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A Review on the Chemical Compositions of Natural Products and Their Role in Setting Current Trends and Future Goals

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Abstract

Natural products chemistry has played a significant role in the advancement of physical and biological sciences and its interdisciplinary fields due to its unique applications and constructive contributions. The importance of biomedical research is also highlighted in the present evaluation of basic and core advancements in biomedical, health, nutrition, and other associated disciplines. In addition, there's a look at the accomplishments and current developments in the natural products chemistry area, along with the field's purpose and its economic and scientific implications. Consideration is given to how the chemical composition of natural goods may progress science in a wide range of disciplines. Controlling metal dissolution and acid consumption may effectively restrict the corrosion rate of an exposed metal when supplied at low concentrations. This prevents corrosion by decreasing oxidation and/or reduction. Corrosion inhibitors are used sparingly to prevent corrosion since they are harmful to the environment, especially aquatic creatures. It has been noted that chemically synthesized corrosion inhibitors suffer from several drawbacks, including toxicity during manufacture and application, as well as long synthesis techniques and expensive prices. To counteract the effects of corrosion, researchers have developed environmentally friendly corrosion inhibitors based on natural substances.

Keywords: Natural Products; Current Trends; Future Goals; New Perspective; Perspective Outlook; Green Corrosion Inhibitors

1. Introduction

Interest in natural products and their chemistry, and their effect on diverse scientific fields, technological advancements, and economic activities, has experienced a resurgence in recent years that is unprecedented. Recently, the thrust has regained popularity after almost losing it. As a result of the failure to prioritize the research, lack of precise investigative apparatuses, the nonexistence of broader hypothetical and engineering curricula, in addition to a lack of financial resources to support advancements in research as well as development opportunities for discoveries and applications, the interest in the field has waned significantly over the years [1-5].

(i) Science's development in the physical and biological sciences, along with its connections to other fields and economic implications
(ii) Technical breakthroughs, particularly in the analytical, biotechnological, and pharmaceutical fields; and,
(iii) The discipline's role as a research tool for modern chemistry and.
(iv) Progress in mechanistic, environmental, and ecological sciences with their natural products (metabolites), chemistry, etc. have all had an impact on this subject, as have technological advances.

About the study of natural products and their chemistries in terms of purification, description, construction purpose, occupations, as well as metabolic and chemical interrelationships, there was a rationalization of the advances in furthering

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thoughtful and charities to the punishment that was founded on pharmacological usage and roles. Taking a bio-mechanistic approach to cell and ultracellular processes has opened the door to finer details in terrestrial and marine species and wider applications. This has had an important influence on the development of purifying technologies and ecological knowledge in addition to phytomedicines [6-9].

It has also had an impact on technical developments and economics connected to natural goods and allied fields such as agriculture and agricultural sciences. It has become easier to understand the issue as more information has been available on microbiology, plant-microbe interactions, and secondary metabolite metabolism [7-10]. Soon, scientists will be able to use chemical instruments to better comprehend natural resources in terms of their chemistry, biology, and environment. As well as the disparities in techniques between academics and industry in terms of natural resource utilization and product creation as well as future action plans, the pace, and structure of the subject's progress were also impacted by these discrepancies [11,12].

Natural resources are increasingly perceived differently by academics and industrialists, which has led to bottlenecks in strategy and method, as well as design for resources' sustainable use, including innovative medication development and other areas [13-15]. Lacking appropriate methodological income and additional investigative apparatuses, and possibly due to a deficiency of motivation in tackling natural products-chemistry problems due to the insufficient use and application of existing knowledge, intelligent interrogations resolves have gradually and progressively decreased at several periods. There are several reasons for the slow rate of advancement in this subject, including the use of technology and tools, funding, and support [16-18].

An interest in herbal ethnobotany, nutraceuticals, obtaining of methodological harvests, the discovery of greener medications as well as their detection patterns, encounters in the fields of chemistry systematics, and conservationism as well genomic summarizing of the anthropological genetic maps, along with the exploration for healing patterns in long-lasting and genomic illnesses, have emerged as alternatives to conventional medicine [19-21]. Detailed information on biomechanics, biogenesis and templated biosynthesis was presented, as well as information on naval patterns and nautical medications, comprising naval poisons, microorganism-supported chemistry, processes of fermentation yields, different foodstuffs, designer foods, and the development of polymers that are biologically companionable and biologically degradable for usage in other punishments of the healthy knowledge [22-25].

In addition, current discussions, and studies on natural product separation from various bio-diversified locations have contributed to extending the spectrum of chemical beings and objective patterns for architecturally and pharmacologically varied biologically active molecules, thus helping the diasporic population [26]. Problem-solving with natural products is a breeze. Retro biogenetic ideas may be utilized to determine molecular structure and function, as well as reactivity, pathways, and synthesis approaches see Table 1.

Table 1: Discipline contributions and achievements in natural products chemistry [27-30]

Addiction to plant-based substances	Heterocyclic derivates of psychedelic drugs such as hallucinogens, opiates, and cannabis
Fibbers and plant-based polymers	Products such as Jute fibres, Paper, Paperboards, etc. Pectins, Cellulose, Marine-Sourced Products, Alginates, and many others.
Pharmacy manuals, medical treatises, and alternative medicine	Plant-based therapeutic systems include Ayurveda, Unani, Chinese, and African, Shaman, Red-Indian, and other ethnobotanical traditions, and treatises. Medical systems based on the use of aromatherapy, homeopathy, and Buddhism
Aspects of therapeutics	For example, penicillins, cephalosporins, Taxol, tetracyclines, camptothecins, combretastatin, etoposides, Podophyllotoxin, marine-sourced bryostatins, homoharringtonine analogs, Kahalalide F, Ecteinascidin, and others
Development of semi-synthetic drugs	To date, 50 % of pharmaceuticals have natural origins, new templates in drug design, and new chemical entities are continually being discovered. The majority of pharmaceuticals were herbals before synthetics were developed, semi-synthetic medications are feasible and economic, and there is currently 50 percent of pharmaceuticals that have natural origins.
Chemical synthesis	Novel pathways, new templates, and difficult molecular frameworks available are some of the innovations that have been made in biogenetic synthesis in recent years.
Synthesis of bioactive molecules.	Pesticides, insect-repellants, herbicides, larvicidal, auxins and anti-filarial, phytoalexins, neuro-activating, antihelminth, anti-hyperlipidemic, anti-inflammatory, and liver-protective. Antibiotics, antioxidants, antidiabetics, pain relievers, digestives, anti-spasmodic, aphrodisiacs, purgative, anti-ulcer, and tonic.
A list of consumables	Colorants from plants, essential oils, fatty acids, glycerol and stearic acid, raisin, and gum, tannins, and alkaloids spices, neutraceuticals, condiments, are all examples of plant pigments, colours, dyes, and essential oils.
Effect of economics	For developing world economy, the economic advancement in plant resource-rich nations, global imports, indigenous consumption, forest economies, is considered long-term sustainability.

1.1. Synthetic or Semi-Synthetic Drugs

Fundamental welfares in natural capitals for its functioning pharmaceutically ingredients, architecturally differentiated and unnaturally inspiring patterns for progress concerning therapeutic usages beside an impression on the larger pharmacological welfares and associated with the pecuniary actions have been essential for this discipline to advance. Small compounds are being discovered using bio- and chemically varied natural products as templates and designs, which has resulted in new separation, purification, and ligand-binding characterization approaches [31-33].

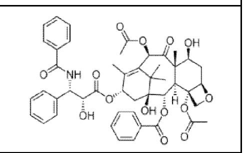
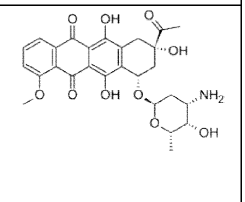
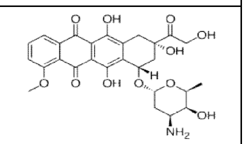
As a result of these free substrates, scaffolds, and scaffolding, it was much easier to separate drug templates from newer medicines derived from terrestrial or aquatic sources. Securing chemical-biological drugs for medicinal purposes, rapid scientific advances in technological applications, and the development of healthier procedures, along with their impression on financial possibilities have all contributed to greater public awareness and appreciation of the value of natural products [34,35]. The ethnopharmacological and ethnobotanical repute of commercial herbs has given scientists with new opportunities and encounters in medication development and supplementary healthiness-correlated product discoveries [36].

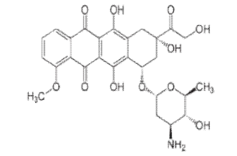
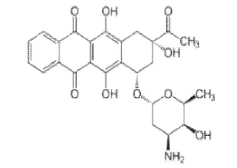
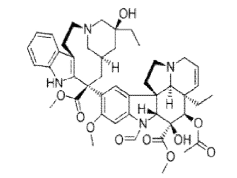
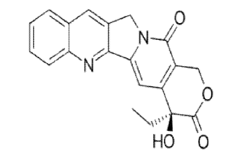
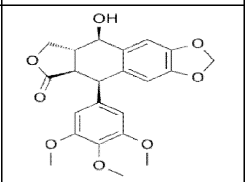
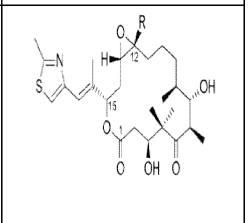
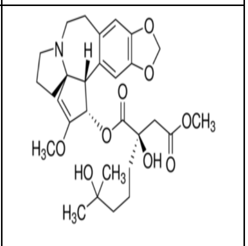
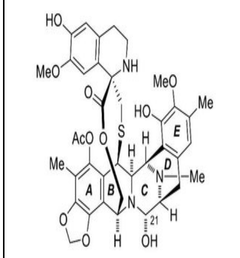
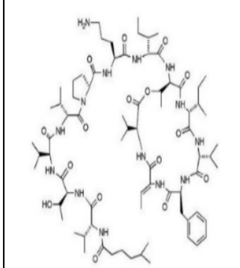
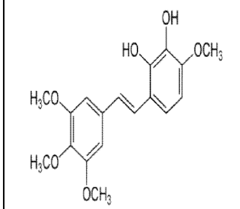
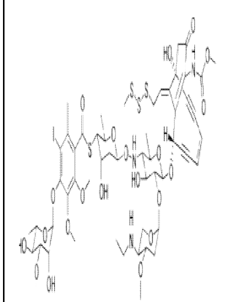
Taxol (paclitaxel), anthracene, and other anthracyclines have been found in addition to phenotypic and virtual screening advances [37]. These include camptothecin, vinca alkaloids, epothilones, podophyllotoxins, combretastatin, enediynes, and homoharringtonine analogs from the sea, marine-derived bryostatins, ecteinascidin, kahalalide, and others see Table 2. Nowadays cancer medicines, 60% are made from natural substances. Analyse the biological activity of natural products, especially in single-component products from plants that have or don't have synergistic bioactivity profiles, as well as in drug template screening versus the bioactivities of natural products derived from secondary metabolites, to determine whether there is conflicting biological activity [38].

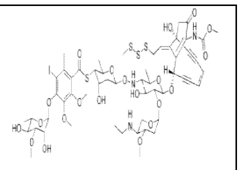
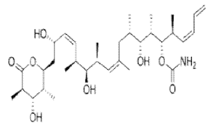
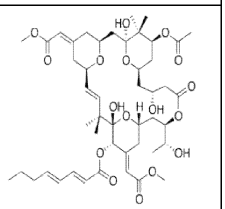
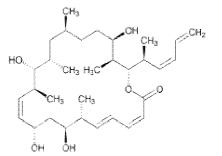
Chemically synthesized pharmacological compounds provided a conceptual and rational framework for the creation of modern medications today. About a third of all medications were produced from natural ingredients and their derivatives before 1980. Pharmaceuticals made from natural resources continue to have most of the market share in Europe. The alleged adverse effects of artificial medicines of partially natural and originally artificial, requirements for advanced infrastructure, and adherence to stricter regulatory mechanisms, as well as proficiency in the enterprise of and up-scale research for artificial medicines of partially natural and artificial origins, commanded to the development of steady growth in Phyto- and marine-sourced drugs [39-41].

As synthetic techniques have been coupled with naturally sourced medications, it has been a key sponsor to the discipline's growth of natural products chemistry and incremental advances over the past few years [42]. The interdependence of molecules, structure connection, and molecular action correlations for various natural patterns were studied using a variety of techniques. As a preventative measure in many parts of the world, nutraceuticals, nutritional supplements, herbal medicines, and corresponding for unconventional therapeutic mediators have recently begun to transform their demand and image. People with chronic diseases caused by genetic, lifestyle-related, occupational, or other chronic problems are increasingly in need of natural medications that are safer and more effective. However, nature's products also provided a means to investigate traditional medicine resources and knowledge for further research by using standardized approaches in biological assessment directed to the process of fractionation and commotion localization from the committed components [43]. They used SAR and QSAR techniques to modify the structural features of the initial molecular template to increase their biological activity. A recent biologically active technique was created in the reformed object by assessments and expectations by using in silico activity predictors, which allowed the originally natural product patterns to be compared in expressions of medical relevance [44]. To create novel and better therapeutic agents, natural materials have been used as a starting point see Table 2.

Table 2: Structures of some natural products and their medical applications [45-49]

Name	Medical applications	Structure
Taxol©	Breast and ovarian cancer are not the only cancers that taxol is used to treat but also used to treat Kaposi's sarcoma.	
Daunorubicin	The growth of cancer cells in the body is delayed or even prevented. When coupled with other chemotherapy drugs (such as cytarabine), the dosage is decided by the kind of tumor and the degree of response to the treatment, according to the National Cancer Institute.	
Doxorubicin	Doxorubicin is commonly used to treat leukemia and lymphoma.	

Epirubicin	Epirubicin can be used to treat breast cancer. It belongs to the anthracycline class of drugs, which are used to slow or stop cancer cell growth.	
Idarubicin	Idarubicin is used in combination with other drugs to treat acute myelogenous leukemia (AML), a cancer of white blood cells. Idarubicin is an anthracycline and belongs to this class of medicines. As a result, cancer cells in the body are slowed or stopped from growing.	
Vinca Alkaloids	Some of its uses include diabetes and high blood pressure treatment and disinfection. Vinca alkaloids are effective cancer fighters. Clinically, there are four major alkaloids found in vinca plants.	
Camptothecin	Camptothecin is a quinolone alkaloid used in chemotherapy for leukemia (camptothecin). By binding to type I topoisomerase, this drug prevents the cleavage and rearrangement phases of replication.	
Podophyllotoxin	By attaching to enzymes, podophyllotoxin can stop the replication of both cellular and viral DNA. This medication has the potential to destabilize microtubules and halt cell division.	
Epothilone-A	Clinical trials of epothilones, a class of nontaxane medications that target microtubules, are underway at varying stages of development. Only one other epothilone equivalent has been authorized by the US Food and Drug Administration to treat advanced breast cancer, therefore this evaluation will focus on that.	
Homoharringtonine	Cancer medicines that block the tyrosine kinase enzyme in some types of chronic myelogenous leukemia, or that have failed to improve after at least two tyrosine kinase inhibitor anticancer therapies. It is also used to treat many types of cancer. Homoharringtonine inhibits particular proteins involved in cell growth, it might be used in cancer treatment. Inhibits the production of proteins in the body and is an alkaloid from plants. Omacetaxine mepesuccinate is sometimes called Synribo.	
Ecteinascidin-743	Cancer cell lines and human tumor xenografts, including soft tissue cancer, melanoma, non-small cell lung cancer (NSCLC), and ovarian breast prostate and renal cancer, show potential for treatment with Ecteinascidin 743.	
Kahalide-F	Tridecapeptide Kahalalide F is composed of two halves, one in the form of an annulus and the other aside with a fatty acid group. A-549 and HT-29 human colon cancer cell lines in vitro were used to test the drug's efficacy.	
Combretastatin-A1	For patients with acute myeloid leukemia (AML), combretastatin A1 (OXi4503) exhibited anti-leukemia effectiveness in a Phase 1A clinical study.	
Enediyne	A notable feature of enediynes is their limited use as antitumor antibiotics (known as enediyne anticancer antibiotics). This makes them unable to differentiate between cancerous and non-cancerous cells, however. As a result, enediyne toxicity is being researched in order to improve its sensitivity.	

Calicheamicin	Scientists have identified a new family of anticancer antibiotics termed calicheamicins from the fermentation broth of the Micromonospora echinospora subspecies calichensis. On the other hand, in vitro, they were extremely efficient against bacterial strains of both Gram-positive and Gram-negative. They both showed resistance to calicheamicin gamma 1I when tested in vivo.	
Discodermolide	It has been shown that discodermolide has an immunosuppressive effect in vitro and animal studies. Despite the immunosuppressive response, discodermolide was not harmful in vitro.	
Bryostatin-1	Bryostatin 1 has been shown to have a variety of impacts on tumor cell lines. Both anti-tumor and immunomodulatory effects have been established in animal studies.	
Dictyostatin	Dictyostatin, the sponge's secondary metabolite, maybe an anticancer medication. Difficulty finding its cytostatic characteristics and developing full syntheses due to its scarcity. A new drug called dictyostatin is presently being developed, however, it is not yet available for medical use.	

1.2. Separation Techniques and Structural Testing

It's been a big year for natural products research, due to the development of improved separation, testing, and detection techniques [50-52]. There have never been so many minor-yield products identified because of chemically non-reactive and stable isolation and purification methods. Chemical conjugation and physicochemical phenomena, secondary metabolite mixes and molecular connections, polarization constructed mixtures, and the conservation of bio-fragments surrounds, in consort with non-ionically interactions for deposits, were some of the difficulties (especially in marine products) [53,54].

It is possible to study new structures and biological activity thanks to analytical methods developed for separating bio-diversified natural resources. Increasingly, nonconventional chromatographic techniques such as flash, UHPLC, and MPLC are being utilized (Medium Pressure Liquid Chromatography). It was possible to answer numerous mysteries with the help of electrokinetic chromatography (ECC), droplet counter current (DCC), supercritical fluid (SF), and circular (CC) chromatography, as well as gel filtration methods [55]. Neural network descriptor models have been used to accurately predict chromatographic sequences of natural substances using gradient chromatography and may now help identify natural compounds more readily utilizing chromatographic fingerprints that are anticipated. Spectro analytical analysis has many techniques, but mass spectroscopy, in conjunction with supplementary hyphened procedures such as LC-MS, GC–MS, NMR, circular dichroism, and correlational NMR spectroscopies, has altered the tactic to determine the structure, removing the need for chemical conversions that were closely extinct in the early days of the field. An increase in interest in the decontamination and documentation of functioning ingredients from molecular structure or coupled by physiochemically bound. Natural products have also occurred, but the need for a faster and more efficient technique in the natural product isolation field has become more apparent as well [56,57].

Naturally occurring templates in biogenesis, such as tannin and biopolymers, have led to a combinatorial or near-combinatorial approach to the production process, especially for larger and recurring units [58]. Chemometric examination of their products intensifies the phenomenon in prokaryotes. It was the discovery of drug-like natural products from a single species and the most potent natural component that led to templated synthesis. They may be seen as part of the combinatorial setup to identify compounds with better biologically active ingredients and pharmacologic diversity for more improvement of the reached pattern [59].

Diversity-oriented synthesis is an alternative method that uses techniques established to produce small molecules with various skeletons, such as folding and branching pathways and polymer-based oligomers. Studies on the combinatorial synthesis of naturally occurring chemicals and the molecular frameworks of natural products obtained from bacterial and fungal sources have been published in large numbers, which has expanded the breadth and utility of natural products research [60,61]. Potential uses of HT screens, purified natural products, and combinatorial libraries based on natural products (including HT screening of raw extracts) are in the works. Pan assay interference compounds (PAINS) are accountable for misleading advances on or after a variety of artificial and natural products have also been identified using this information. These products had displayed bioactivities that did not conform to the properties of artificial archives and were therefore assigned as unacceptable metabolites. Power law characteristics were found in over half of the 200,000 objects analysed [62].

1.3. Aspects of Bioactivity and Chronological Sequence

Conventional medication can be better understood by using chemical biology. A new generation of pharmacophoric models has been created, allowing for the discovery of antagonistic or synergistic components, as well as targets and pathways within the process itself. The mechanical details make it possible to have a deeper understanding of the mechanisms behind complex diseases [63]. The Sp transcription factor is a target of certain anticancer drugs and their equivalents. Cancer cells and tumours exhibit high amounts of Sp1, Sp3, and Sp4, and prooncogenic genes that are controlled by the transcription factor (cyclin D1 and the growth factor) are implicated in cell proliferation according to this notion" (NF-kB). We can optimize therapeutic applications of natural items and their combinations if biomechanics can be validated [64].

They discovered that the antioxidants myricetin, quercetin, and epicatechin all had substantial impacts on AO levels. Butein's capacity to decrease cervix anti-cancer proliferation in a human cervical cancer cell line is inhibited via the PI3K/AKT/mTOR pathway. ROS generation increased, but PI3K, AKT, and MTOR expression decreased. When these substances were combined, they reduced oxidative stress in test participants and prevented cancer growth. It was recently shown that Hypericum hookerianum and polyketide inhibitors of eukaryotic protein synthesis have anticancer properties. This shows how important biomechanics is when it comes to testing the bioactivity of natural medicines [65].

Genomic information is essential when it comes to diagnosing and detecting illness causes utilizing biomarkers. That's because human and animal genomes are both affected by the same thing. Human genome sequences include specific biochemical information that must be translated into distinct, step-by-step reactions to contain and treat diseases [66]. When it comes to bioactivity, mode of action, and receptor-ligand binding, as well as medication transport to specific sites in the body, genomics must be mined for information that may be used as an arbitrator in these investigations. Secondary plant and microbial metabolites, when combined with natural product probe-compounds to bridge the disease-natural product interaction gap, may open new opportunities for a genomic natural product developed therapeutics and operational individuals of naturally originated medications [67].

This knowledge might be utilized to build superior patterns and biologically function suppressors or advocates for a variety of applications. In addition, genome discovery, and genome allowed objectives whitethorn to perform a key factor in the development of future therapeutic therapies [68]. Antibacterial therapies are improving because of a greater awareness of the microbial genome, genetic factor statement, and antibacterial drug endurance mechanisms, as well as the bacteria's ability to effectively infect humans. Individualized natural product-based therapy will also play a bigger part in medicine in the future. Some of the subjects discussed in 1.7 include bioengineering and bioenzymatic. There is a growing interest in biotechnology fields that utilize physiological knowledge and bio-engineering techniques to solve problems [69]. As a result of employing large, medium, and tiny enzymes as well as enzyme-mimetic templates and investigations into the regulation of structural and physicochemical properties of enzymes, as well as changes in enzyme function and structural features, enzymology has a major influence on chemistry. Biological structures, responses, and biochemical characteristics play a crucial role in determining biochemical bioengineering processes, as well as product outcomes if they are engaged in biochemical bioengineering processes, as well as degrees of reactivity in enzymatic bioengineering. Enzyme-based manufacturing processes and enzyme-mimetic manufacturing processes at large scales, protocol development, and biocatalytic applicability of structurally defined substrates will be required to reach the next level of industrial performance. Biocatalyst reactivity is also like that of conventional catalysts in both natural and non-natural settings, which is an interesting field of research. Based on functional effectiveness, fermented and normal biogenetic products may be compared [70].

1.4. Chemistry of Biogenesis, Biodiversity, and Biosystematics of Natural Products

As a result of these interactions, we need to learn more about the biochemical interactions that occur in physiological settings as well as the reactions that take place and the effects that these interactions have on phytochemicals, second-metabolites, molecular templates [71]. To further understand these connections, biological trial delivery of produced patterns in cell approaches and parallels with examples in interdisciplinary fields might be used. In the future, it may be possible to study the interactions between medications and receptors in vivo and in vitro, as well as between xenobiotics and their receptors [72]. Enhancing bioactivity/drug discovery bioactivity by using a rapidly emerging field with consequences and impacts on the subject as well as the mechanisms of inter-and intramolecular bio-chemical, physicochemical interactions of different chemobiological entities in natural biosystems. As a result of physicochemical and biochemical processes, mechanisms will be better understood, including the identification and exploitation of channels and their feedback in biomechanics [73].

As far as chemistry is concerned, biogenetic processes of marine and microbiological sources, the synthesis of specific chemicals, and data on the symbiotic connection between the components' structure and function are of essential importance [74]. Chemo-ecological research has led to the finding of biogenesis that is both distinct and abnormal. Some self-assembling and combinatorial systems approaches have produced outcomes that are comparable to typical, ecologically explained, and designed components. In recent years, bioengineering for natural products components has also been gaining in popularity. Discussions will focus on the responsibilities of peripheral and inner chemical beings, together with their influence on the biosynthesis of natural product components and biocatalysts [75].

When combined with total and semi-synthetic organic chemistry techniques and designs, for example, chemical analysis can be utilized to produce novel biosynthetic templates, products, or processes. Toxins, poisonous oceanic products, hazardous plants microorganisms, and moulds, and their metabolic by-products will be discussed in addition to natural product production in the naval environment and amphibian ecosystem [76]. Biochemical processes need an understanding of the stages involved in the process, as well as the consequences and implications of signal transduction in chemical ecology. As species evolve, natural products from earthly and marine resources with increasing organizational and operational intricacy will be used to develop future concepts, according to fount.com. Economic growth in the foreseeable future is dependent on natural resources and ecosystems [77].

1.5. Chemical Perspective, Environment, Photochemistry, and Microbial Aspects

Recent environmental changes have changed phylogenetic crossovers and species purity, the availability of legitimate raw materials and herbal formulations, chemical profiling findings as well as natural product quality. It is neither safe nor effective to use herbal compositions that have been adulterated by humans from natural resources [78]. These include the toxic and polluting effects of xenobiotic goods, in addition to the introduction of man-made chemical entities into ecological systems and eventually into natural resources and food chains. Using natural ways of seeking alternatives and remediation resources have been conserved and biodiversity has been fostered on a larger scale. In recent years, chemists and biologists have begun to pay attention to the ecological consequences from a chemistry viewpoint. This template can be used in future ecologies to better understand the biochemicals and bio-mechanistic of ecosystems [79].

Since the 1950s, microbial chemistry has dominated the antibiotic spectrum. Streptomyces has created beneficial metabolites because of genetic non-exchanges between species, even though it has built the same molecular framework compounds from a broad range of environmental sources. For this reason, it's more important than ever to develop new molecular templates with better biological properties. It is possible to extract antimicrobials and antibiotics from anaerobic actinobacteria prevalent in mangrove environments [80]. Metabolite profiling and novel interdisciplinary approaches will play a part in the future development of innovative and often-challenged primary identified antiseptics for simultaneously developing extremely repellent microbe varieties. As a result, the chemist's perspective has been altered by the discovery of novel stereochemical assembly evaluation techniques for metabolites of myxobacteria, mycological biotechnology dereplication, and intriguing combinatory biotechnology of plant-explicit compounds such as coumarins in bacterial biotechnology. Biological activity diversification and marine component isolation from the ocean have irreversibly transformed nature [81].

To test for novel medicines against major pharmacological classes, it was revealed that unique, structurally varied molecular frameworks might be employed. As a result of the discipline's growth, these advancements helped to better comprehend the marine ecosystem and revealed the components of marine fungus and other microorganisms [82]. Natural products reactivity and differences in photochemical set-up may shed additional insight on astrophysical impacts on shrubberies and their creations, as well as the micro details of the chemistry happening in plant systems that may be exploited. They might provide a new chemical framework for drug development when exposed to sources of solar and non-solar. They could be produced from distinct, innovative, and well-known substrates. Observations of curcumin's photo behaviour in the zwitterionic micellar system support this theory [83].

1.6. Assessments of Immunomodulation, Toxicology, Bioactivity, and Food Design

Organoleptically generated compounds' preventative and toxicity-reducing effects are crucial in ethnobotanical medicine. Doing a toxicological profile on the natural formulations you're utilizing is necessary if you're seeking effective and safe medications, antidotes, or antivenin. Many plants have been shown to safeguard alongside appendage harmfulness, such as nephrotoxicity and liver poisonousness, by screening [84]. Other plants that are poisonous and cause severe toxicity may provide a model designed for future research keen on toxicologic outcomes and toxicokinetic of components as well as additional organically existing underdone suppliers from continental and marine settings. Toxicological profiling and widespread contamination of air, soil, and water in natural resources close situations make it possible to study and use chemical toxicity better [85].

Develop super-nutritious meals, designer-food ingredients, and formulations for chosen nutritional value in addition to agrochemicals research and development. The bioactivity of dietary plants and the therapeutic qualities of traditional meals are also being studied [86].

1.7. Technicality of Polymeric Products, Theoretical Modelling, and Fiscal Impacts

For example, nanofibers, dendrimers, crown ether polymers, and natural gels are being researched and developed for use by scientists in biomedicine or biofuels, as well as technological, industrial, or biomedical materials for an eco-friendly economic push. For example, scientists are looking at the effects of phytochemicals in agroforestry and designer afforestation, as well as genetically engineered renewable plant resources [87,88]. Utilities of chemical product responsiveness readings and quantity of commotion will determine dietary components, biological mass, and energy in the next century.

To stay up with the speed of development in phytochemistry and chemistry of natural products, great-tech improvements in computer-based theoretical techniques, information mining, and managing of data are required [89-91]. We need a better repository for informational data as well as better handling of informational data management to achieve our goals of drug discovery and development as well as a greater understanding of the impact of natural products science on interdisciplinary sciences and structural, functional, and other applications in a variety of domains. Chemical understandings across a wide variety of fields are producing new difficulties when it comes to biocomputing and resource management [92-94]. It has taken the efforts of several natural products chemists to bring this idea to fruition. There is enormous promise in biomechanics, software development, and other advancements in computer technologies.

Chemistry, chemists, and chemistry's impact on the industry, society, and the economy are only just beginning to take shape. A growing number of plant resources are being exploited for industrial purposes, including phytopharmaceuticals and essential oils as well as nutritional supplements and medicines produced from natural sources [95]. Future years should see this tendency continue.Naturally, natural product chemists will have to participate in new techniques as well as a variety of fields. What this means for the future of chemical research as well as related areas will be profound see Table 3.

Table 3: Trends and aims in the chemistry of natural products [96,97]

Aspects of Isolation, and Purification	Prioritize natural products of bio-diverse places, discover the active components of traditional treatments, and seek innovative compound templates, now is the time to act. Isolation procedures need finer, more stable, and chemically non-reactive ways for separating and describing molecules. While isolated, chemical, and physical surroundings are purified and preserved. A safe, easy to obtain, and affordable plant-derived product.
Structure Elucidation of Designed Molecules,	Marine and harsh terrestrial plants have a wide range of unique elemental combinations that enable diverse and changeable structures. Herbal fuels, non-reactive fibers, and natural gels for industrial applications in both non-food and food applications are just a few of the plant-based polymers discussed in this article.
Pharmaceutics Research and Development	Modern pharmaceuticals are made from plants to a greater or lesser extent than they used to be. For example, phytochemicals are being developed as NCEs because of their low and non-toxic side effects. Natural plant medicines and bioactive items were available once small molecule medications were discovered. Global trends and influence on phytopharmaceuticals are influenced by prioritization, improvements in strategy for novel techniques in the future drug discovery. In the globe, Phytopharmaceuticals
Aspects of Bioactivity and Synergism	Consider variables such as ineffective or slowed biological changes, the essential goods and ingredients, contamination levels, and human-made adulteration of herbal items, among others. Natural product with a greater molecular weight that can interact with receptors, its discovery, and experimental replication. There is promise in both purified natural product high-throughput screening for template selection and crude extract high-throughput screening of natural products
Aspects of Biomechanics	Biogenetic principles such as self-assembly and combinatorial techniques and novel biosynthetic routes that are compatible with and like existing natural processes. As part of their research, scientists are looking at enzyme structure and physics as well as biochemical properties, enzyme-mimetic templates, and functional stage substrates. Smaller creatures, such

	as plants or animals, and their tissues, were the first to exhibit scattered biological activities, such as signal transduction systems and electrochemical characteristics. To decode biochemical pathways and their reactive substrates, this knowledge was handed on to the plant world.
Aspects of Proteomics	To self-assemble polymeric materials and life-chemicals like proteins, enzymes, and enzymatic cofactors are employed in nature. Use of reactivity by functional proteomics.
Aspects of Genomics	Using sequences of the human genome for site-specific action and response, as well as chemical information that must be translated into diverse and non-stepwise reactions coded therein for the diseases, should be the basis of arbitration.The genetic engineering of human food, as well as the self-generated and induced mutations of microbes, are all examples.
Aspects of Metabolomics	Using natural product probe compounds, which may be found in natural goods, researchers are addressing the disease vs plant product interaction gap using small and big molecules as active components. Functional genomics: large-scale phytochemicals and metabolic profiling of plants.
Aspects of Toxicology	Health risks linked with natural toxins and plant-derived chemicals in the workplace. Containment and toxicological profile of the discovered product/cause.
Role of Photochemistry	Biological reactivity and final product variation, variety of photo-transformation, and ultimately the end-product manufacturing in terms of routes selection and execution. In addition, sunlight has an impact on the chemistry of plants and their products.
Dietetics and designer food	Each of these elements, from their purity and acquisition to combination according to nature's plan, required a specific prescription.
Biodiversity and Microbiology	In addition, we will be identifying fermentation broth compounds as well as producing recent products from a variety of pools.It has been used in induced and variant microbiological transformations, cell suspension culture products, and other domains of biotechnology.
Computation and searching for information	Substantial growth has occurred in computer methods, prediction strategies for many sorts of biological processes, software platforms, and procedures essential for data processing.
Ecosystem and Natural environment	Chemo-pollution, xenobiotic pollution, and human-made items entering the food chain are all examples of pollution. Environmentally friendly chemistry is a step up from the natural products' chemical template, which relies on the sustainable use of resources. Along with their influence on the production of goods inside plants, guest-hosts, and autonomous marine and amphibian ecosystems.
Impacts on the economy	Herbal supplements, botanical treatments, and organically grown commodities include traditional uses and ethnobotany of poor cultures.

1.8. Plant Extracts as Green Corrosion Inhibitor for Metals

There has been a lot of attention paid to metal corrosion inhibitors in recent years. It's one of the most intense research programs now undertaken to develop green corrosion inhibitors (GCIs). Plant extract GCIs have been intensively investigated because they are cheap, renewable, biodegradable, and most importantly, safe for both the environment and humans [98-105].

Additionally, the performance of GCIs is tested by using both theoretical and computational research in addition to gravimetric analysis and electrochemical testing. To counterbalance this, there's a decent collection of the inhibition performance estimated from multiple approaches under distinct conditions. Extracted plant compounds reduced corrosion by more than 80%, according to the study. The high concentration of phytochemicals, which are active components, is responsible for the high effectiveness. The efficacy of GCIs can also be determined by identifying the inhibitor type and inhibition mechanism [106-112].

This review examined the production, performance, and inhibition mechanism determination of plant extracts as GCIs for ferrous metal alloys. According to this evaluation, additional improvement activities are needed to achieve the highest corrosion inhibition efficiency of around 100 percent [113-115]. Corrosion in ferrous metals and alloys is a natural process that is detrimental to both people and the environment. Corrosion inhibitors are the most practical way to deal with this problem. Plant extracts have been extensively reported in the literature as an alternative to conventional corrosion inhibitors [116-118].

This is because extracts from plants have been shown to inhibit metal corrosion significantly. The GCI's IE is affected by heteroatoms and p-electrons in plant extracts (interaction efficiency). As a result of its comprehensive structural study and molecule-surface interactions, plant extract has been proven to be a very efficient green corrosion inhibitor using both experimental and theoretical methods [119]. To yet, no one has figured out exactly how to create a truly eco-friendly green corrosion inhibitor. Also, this research will assist other scientists in better grasping the importance of GCIs assessment in metal corrosion prevention, which is another aim [120-124].

2. Conclusion

Nature-based scaffolds can be found in many areas such as the biochemistry and physiology of natural products and designer foods, ecologically and environmentally sensitive compounds such as secondary metabolites of aberrant biogenesis or marine products, as well as traditional herbal uses and ethnobotany/ethnopharmacology. There are several benefits to using natural products for biomedical and phytopharmaceutical purposes. As a great source of various items with high technological standards, natural products are a wonderful method to get an advantage in the commercial world. Science and technology have advanced significantly because of natural products science's maturity and interconnections.

Diverse Physico-chemical sciences and medical technologies as well as their accompanying technologies have also resulted in substantial economic advantages and growth over time. The utilization of conventional and regional knowledge and techniques of acquisition as well as managing the resources of natural products in past lifetimes made natural goods an added advantage. When it came time to create science, medicine, and technology, it appeared that natural goods had played a more important role in the early stages than they had done in the previous century, especially in the domains of biology. It is possible to operate in a wide range of fields in natural products chemistry, including biochemical, ecological, and medicinal areas.

A lot of the secrets of nature will be solved, and there will be plenty of questions and difficulties. We will be better prepared to meet the challenges of the future by gaining a more profound sympathetic the chemistry of natural products domain with its interrelationships with the biological and natural knowledge, as well as the previously concealed perceptions/understanding in bioengineering and medication finding, pharmacological knowledge, inheritances, and chemical conservationism. Globally, the possibilities for innovative chemistries and biochemistries, as well as chemicals, are highly attractive and crucial during a recessionary period. With breakthroughs in science and technology, scientists and chemists' contributions to research, technology, and economic turnarounds are becoming more and more essential to the globe.

Research on green corrosion inhibitors based on plant extracts is among the most extensive in corrosion inhibition. A growing number of studies on the use of plant extracts in corrosion inhibition are published each year, and this trend will continue. The growing number of articles confirms importance of finding a superior corrosion solution using plant extract-based corrosion inhibitor. The use of GCIs from plant extracts in corrosion prevention is showing great promise in an increasing number of studies.

3. Conflicts of interest

There are no conflicts to declare

4. Formatting of funding sources

No funding sources

5. Acknowledgments

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6. References

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