IJARSCT
International Journal of Advanced Research in Science, Communication and Technology
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
ISSN: 2581-9429
Volume 6, Issue 5, March 2026
Impact Factor: 8.2

A Comprehensive Review on Marine Drugs

Dr Abhishek Kumar Sen, Prof S. B. Shinde, Gaikwad Nikita Shashikant
Pratibhatai Pawar College of Pharmacy Wadala Mahadev, Shrirampur, Ahilyanagar

Abstract: *Marine microorganisms have received much attention in biological discoveries due to the special physicochemical characteristics they have acquired as they have adapted to the extreme conditions present in the marine environment. Unique marine microorganisms and their biologically active metabolites have been noted as potential sources for use as sustainable food and pharmaceutical ingredients. Marine microorganisms have excellent potential against several diseases due to the natural biomedical compounds present in them. So that the marine environment is most utilized and trusted for drugs with therapeutic uses, bioactive compounds, etc. Marine drugs have diverse structural features and mechanisms of action. They are known for antibiotic, antiviral, anti- inflammatory, anticancer, anti-fungal, antiobesity, and Immuno-protective activities. Marine medicine is also used for heparin overdose, vaccine carriers, and omega-3 fatty acid supplementation in the diet. In the present manuscript, we have thoroughly studied marine drugs that have been successfully used in the clinic.. .*

Keywords*:* Marine drugs, Marine microorganisms, Marine medicine, Marine environment

I. INTRODUCTION

Oceans occupy more than 70%of the planet's surface, and they are home to 95% of the biosphere.The first living things in the sea originally arose more than 3500 million years ago.Since their signilife has come to light more and more recently, so has our interest in understanding how marine ecosystem work.[1,2] Over the course of evolution, marine bacteria have changed the chemistry of the seas and atmosphere. In marine habitats, there are thousands of different species of bacteria, fungus, and viruses that construct intricate microbial food webs. The marine flora and animals are an important source of novel molecular entities. There are 5 million species in about 30 phyla in the waters of the planet. Terpenes, polyketides, and other chemical classes are among those found in marine natural products.In this review, we present drugs from marine compounds, it's biological source, purification process and therapeutic action of the particular microorganisms.Bioactive are the biologically active complex which are generated by marine organisms.About 10% of known biologically active natural foodstuff or products are obtained from microbial origin. Microbial resultant bioactive by the 20th century had turn out to be the basis of pharmaceuticals. Researchs have confirmed us that living surface symbolize an environment that synthesize and correlated drugs are used to treat 87% of human disease like anti-cancer, antibacterial, antiparasitic, anticoagulant, immunosuppressant.The human body uses inflammation, a complicated biological response, to react to a variety of dangerous stimuli, such as pathogens, toxic substances, and damaged cells. Furthermore, inflammation is essential for tissue regeneration and repair [1]. While a chronic inflammatory response can arise from an inappropriate immune response and cause tissue damage and destruction, acute and controlled inflammation is generally advantageous [2]. Similar to inflammation, the process brought on by damage to the nervous system is referred to as neuroinflammation. Long-term neuroinflammation can impair physiological regulation and lead to a number of detrimental effects, including proinflammatory signaling pathways, oxidative stress, and neuronal death. Only since the 1960s and the 1980s has the field of marine natural products chemistry been pursued seriously with an emphasis on drug discovery. The most noticeable and collectable organisms, such as intertidal and shallow subtidal macroalgae and invertebrates, were the main focus of early research. Since the introduction of SCUBA and the subsequent use of deep-sea diving vessels for this purpose, organisms from everdeeper waters have been gathered and examined for secondary metabolites that are important to medicine. A considerable portion of the more than 22,000 distinct marine

Copyright to IJARSCT
www.ijarsct.co.in
DOI: 10.48175/IJARSCT-31974

IJARSCT
International Journal of Advanced Research in Science, Communication and Technology
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
ISSN: 2581-9429 Volume 6, Issue 5, March 2026 Impact Factor: 8.2

metabolites that have been isolated and structurally described as a result of these efforts have been assessed for biological activity, such as toxicity to mammalian cells or antimicrobial effects[1].The perspective's main goals are to highlight the enthusiasm surrounding the search for novel drugs from the ocean, highlight some of the achievements that support this endeavor, and offer some potential directions for future research. The majority of marine natural products drug discovery research is conducted in the public sector due to shifts in the private sector that have changed interest in these "higher risk" activities, despite the general enthusiasm for the field and the successful products that have been developed. However, is it correct to say that efforts to find new drugs involving marine natural products are high risk Maybe, but that depends on your point of view [2]

Literature Survey:

1. The review by Muskan Gupta (2023) presents a comprehensive overview of bioactive compounds derived from marine organisms and emphasizes their growing pharmaceutical relevance. According to the authors, marine ecosystems— which occupy almost 70% of the Earth's surface— harbor a vast diversity of organisms such as algae, sponges, molluscs, marine bacteria, and fungi. These organisms produce a wide range of structurally unique secondary metabolites that help them adapt to extreme marine conditions. Many of these compounds have shown significant therapeutic potential in human health.
2. Gerwick and Fenner (2012) emphasize that marine microbes—including bacteria, actinomycetes, and fungi—are valuable sources of novel drug leads due to their ability to produce distinctive secondary metabolites not found in terrestrial organisms. Research has shown that several compounds once attributed to marine sponges and tunicates are actually synthesized by their associated microbial symbionts. Despite challenges such as the difficulty of cultivating many marine microbes, advances in genome mining, metagenomics, and modern analytical tools are enabling the discovery of new bioactive molecules with anticancer, antibacterial, and antiviral activities. Overall, the authors conclude that marine microbes hold significant promise for future drug discovery and therapeutic innovation.
3. Sruthi et al. (2020) explain that the marine environment is a rich and largely unexplored source of new drug molecules. Marine organisms such as sponges, algae, tunicates, and microorganisms produce unique bioactive compounds with diverse activities, including anticancer, antiviral, antibacterial, anti-inflammatory, neuroprotective, and antiparasitic effects. Advances in isolation and analytical techniques have accelerated the discovery of these marine natural products. The authors emphasize both the potential and the challenges of marine drug research—such as difficulty in cultivation, limited supply, and ecological concerns—and conclude that marine pharmacology offers great promise for developing novel therapeutic agents.
4. Barzkar, Jahromi (2019) highlight that marine microorganisms and macroalgae are abundant sources of structurally diverse metabolites with strong pharmacological potential. These marine- derived compounds exhibit activities such as anticancer, antimicrobial, antiviral, antioxidant, and anti-inflammatory effects. The authors emphasize that advances in biotechnology, genomic tools, and cultivation techniques have improved the discovery and characterization of these metabolites. They conclude that marine microbes and macroalgae represent an immense and still underexplored resource for developing novel therapeutic agents.

Definition:

Marine Drugs:

Marine pharmacognosy is a sub branch of pharmacognosy which is mainly concerned with the naturally occurring substances of medicinal value from marine. Generally the drugs are obtained from the marine species of bacteria, virus, algae, fungi and sponge.

Marine sources:

Marine organisms such as sponges, tunicates, fishes, soft corals, nudibranchs, sea hares, opisthobranch Molluscs, echinoderms, bryozoans, prawns, shells, sea slugs, and marine microorganisms are sources of bioactive compounds.

IJARSCT
International Journal of Advanced Research in Science, Communication and Technology
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
ISSN: 2581-9429
Volume 6, Issue 5, March 2026
Impact Factor: 8.2

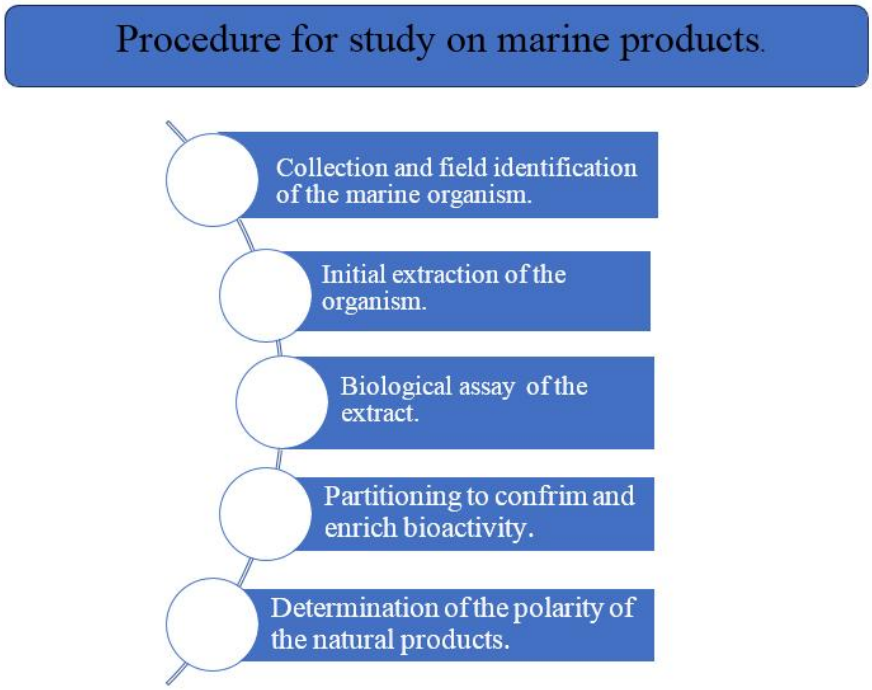


Fig 1: Procedure for study on marine products.

Marine Collagen:

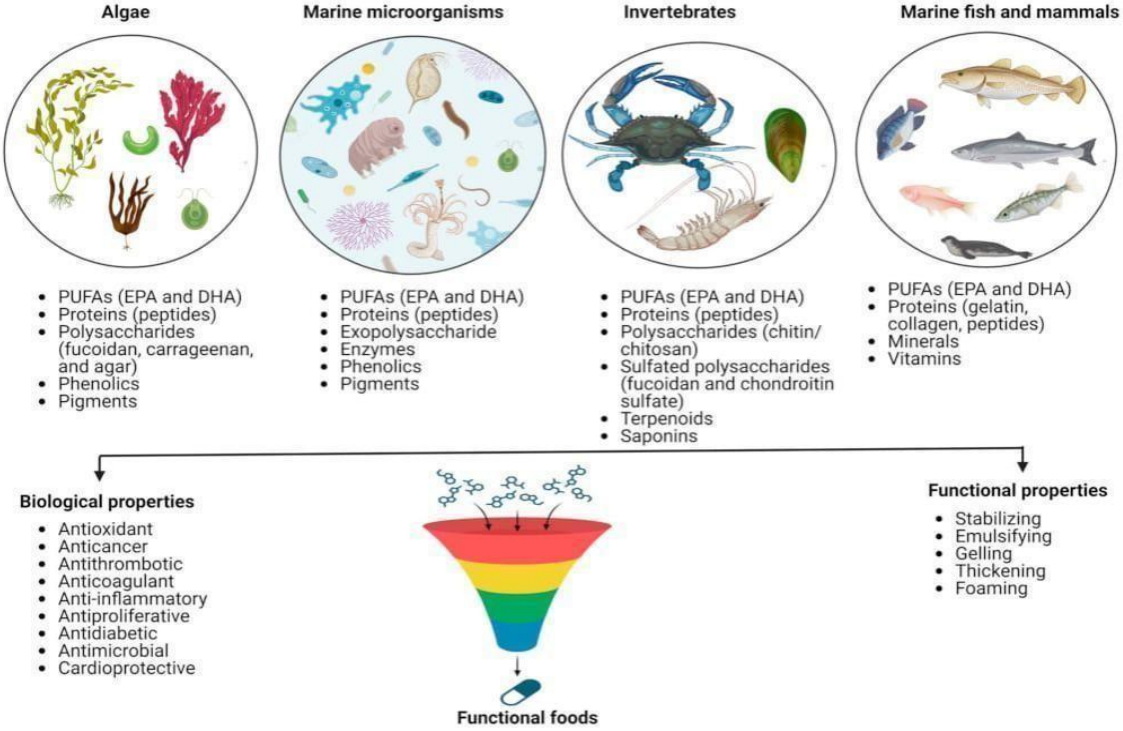
Marine collagen is primarily obtained from fish especially the sikn of wild caught cod that are not considered endangered. It is a Type 1 collagen derived from fish collagen peptides and is known for being the most bioavailable and efficiently absorbedf from of collagen currently available.

Symptoms: Itching, Rashes,Swelling

Fig 2:Marine collagen

IJARSCT
International Journal of Advanced Research in Science, Communication and Technology
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
ISSN: 2581-9429
Volume 6, Issue 5, March 2026
Impact Factor: 8.2

Different marine sources with major bioactivity area discovered:



Classification of Drug Molecules of marine organisms:

marine organism across the world may be judiciously and logically classified based on their The enormous quantum of newer and potent drug molecule derived from the wide spectrum of specific pharmacologic actions as stated below.

1. Anti-Bacterial
2. Anti-Inflammatory
3. Anti-Cancer
4. Anti-Viral Agents
5. Anti -Microbial

1. Anti-bacterial:

Eicosapentaenoic Acid, a type of polyunsaturated fatty acid, comes from a marine inhabitant known as phaeodactylum tricornutum. It shows interesting effects against various strains of both good and bad bacteria, including a type of staphylococcus that resists several antibiotics. In terms of its benefits, the extracts have anti-inflammatory properties as well[8]

2. Anti-inflammatory:

The extracts from the Mediterranean sponge species, known as Spongia officinalis, have been studied for their anti-inflammatory properties. This research involved testing various amounts of these extracts on rats, using the carrageenan-induced paw swelling method.

Copyright to IJARSCT
www.ijarsct.co.in
DOI: 10.48175/IJARSCT-31974

IJARSCT
International Journal of Advanced Research in Science, Communication and Technology
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
ISSN: 2581-9429
Volume 6, Issue 5, March 2026
Impact Factor: 8.2

3. Anti-cancer:

The large and distant substance bryostatin is derived from bryozoans.Buegula neritina. Additionally, some documentation had been taken from sponges and tunicates. Spinoff of Sorbicillin alkaloids two', three'-dihydrosorbicillactone A and its analoguein contrast, sorbicillactone B has demonstrated its interest inleukemia cells that have not been exposed to cytotoxicity.Using salt water, sorbicillactone-B was created of the penicillium chrysogenum bacterial stress.The sponge has been separated from Penicillium chrysogenum.An example of a Mediterranean sponge is Ircinia fasciculata.

4. Anti-Viral Agents:

From the French plant Celtodoryx giradae marine sponge and the symbiotic bacteria that are linked to it There is evidence of anti-herpes simplex virus-1 (HSV) activity inexopolysaccharides with a higher molecular weight, whichare taken.

5. Anti-Microbial:

Cehalosporin is a well-known antimicrobial agent that possess a marine origin. From a marine fungus first, marine cephalosporin C was extracted and purified.The fungus that was used to extract it was the cephalosporin Acromeum9,10,11].

Marine Biodiversity as a Chemical Reservoir:

The marine environment is arguably the largest and most under-explored reservoir of biodiversity on Earth, representing an immense chemical library for drug discovery. For example, it has been observed that up to 33 of the 34 major animal phyla are represented in the oceans, whereas only 12 occur on land. This extraordinary biological diversity implies a correspondingly vast chemical diversity, because evolutionary adaptation to a wide variety of marine habitats—such as shallow coral reefs, deep-sea trenches, hydrothermal vents, polar seas, and mangroves—has driven the development of unique metabolites for survival. Indeed, marine organisms have produced novel chemical scaffolds not encountered in terrestrial systems, making them a valuable "chemical reservoir" for bioactive compounds [8].

MARINE DRUGS:

1] Cytarabine (cytosine arabinoside or arabinosyl cytosine, ara-C):

Cytarabine is a syntheticpyrimidine nucleoside derived from spongothymidine and primarily isolated from a Caribbean sponge species Tethya crypta. It is FDA approved and mainly used in different types of leukemia, including acute myelocytic leukemia, lymphocytic leukemia, meningeal leukemia, and blast crisis phase of chronic myelogenous leukemia.

Molar Mass: 243.217 G/Mol

Formula: C9H13N3O

Routes of Administration: Injectable (Intravenous or infusion or intrathecal or subcutaneous)

MOA: It is converted into the triphosphate form with in the cell and complete with cytidine to combine itself into DNA.The sugar moiety of Cytarabine hampers the rotation of the molecule in the DNA. Excretion: Kidney

Protein Binding:13%

Metabolism: Liver

Class: anti metabolites

Dosing: In the induction therapy of acute non- lymphocyticleukaemia, the usual Cytarabine dose in combination with other anti-cancer drug is 100mg/m2/day by constant IV infusion (day 1-7) or 100 mg/m2 lV every 12 hours (day 1-7).

IJARSCT
International Journal of Advanced Research in Science, Communication and Technology
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
ISSN: 2581-9429
Volume 6, Issue 5, March 2026
Impact Factor: 8.2

Side Effects: Bone marrow suppression with leukopenia thrombocytopenia and anaemia, nausea, vomiting, diarrhea, abdominal pain.

Fig 3:Cytarabine

2] Vidarabine: (adenine arabinoside, Ara-A Vidarabine (adenine arabinoside, ara-A or arabinofuranosyladenine :
Vidarabine is a synthetic purine nucleoside isolated from the Caribbean sponge T. Crypta and developed from spongouridine is currently obtained from Streptomyces antibioticus. It is approved by FDA for use in recurrent epithelial keratitis caused by HSV) type 1 and 2, acute kerato- conjunctivitis, and also for superficial keratitis.
Molar Mass: 267.24
Formula: C10H13N5O4
Route of Administration: Eyes
Excretion: Kidney
Protein Binding: 24-38%
MOA: Vidarabine work by snooping with the production of viral DNA. It is nuucleoside analog and therefore has to be phosphorylated to be active.
Viral DNA. It is nucleoside analog and therefore has to be phosphorylated to be active. Vidarabine is consecutively phosphorylated by kinases to the triphosphate ara-ATP by 3 step process.
Side Effects: Burning, pain, irritation, itching, redness, swelling, blurred vision.

Fig 4:Vidarabin

IJARSCT
International Journal of Advanced Research in Science, Communication and Technology
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
ISSN: 2581-9429
Volume 6, Issue 5, March 2026
Impact Factor: 8.2

2] Ziconotide:

Ziconotide is a synthetic molecule, equivalent to a natural 25-amino acid peptide, vconotoxin MVIIA. It is originally extracted and purified from the venom of marine snail C. Magus, which is a fish-hunting species. Ziconotide has shown potential as an analgesic with a novel mechanism of action. It is approved as an analgesic by FDA.

Molar Mass: 2639.14

Formula: C102H172N36O32S7

Route Of Administration: Intra thecal

Excretion:<1% urine

MOA: Its binding blocks N-type calcium channels, which lead to a barrier of excitatory neurotransmitter release from the primary afferent nerve terminal and antinociception. Side Effects: Dizziness, drowsiness, nausea, headache,weakness.

Fig 4:Ziconotide

3] Tetrodotoxin

A very well known “marine toxin,” and highly substituted guanidine-derivative.Itis not an anti- tumor agent, currently in Phase III trials as analgesic against inadequately controlled pain related to the cancer. A Phase II trial is ongoing to assess the efficacy of tetrodotoxin against the neuropathic pain related to chemotherapy-induced peripheral neuropathy.

Molar Mass: 319.27 g/mol

Formula : C11H17N3O8

MOA: Inhibits voltage gated sodium channels, preventing cell membreane from depolarising. Thisin turn inhibit action potential propagation and prevents neurons and myocytes from functioning

SideEffects: Headache, diaphoresis, bodynumbness, dysantheria, dysphagia, nausea,vomitting, abdominal pain, generalised malaisc weakness.

IJARSCT
International Journal of Advanced Research in Science, Communication and Technology
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
ISSN: 2581-9429
Volume 6, Issue 5, March 2026
Impact Factor: 8.2

Fig 5 :Tetrodotoxin

4] Plitidepsin: :

It is a natural marine depsipeptide, currently obtained by total synthesis. It was primarily isolated from a tunicate Aplidium albicans found in the Mediterranean Sea. plitidepsin is a highly potent apoptosis inducer with low nanomolar (nM) range of IC50 values. The major toxicity found with most schedules of plitidepsin were muscle toxicity, an increase of transaminases, general fatigue, diarrhea, and cutaneous rash.

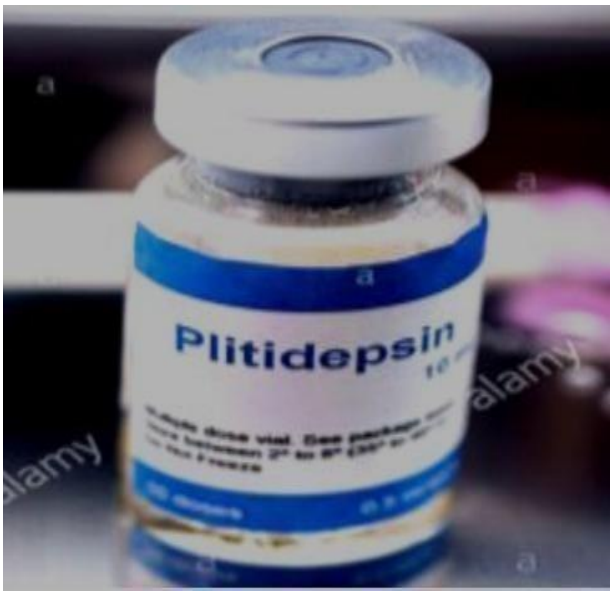


Fig 6:Plitidepsin

IJARSCT
International Journal of Advanced Research in Science, Communication and Technology
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
ISSN: 2581-9429
Volume 6, Issue 5, March 2026
Impact Factor: 8.2

5] Elisidepsin (PM02734)
It is a novel cyclic peptide derived from marine sources and belongs to the Kahalalide family of compounds. It is currently undergoing development in Phase II with primary evidence of antitumor potency with encouraging therapeutic index. It has shown potent in vitro cytotoxic action against diverse human tumor cell lines, which may be because of oncolytic cell death induction instead of apoptotic cell death.

6] Soblidotin (auristatin PE or TZT-1027) :
Is a synthetic derivative of the dolastatin backbone from dolastatin 10? It is a vascular disrupting agent causing the collapse of the vasculature inside the tumor, in addition to its tubulin inhibitory activity. This drug is undergoing trials in clinical Phases I, II, and III with different companies who are trying to use it as a weapon to specific monoclonal antibodies linked via customized peptide

Method To Extract Various Biomolecules From Seafood Waste:
When seafood is processed, by-products are created.It has significant effects on the environment and the economy [12].By utilizing a blend of green approaches, certain issues can be fixed, such as the extraction techniques as well as the operational circumstances that were employed are extremely important in the production of green extraction yield and higher-quality target substances. This is due to the variety of seabyproducts and because of the differences in the food biomolecules' characteristics[13].
1] Traditional Method:
Traditional extraction techniques that are frequently used include maceration,soxhlet and Percolation. These
selected based on the polarity of the molecules to be extracted, such as ethanol, water methanol, acetwater, and other combinations. Mixtures of hydroalcoholics are suitable for this method since phenolic compounds are hydrophilicphilic[15].
2] Ultrasound Assisted Method:
To increase the effectiveness of ultrasonic wave extraction in the 20–1000 KHz ranges are frequently utilized. The ultrasonicwaves the mechanical waves passing through the intendedmatrices through rarefaction and compression. When through the solvent, the ultrasonic waves propagate, they generate negative pressure. R Ultrasonic waves with frequencies between 20ng20 and kHz0KHz are typically utilized for the pressure-stress difference caused by the bubbles in this method Bubbles are created. When these bubbles exploded, cavitation happens as a result of triggbreakup, which breaks the solid-solid interface and releases the bioactiv there is a cmatrix intorixinto matrix. In order to extract phenolic chemical compounds derived from algae[19].

Processes for marine natural product drug discovery:
A typical workflow for marine natural product (MNP) drug discovery begins with the collection of biomass—such as a marine invertebrate or a microbial culture isolated from a marine source
(e.g., sediment, sponge, etc.). This biomass is then used for large-scale fermentation to produce bioactive compounds[12].

IJARSCT
International Journal of Advanced Research in Science, Communication and Technology
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
ISSN: 2581-9429
Volume 6, Issue 5, March 2026
Impact Factor: 8.2

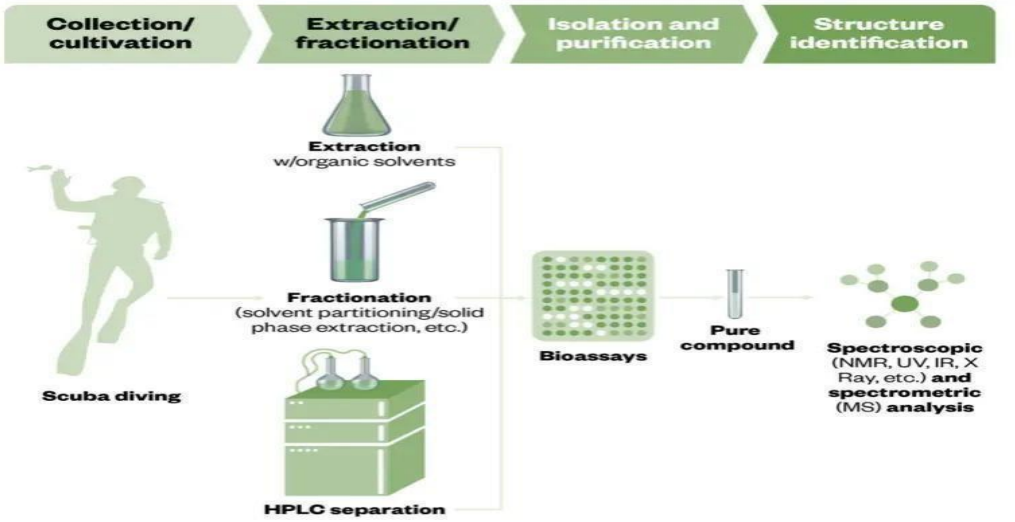


Fig7: Traditional workflow for getting bioactive MNPs from marine sources to their structural characterisation.

Bioactive NPs from Marine Bacteria and Fungi:

Bacteria and fungi are widespread in marine environments, and over the past few decades, the number of bioactive compounds discovered from these marine microorganisms has steadily increased [5]. Marine bacteria, in particular, produce a diverse range of secondary metabolites that help them adapt to the harsh conditions of the ocean [1,6].

Merits and Demerits of marine pharmaceutical:

Fig 8: Merits of Marine pharmaceuticals.

IJARSCT
International Journal of Advanced Research in Science, Communication and Technology
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
ISSN: 2581-9429
Volume 6, Issue 5, March 2026
Impact Factor: 8.2

Fig 9: Dismerits of Marine pharmaceuticals.

Use of marine compounds in diagnosis and experimental tools:

The marine compound (isolate) is used as a diagnostic, disease modifying and laboratory tool.Pfu, an enzyme from the marine thermophilic Pyrococcus furiosus used for PCR. GFP, green fluorescent protein isolated from the jellyfish Aequorea Victoria. It is used as a biological marker to label cellular structures in vitro and in vivo. Shimomura (Japan), Chalfie and Tsien(USA) received the Nobel Prize in 2008 for their discovery and applications in the year 2008. LAL-Limulus amebocyte lysate obtained from Polyphemus crab, for detection of pyrogenic lipopolysaccharidein bacteria.Keyhole lymph hemocyanin (KLH) is a largemultisubunit oxygen- transporting metalo-protein found in the hemo-lymph of the giant lymph of Megathura crenulata, a marine mollusc native to the California Coast of the United States[1].

Identification and Isolation of Bioactive Compound from Marine Natural Extract :

The application of advanced analytical techniques begins with the screening of crude drug extracts, followed by the isolation and identification of bioactive molecules. These extracts are fractionated to obtain the active moieties from natural products [28]. The isolation of a bioactive compound is a complex and labor-intensive process. Once isolated, the molecule is analyzed against extract libraries and subjected to high-throughput screening, allowing the crude extract to be pre- fractionated into subfractions that are compatible with automated liquid-handling systems [3]. Fractionation methods can be modified to produce preferential subfractions enriched with active compounds of similar characteristics. This approach increases the number of potential hits compared with crude extracts, leading to more efficient and promising outcomes [6]. Advances in analytical instrumentation, combined with modern computational techniques, have facilitated the identification of structural analogues of natural products [29]. Furthermore, metabolomics provides detailed information about the metabolic composition of crude marine extracts, aiding in the prioritization of compound isolation and dereplication to identify structural analogues of newly derived products[28].

IJARSCT
International Journal of Advanced Research in Science, Communication and Technology
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
ISSN: 2581-9429
Volume 6, Issue 5, March 2026
Impact Factor: 8.2

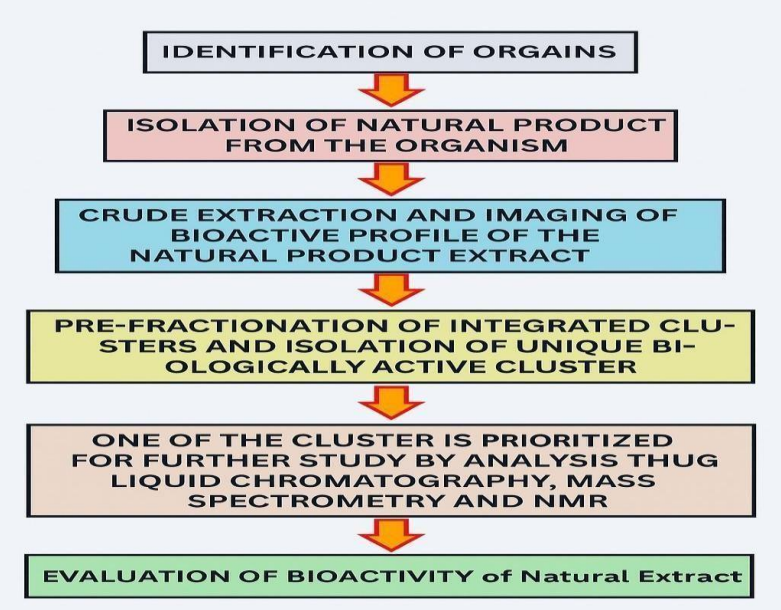


Fig10: The process of isolation of a bioactive molecule from a marine source.

Sources of Marine Natural Products:

The producers of marine natural products (MNPs) are broadly categorized into three major biological groups:

• Marine microorganisms – including bacteria, fungi, cyanobacteria, and phytoplankton.

• Marine algae – encompassing macroalgae or seaweeds, which are classified into green, brown, and red algae.

• Marine invertebrates – such as bryozoans and coelenterates.

Additionally, microalgae like blue-green algae, dinoflagellates, and diatoms (Bacillariophyta) are also significant contributors to MNP production.

Chemical Composition of Marine Drugs :

Marine-derived compounds belong to diverse chemical classes such as alkaloids, terpenes, polyketides, peptides, steroids, polysaccharides, and fatty acids. The complexity and novelty of these molecules make them potential candidates for pharmacological development.

• Polyketides: Macrolides like halichondrin B, derived from Halichondria okadai, form the basis for the anticancer drug eribulin.

• Peptides: Conotoxins from Conus species act on ion channels and serve as analgesic agents.

• Terpenoids: Diterpenes and sesterterpenes exhibit antimicrobial and cytotoxic effects.

• Polysaccharides: Sulfated polysaccharides from algae display anticoagulant and antiviral properties [3–6].

Current Status in Marine Pharmacology:

New modern technologies have opened many research opportunities to extract useful biomedical compounds from the ocean. Marine animals like sponges, bryozoans, and tunicates do not have strong body defenses, so they produce special chemical compounds called secondary metabolites for protection. These compounds are very interesting for drug development. Researchers are also studying marine microorganisms found in sediments and sponges. Some marine-based drugs are already in clinical trials, and many more are being developed[4].

IJARSCT
International Journal of Advanced Research in Science, Communication and Technology
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
ISSN: 2581-9429
Volume 6, Issue 5, March 2026
Impact Factor: 8.2

1. Sponge:
Marine organisms have many important properties such as anticancer, anti-inflammatory, and antibiotic effects. Researchers mainly study toxic compounds that help these organisms protect themselves from predators. Sponges are especially rich in compounds called terpenoids, which show strong antibiotic activity. Terpenoids are key ingredients in drugs like variabilins and hydroquinone, known for their pain-relieving and antiinflammatory effects.
Biological source: Phylum porifera

Chemical constituents:
Skeletal constituents:
1. Sopngin : Protein that forms a fibrous network providing flexible support.
2. Mesohyl:A gelatinous matrix that acts as an internal skeleton in soft-bodied sponges often stiffened by spongin or spicul.
Uses:
1. Cleaning and scrubbing
2. Personal care
3. Various household

Composition: Sponges can be made of natural or synthetic materials.

Fig 11 :Sponge

2. Algae:
Many scientists have reported that sulfated polysaccharides and oligosaccharides obtained from marine algae show antiviral, anti-inflammatory, immunomodulatory, antithrombotic, antilipidemic, and antioxidant activities. These compounds also have strong anticancer and antiviral properties. The algae species Spirulina platensis has been found to protect the liver (hepatoprotective effect) against carbon tetrachloride–induced liver damage in experimental studies conducted on rats.
Biological source:They can also be found in moist soil ,rockand on other organism.

Chemical constituents:
1. Carbohydrates:This is a major component, especially on a dry weight basis. It includes structural polysaccharides such as cellulose, mannans, and galactans, as well as storage carbohydrates like starch. Some algae also produce unique polysaccharides like alginic acid, agar, and carrageenan.

IJARSCT
International Journal of Advanced Research in Science, Communication and Technology
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
ISSN: 2581-9429
Volume 6, Issue 5, March 2026
Impact Factor: 8.2

2. Lipids :The lipid content varies, but algae are a valuable source of lipids, including phospholipids, glycolipids, and neutral lipids. They are particularly rich in polyunsaturated fatty acids (PUFAs), such as docosahexaenoic acid (DHA) and eicosapentaenoic acid (EPA).

Composition:Algae are composed of water and a variety of dry-weight components including carbohydrates (like cellulose, starch, and unique polysaccharides), proteins, lipids (including omega-3 and omega-6 fatty acids), pigments (such as chlorophyll and carotenoids), vitamins, and minerals (like iron and calcium)

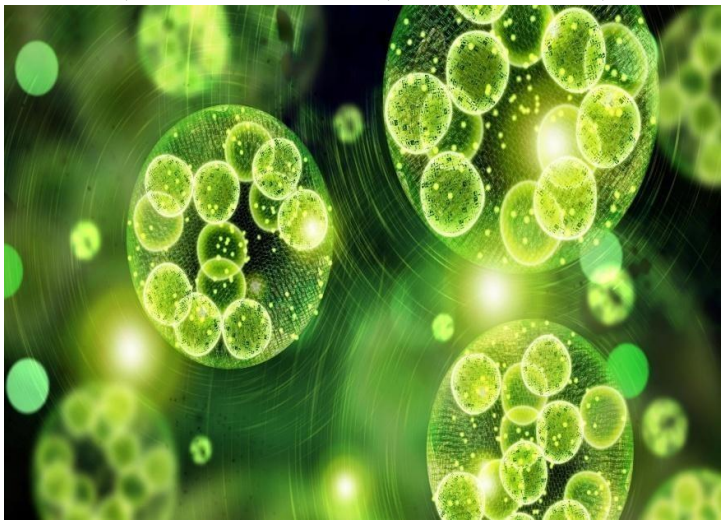


Fig 12: Algae

3. Sea whip:

Pseudopterosins are marine-derived compounds that exhibit strong anti-inflammatory and analgesic properties. They act by inhibiting the synthesis of eicosanoids in polymorphonuclear lymphocytes. Because of their highly selective activity toward specific biological targets, pseudopterosins have attracted great interest among researchers[1,3].

Biological source:On shell live bottoms in sounds and tidal creeks but can also be found on floating docks, rock jetties, and oyster reefs

Chemical constituents:The diterpenes, such as cembranoids like those found in Eunicea knighti. Other important compounds include the anti-inflammatory and analgesic pseudopterosins from Pseudopterogorgia elisabethae and the recently studied erogorgiaene, which shows potential for treating multi-drug resistant tuberculosis. Other compounds include a variety of terpenoids, such as norditerpenes and bisnorditerpenes

Uses:

1. Uses in skin care.
2. Anti inflammatory properties.

Composition:The composition of a sea whip includes an internal, flexible axial skeleton made of a tough protein called gorgonin, an outer layer of living tissue (coenenchyme), and microscopic, needle-like structures of calcium carbonate called sclerites.

IJARSCT
International Journal of Advanced Research in Science, Communication and Technology
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
ISSN: 2581-9429
Volume 6, Issue 5, March 2026
Impact Factor: 8.2

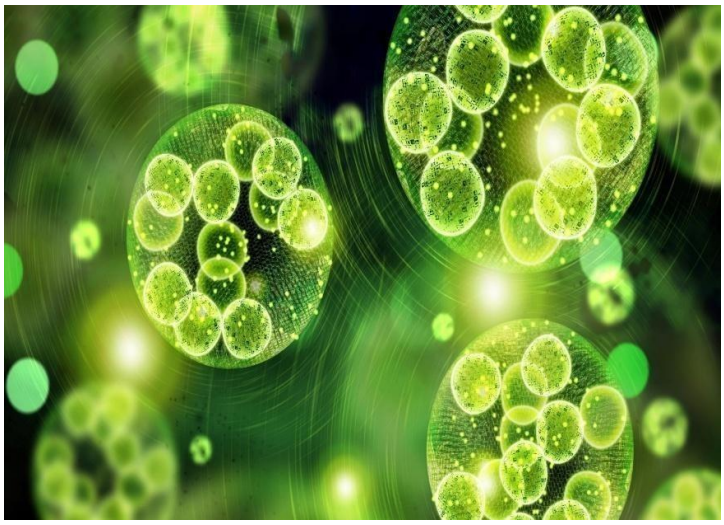


Fig 13 : Sea whip

4. Corals:Corals are marine animals that are either solitary or form colonies, known for creating hard, calcium carbonate skeletons that build coral reefs.

Biological source:Cnidaria

Chemical constituents:They also contain a small percentage of organic matter, which includes proteins like gorgonin, and trace elements like magnesium, iron, manganese, copper, and strontium.

Uses:

1. Used in medical treatments.
2. Medical and surgical uses.

Composition:Coral is primarily composed of calcium carbonate (\(CaCO_{3}\)), secreted by tiny coral polyps to form a hard skeleton.

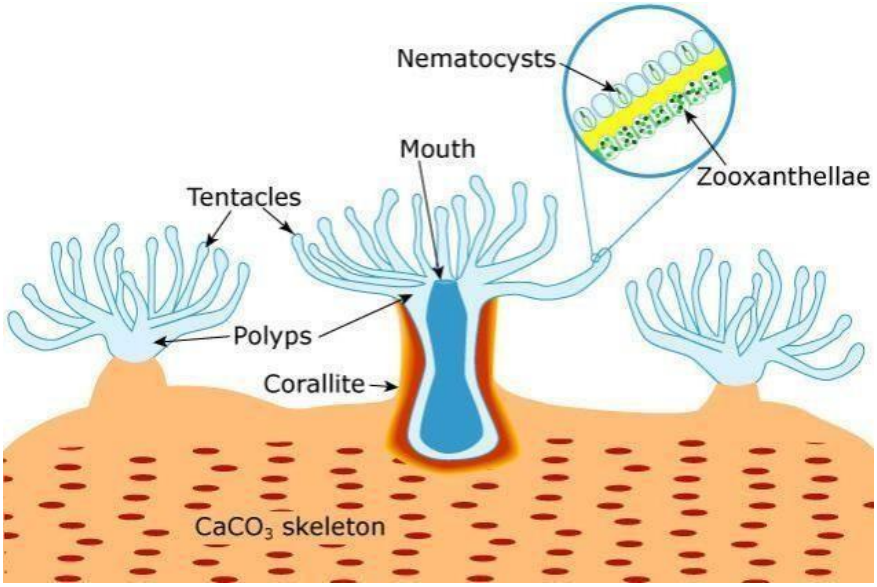


Fig 14: Corals

IJARSCT
International Journal of Advanced Research in Science, Communication and Technology
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
ISSN: 2581-9429 Volume 6, Issue 5, March 2026 Impact Factor: 8.2

5. Fungi:Fungi are simple organisms that live on organic matter and include molds, yeasts, and mushrooms.
Biological source: Fungi are composed by chitin, glucans, and glycoproteins in their cell walls, along with various bioactive secondary metabolites such as polyketides, terpenes, phenols,
and alkaloids
Chemical constituents:chitin and beta-glucans
Uses:
1. Food and beverage production.
2. Food and agriculture
3. Medicine
Composition:Fungi are composed of eukaryotic cells with a rigid cell wall made primarily of chitin and polysaccharides, and internal structures like a membrane-bound nucleus, mitochondria, and a plasma membrane containing the sterol ergosterol.

Fig 15:Fungi

6. Bacteria:
Biological source:Bacteria are ubiquitous single-celled organisms found in virtually every environment on Earth
Chemical constituents:Bacteria are chemically composed of water, proteins, nucleic acids (DNA and RNA), lipids, carbohydrates, and inorganic ions
Uses:
1. Production of food
2. Antibiotics and vaccines.
3. Killing the plang pests
Composition :Bacteria are single-celled prokaryotic organisms composed of a cell wall, plasma membrane, and cytoplasm containing ribosomes, a nucleoid with circular DNA, and sometimes plasmids.

IJARSCT
International Journal of Advanced Research in Science, Communication and Technology
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
ISSN: 2581-9429
Volume 6, Issue 5, March 2026
Impact Factor: 8.2

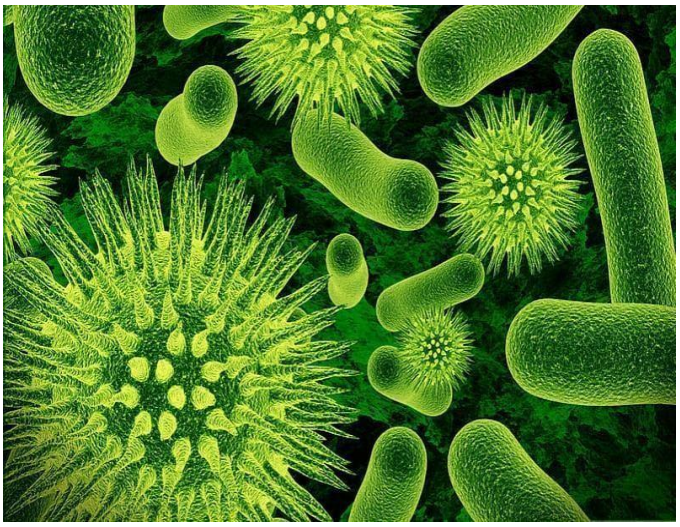


Fig 16 :Bacteria

7. Tunicates :

Biological source: A rich biological source for high-quality nutrients, unique cellulose, and potent bioactive compounds with pharmaceutical potential.

Chemical constituents: The unique animal cellulose in their tunic, bioactive compounds like alkaloids, peptides, and toxins (such as plitidepsin and trabectedin), and nutritional components like proteins, lipids (including ω-3 fatty acids), and carbohydrates.

Uses:

1. Food and animal feed.
2. Developing new biomaterials.

Composition:Tunicates are composed of a tunic made of cellulose and proteins.

Fig 17 : Tunicates

IJARSCT
International Journal of Advanced Research in Science, Communication and Technology
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
ISSN: 2581-9429
Volume 6, Issue 5, March 2026
Impact Factor: 8.2

8. Fish:

Biological source:The biological source of fish is the aquatic environments they inhabit, such as oceans, rivers, and lakes.

Chemical constituents:The main chemical constituents of fish are water, protein, lipid (fat), and ash (minerals).

Uses: Fish are used as a food source for protein and nutrients like omega-3s, for making products such as fish oil, fertilizer, and animal feed, and for economic purposes through fishing and related industries.

Composition:

1. Water:63- 83%
2. Protein:10-23%
3. Fat:1-13%
4. Minerals:1%

Fig 18:Fish

Marine Components As Diagnostics And Experimental Tools:

Marine compounds are not only used for treating diseases but also play an important role in diagnosis and research. For example, the Pfu enzyme, taken from the marine organism Pyrococcus furiosus, is used in PCR (polymerase chain reaction) for DNA amplification. Another example is the green fluorescent protein (GFP), found in the jellyfish Aequorea victoria. GFP is used as a biological marker to label cells and their parts in the lab, both in vitro and in vivo. For this discovery and its use, Shimomura (Japan), Chalfie, and Tsien (USA) received the Nobel Prize in Chemistry in 2008.The Limulus amoebocyte lysate (LAL), obtained from the horseshoe crab Limulus polyphemus, is used to detect harmful bacterial toxins (pyrogens) from Gram-negative bacteria. Another compound, keyhole limpet hemocyanin (KLH), is a large oxygen-carrying protein found in the blood of the giant keyhole limpet (Megathura crenulata), a marine mollusk from the coast of California, USA. KLH is widely used in research and as an immune-stimulating agent in medicine[12].

Sources Of Marine Drugs:

The ocean is home to a diverse range of flora and fauna, including sponges, coelenterates such as sea whips, sea fans, and soft corals, as well as tunicates, echinoderms like starfish and sea cucumber, bryozoans,and numerous type of

IJARSCT
International Journal of Advanced Research in Science, Communication and Technology
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
ISSN: 2581-9429
Volume 6, Issue 5, March 2026
Impact Factor: 8.2

marine microorganisms.

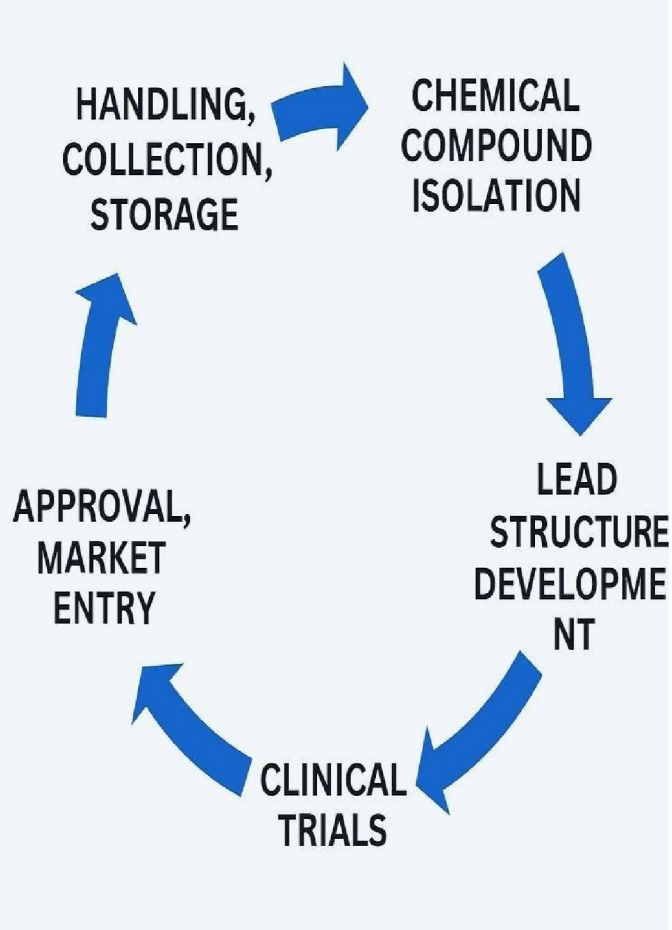


Fig 19 : Marine Drugs Development

Advantages:

1. Sources for developing potent drugcandidates.
2. As nutritional supplements.
3. As molecular probes that can be
4. As molecular probes that can be supported to increase the healthy life span of human.
5. Use in cosmetics.
6. Unlimited suppy of biomass.

Disadvantages:

1. Toxicity issues.
2. Cultivating organisms for production, supply issuemacro and microorganisms.
3. Expression of silent biosynthetic pathways.
4. The marine ecosystem 8s not only productive to discover novel entities but it is also a tool to identify new cellular targets for therapeutic intervention.

IJARSCT
International Journal of Advanced Research in Science, Communication and Technology
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
ISSN: 2581-9429
Volume 6, Issue 5, March 2026
Impact Factor: 8.2

Uses:

- Anti-bacterial
- Anti-fungal
- Anti-cancer
- Imunomodulatory
- Anti-inflammatory
- Anti-microbial
- Neuroprotective
- Analgesic
- Antimalarial properties

II. CONCLUSION

In conclusion, marine-derived compounds have great potential as valuable sources for developing new medicines and therapies. The oceans contain a vast variety of organisms that produce many unique chemical substances with different biological activities. Research has shown that several of these marine compounds have promising effects in both laboratory and clinical studies. They have been found to show a wide range of beneficial activities, such as fighting cancer, reducing inflammation, and protecting against infections and nerve damage.Marine organisms like bacteria, algae, sponges, and corals have helped scientists discover and study these active compounds, leading to new possibilities in drug discovery. In addition, studying marine life has helped researchers understand how these compounds work in the body. Many of them act in new and different ways on biological targets, which can inspire new strategies for developing effective drugs.

REFERENCES

[1]. .Muskan Gupta, Annu Kumari, Abhishek Rankawat & Gaurav Rankawat.Marine drugs: A review. Asian Journal of Pharmaceutical Research & Development,2023, 11(4), 155–161 DIO-http://dx.doi.org/10.22270/ajprd.v11i4.1301.

[2]. William H. Gerwick, Amanda M. Fenner. Drug discovery from marine microbes.Author manuscript peer reviewed and accepted for publication by journal published in final edited as Microbial lEcology-2012 Dec 30:65(4), 800–806.10.1007/s00248-012-0169-9. https://pmc.ncbi.nlm.nih.gov/articles/PMC3640700/

[3]. Gerwick, W. H., & Moore, B. S. (2012). Lessons from the past and charting the future of marine natural products drug discovery and chemical biology.Chem Bio/2012 19(8), 19;85– 98. https://doi.org/10.1016/j.chembiol.2011.12.014.

[4]. Hentschel, V. Vsher, km Tavior MVV Marine sponges as microbial fermentor International journal of pharmaceutical research and development J Nat 2023 66:1001037.dio.10.3390/md8041417. www.niobioinformatics.in/drug.php.

[5]. Newman, D.J, Cragg, G M Sander Km. Study of marine drugs.International journal of Creative Research Thoughts, Volume (9) issue 9sep2021, 1022–1037. ISSN 2320– 2882.www//ijcrt.

[6]. Nalini, S; Sandy, R., Riyaz, D; Mohammad Riyaz Su. Antimicrobial Macro molecules from marine organisms. International Journal of Biological Macromolecules, Volume 115, August 2018.DIO-10.1016/j.ijbiomac.2018.04.144.

[7]. Simat V, Cagalj, M, Skroza, D,Gardini,F, Tabanelli ,G Montanari,Cetal Sustainable source for antioxidant and anti-microbial compund used in meat and seafood products . National institutes of health.dio;10.10/6/bs afnr.2021.30.00/2021 March 31.

[8]. Julia D. Sigwart,Robert Blasiak, Marrel Jaspars The potential of marine. Biodiscovery. Natural product reports 2018 38 1235-1245 “Doi – 10.1039/d0n0067 rsc.li/npr

IJARSCT
International Journal of Advanced Research in Science, Communication and Technology
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
ISSN: 2581-9429
Volume 6, Issue 5, March 2026
Impact Factor: 8.2

[9]. Tejsutní Devidas Nargire Study of Marine drugs International Journal of Creative Research Thoughts volume 9 issue 9 Sep 2021 aISSN: 2320-2882.

[10]. Annu kumari Muskan Gupta Gaurav Abhishek Rankacoat Asian of pharmaceutical Research of Ronkawat Journal development mraine Drugs A review 2023 11(5):35-40.dio-http://dx.doi.org/10.22270/ajprd.v11i5.1318.

[11]. Petit C: sieffermann J. Testing prefer ences open Access For iced – coffee. Consumer international Peer-reviewed Refereed Journal 2007 18,161-172.

[12]. Andres M Francesch keith B Glaser & Marcel Hendrik Luesch marine from Future Jaspars, Carlos Jimenez, Pharmaceutical Present Sources i past, Pharmaceutical sciences. 30 July 2024.

[13]. Noora Barzkar, Saeid Tamadoni Jahromi Hadi Bolooki Poorsaheli Metabol ites Micro and Fabio Vianello from marine microorganism & macroalagae – Immense scope For pharmacology. Marine drugs. Published – 8 August 2019 doi: 10.3390/md 14080464. 17,464. www.mdpi.com/journal/marinedrugs.

[14]. Dr. Vineeth Simra Naisha, Blessy Jacob, or Chandy Recent Trends in Novel Marine Pharmaceutical An Overview International Research Journal of Education & Technology2023 FRJEdT Volume: os issue : 83 e : 83 March -2023 ISSM 2581-7795.

[15]. Newman D.J., Cragg G.M. Drugs and Drug Candidates from Marine Sources: An Assessment of the Current "StateofPlay". Planta Med. 2016;82:775–789.

[16]. Talele T., Khedkar S., Rigby A. Successful Applications of Computer Aided Drug Discovery: Moving Drugs from Concept to the Clinic. Curr. Top. Med. Chem. 2010;10:127– 141. Doi: 10.2174/156802610790232251.

[17]. Bhardwaj S., Kesari K.K., Rachamalla M., Mani S., Ashraf G.M., Jha S.K., Kumar P., Ambasta R.K., Dureja H., Devkota H.P., et al. CRISPR/Cas9 Gene Editing: New Hope for Alzheimer's Disease Therapeutics. J. Adv. Res. 2021 doi: 10.1016/j.jare.2021.07.001.

[18]. S. Vignesh, A Raja, & R Arthur James Marine drugs.International Journal of pharmacology 7 (l): 2230, 2011 ISSN 181- 7775) DOI:103923/ijp 2011 22930.

[19]. Mehbub, M.F., Lei, J., Franco, C., & Zhang, W. (2014). Marine sponge derived natural products between 2001 and 2010: Trends and opportunities for discovery of bioactives. Marine Drugs, 12(8), 4539–4577.

[20]. Wijesekara, I., Pangestuti, R., & Kim, S. K. (2011). Biological activities and potential health benefits of sulfated polysaccharides derived from marine algae. Carbohydrate Polymers, 84(1), 14-21.

[21]. Look, S. A., Fenical, W., Matsumoto, G. K., & Clardy, J. (1986). The pseudopterosins: A new class of anti-inflammatory and analgesic diterpene glycosides from the marine sea whip Pseudopterogorgia elisabethae. Journal of Organic Chemistry, 51(25), 5140–5145.4– 21.

[22]. Vadlakonda Sruthi, Nagur Sharone Grace, Monica N, Valishetti Manoj kumar Marine Pharmacology ; an ocean to explore novel drugs International Journal of Basia & Clinical pharmacology. 2020 may; 9(5):822-828 http:// www.ijbep.com DOI intpill dx.doi. org/10.18203/2319-2003. Ijbcp 20201767 PISSN 2319-2003/eISSN 2279-0780