compounds have been studied in a variety of nutritional research around the world, however there are few studies on their cosmetic applications. Chlorella, Spirulina, Nannochloropsis, Porphyridium, Nostoc, and Dunaliella are the most studied species, and their potential for preventing skin ageing, UV radiation damage, and oxidative stress should pique curiosity and spur study into their usefulness as cosmetic and cosmeceutical ingredients.

Some microalgae and cyanobacteria are rich in pigments such as phycocyanins, phycocyanobilin, and phycoerythrobilin, which could be used to make natural colourants for beauty cosmetics (e.g., lipsticks, eye shadows, eye liners, and so on). The cosmetic sector may be interested in more intensive study on discovering novel chemicals from microalgae and cyanobacteria.

Microalgae are cultivated on a large scale for the synthesis of large amounts of various chemicals or specific bioactive molecules. As a result, by changing biomass production to optimise the synthesis of certain cosmetic chemicals, the commercial exploitation of microalgae and cyanobacteria for cosmetic purposes could be improved.

We have shown in this review that there is a potential market for the cosmetic and cosmeceutical uses of microalgae and cyanobacteria bioactive chemicals, with a special market for usage in thalassotherapy. As a result, study in this area should be encouraged.

In conclusion, with the increase in demand for natural products for skin care and wellbeing treatments in spa and thalassotherapy centers, microalgae may be a significant source of substances with beneficial effects for skin health. Its wealth of polysaccharides, carotenoids, unsaturated fatty acids, vitamins, and other antioxidants that protect against UV radiation, etc makes them potential raw materials for the development of cosmetics and cosmeceuticals, but also for thalasso products; therefore, research into these ingredients and their uses must be promoted and extended.

Finally, with the growing demand for natural skin care and wellness treatments in spas and thalassotherapy centres, microalgae could be a substantial source of chemicals with skin-healthy properties. Its abundance of polysaccharides, carotenoids, unsaturated fatty acids, vitamins, and other antioxidants that protect against UV radiation, among other things, makes it a potential raw material for the development of cosmetics and cosmeceuticals, as well as thalasso products; as a result, research into these ingredients and their uses must be encouraged and expanded.

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