



**NATIONAL LEVEL SEMINAR
ON**



**BIOACTIVE NATURAL COMPOUNDS AND
THEIR EFFECTS ON ANIMAL FUNCTION,
HEALTH AND WELFARE**

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ABSTRACT VOLUME



ORGANIZED BY

**DEPT. OF ZOOLOGY, CHEMISTRY & IQAC
EGRA S.S.B COLLEGE
IN COLLABORATION WITH
JHARGRAM RAJ COLLEGE**

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on
Bioactive Natural Compounds and Their Effects on Animal Function, Health
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Abstract Volume

Editors: Dr. Sudipta Kumar Ghorai
Dr. Nirmal Kumar Hazra
&
Mr. Debajyoti Pradhan

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Bioactive Natural Compounds and Their Effects on Animal Function, Health and Welfare

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Egra S.S.B. College & Jhargram Raj College



Egra Sarada Shashi Bhusan College

Egra Sarada Shashi Bhusan College (NAAC Accredited B Grade college), located in Egra, Purba Medinipur district, is a prestigious educational institution in the state of West Bengal, India. Established in 1968, the college has been providing quality education and contributing to the intellectual and social development of the region for several decades.

Egra Sarada Shashi Bhusan College offers undergraduate courses in various disciplines, including Arts, Science, and Commerce. At present the college is successfully running two Post Graduate courses (Zoology & Bengali). The college is affiliated with the Vidyasagar University and is recognized by the University Grants Commission (UGC). It is known for its commitment to academic excellence and holistic development of students.

The college campus provides a conducive environment for learning and growth. It is equipped with modern infrastructure, well-equipped laboratories (DST FIST, DBT STAR COLLEGE, UGC, WBDST FIST & SERB), a library with a vast collection of books, journals, and digital resources, and sports facilities. The college also organizes various extracurricular activities, cultural events, and sports competitions to encourage students' participation and nurture their talents beyond academics.

The dedicated and experienced faculty members at Egra Sarada Shashi Bhusan College play a crucial role in shaping the students' academic journey. They employ innovative teaching methods, encourage interactive classroom sessions, and provide individual attention to students, fostering a spirit of inquiry and critical thinking. The faculty members also actively engage in research activities through the Coastal Environmental studies Research Centre affiliated under Vidyasagar University, contributing to the academic and intellectual growth of the institution.

The college places a strong emphasis on holistic development and instills values of social responsibility and community service in its students through NSS units. It encourages students to participate in various outreach programs, awareness campaigns, and community development initiatives. This helps in cultivating a sense of empathy, leadership, and civic engagement among the students, preparing them to be responsible citizens.

Egra Sarada Shashi Bhusan College has been successful in maintaining a vibrant and inclusive campus life. The college has various student clubs, societies, and cultural groups that provide platforms for students to explore their interests and talents. These activities help in nurturing their overall personality, developing leadership skills, and fostering a sense of camaraderie among the student community.

The college also focuses on creating opportunities for skill development and career guidance through different skill aided courses. It conducts seminars, workshops, and training programs to enhance students' employability skills and prepare them for future career prospects. The college has a dedicated placement cell that facilitates interactions between students and potential employers, ensuring that students are well-equipped to pursue their professional aspirations.

Furthermore, Egra Sarada Shashi Bhusan College maintains a strong relationship with alumni, who have excelled in various fields and are a source of inspiration for current students. The alumni network

provides guidance, mentorship, and support to students, opening avenues for internships, job placements, and networking opportunities.

In conclusion, Egra Sarada Shashi Bhusan College, Egra, Purba Medinipur, is a renowned educational institution that provides quality education, fosters holistic development, and promotes social responsibility. With its dedicated faculty, modern infrastructure, and commitment to academic excellence, the college continues to empower students and contribute to the educational landscape of the region.

Mission and Vision

- ✓ To spread Higher Education amongst the new-generation-students year after year, especially of neighboring rural students.
- ✓ To equip and empower students by providing relevant knowledge competence and creativity for their establishment / placement and to face the future challenges specially for our nation.
- ✓ To create atmosphere for research work in different fields of knowledge.
- ✓ To encourage the students to participate in sports and other activities for building good health and moral values.
- ✓ To encourage creative works of all types by students and staff of the college and to publish the outcome of such works those are fundamental in nature.
- ✓ To encourage the students in nation building activities.
- ✓ To assess regularly the need in the field of Higher Education to introduce new subjects of learning those are relevant, modern and can cope with the demands of the day.
- ✓ To build up proper infrastructure that will help to ensure appropriate atmosphere for education.
- ✓ To recruit Teaching and Non-teaching through a well plan principle to ensure a sound faculty team backed by a good support staff.
- ✓ To maintain good governance that can realize the vision of the college.
- ✓ To build up / participate in different activities of intra and inter college nature to compensate the limitations of the college.
- ✓ To meet with the different stakeholders / their associations to have their opinions for betterment in all respect.
- ✓ To take measures for providing help to the students of weaker section of the community as per government direction and also as per decision of the college authority.

Jhargram Raj College (Govt.)
Affiliated college under Vidyasagar University
Jhargram Town, Jhargram

Jhargram Raj College is situated at the town of Jhargram, the District Head Quarters of the newly created District of Jhargram. The area is a place of natural beauty and diverse tribal culture. The college is set amid the serene and verdant forests of primordial trees such as Mahua, Sal, Piasal etc. It has registered a spectacular growth over the years since its inception. In 1949, the young Raja of Jhargram, Raja Sir Narasingha Malla Ugal Sanda Deb, OBE, KBE, at the request of Pramathanath Banerjee, the then Vice Chancellor of Calcutta University, made a bequest of Rupees One Lakh in cash and vast tracts of land to set up a college at Jhargram. The Khaira Professor of Agriculture of the University of Calcutta Dr Pabitra Kumar Sen who was the first principal of the college, helped with the Khaira Endowment Fund. The college was handed over to the Government of West Bengal in 1953. Jhargram Raj College, over time, grew into a hallowed centre of higher learning, offering to the undergraduate students a whole array of subjects from three disciplines of Arts, Commerce and Science. Initially affiliated to the University of Calcutta, the college came under affiliation of Vidyasagar University in 1985. In 2005, the college introduced its first Postgraduate course in Chemistry. Gradually, Postgraduate courses in Zoology and Bengali also came into being from 2006 and 2008, respectively. Different minor and major research projects funded by different government agencies are carried out by the faculty members of various departments of the college. The faculties regularly participate in seminars, workshops etc. and their research papers are regularly published in reputed journals and periodicals. In its seventy-one years of existence, the college has continuously strived to cope with the changes with time and offer better education to its students. A good number of students of the college come from a predominantly rural and tribal background. The mission of the college has been the empowerment of the under-privileged. Jhargram Raj College boasts being consistently successful in its mission. Many of the alumni of the college are at the top positions of various government and non-government organizations. Many are reputed academicians. Many have made names in the field of art, music, literature etc. While the college takes pride in them, it busies itself with the duty of grooming the present students and looks forward to a brighter future for the coming generations. The college welcomes the young aspirants to help them realize their dreams and thereby contribute to our beautiful nation.

The Post Graduate Department of Zoology

The Department of Zoology at Egra Sarada Shashi Bhusan College is a DST FIST, STAR COLLEGE & WB DST FIST sponsored department that offers undergraduate as well as Post Graduate courses in Zoology. The department started its journey on 2001 but earned its ability to teach Honours course from 2007 and Post-graduate from 2017 under Vidyasagar University. Established with the aim of imparting comprehensive knowledge and fostering a deep understanding of the subject, the department has played a crucial role in shaping the academic and professional journeys of numerous students.

The Department of Zoology is known for its experienced and dedicated faculty members (One Associate Professor, One Assistant Professor, Four State Aided Teachers, four Guest Lecturers and two Laboratory attendants) who possess expertise in various sub-disciplines of zoology. The faculty members are committed to providing quality education and ensuring that students gain a strong foundation in the subject. They employ effective teaching methodologies, including interactive lectures, laboratory practicals, field visits, and research projects, to facilitate a holistic learning experience.

The department boasts well-equipped laboratories and research facilities that enable students to gain practical knowledge and hands-on experience in various aspects of zoology. The laboratories are equipped with modern instruments like fluorescence microscope, microtome, HPLC, spectrophotometer, PCR etc and equipment required for conducting experiments, observations, and data analysis. This facilitates the development of essential scientific skills and techniques among students.

The department also encourages students to actively participate in seminars, workshops, and conferences to enhance their understanding of current trends and developments in zoological research. In addition to academic studies, the Department of Zoology encourages students to engage in research activities. Students are provided with opportunities to undertake independent research projects under the guidance of faculty members. This hands-on research experience helps students develop critical thinking, analytical skills, and a scientific approach to problem-solving. It also instills in them a passion for scientific exploration and encourages them to pursue higher studies and careers in the field of zoology.

The department actively promotes field visits and excursions to natural habitats, wildlife sanctuaries, and conservation areas. These field trips provide students with practical exposure to diverse ecosystems and wildlife. They also create awareness about the importance of biodiversity conservation and environmental sustainability.

Furthermore, the department maintains strong collaborations and partnerships with research institutions, conservation organizations, and wildlife management authorities.

The Department of Chemistry

The department of Chemistry was established in the year of 2001 with B.Sc General course under vidyasagar University to fulfil the need of local students. In 2009, this department started Honours course. The department is situated on 2nd & 3rd floor of science building. This department is equipped with laboratories, instruments and modern teaching aids with three classrooms. Our departmental library is enriched with valuable books that help both the faculty members and students in traditional field as well as research activity in different field of chemistry. Department has also started a certificate course on cosmetic formulation.

One full time professor, five state aided college teacher and one laboratory attendant are engaged in the departmental activities. Department run under CBCS pattern since 2017.

Department regularly arrange educational workshop, state level and national level seminar to enrich students.

TARUN KUMAR MAITY
Member,
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Dear Participants, Distinguished Guests, and Esteemed Colleagues,

It is with great pleasure and a deep sense of pride that I extend my warmest greetings to all of you on the occasion of the Two-Day National Level Seminar on "Bioactive Natural Compounds and their Effects on Animal Function, Health, and Welfare," organized by the Department of Zoology, Chemistry, and the Internal Quality Assurance Cell (IQAC) of our college, in collaboration with Jhargram Raj College.

This seminar marks an important milestone in our journey towards fostering knowledge exchange and innovation in the field of zoology and chemistry. By bringing together experts, researchers, academicians, and students from various institutions and backgrounds.

I wish you all a productive, enlightening, and memorable seminar experience. May the discussions, collaborations, and knowledge shared during these two days pave the way for groundbreaking discoveries and advancements in the field of bioactive natural compounds. Thank you and best wishes.

Sincerely,

(Mr. Tarun Kumar Maity)

TARUN KUMAR MAITY
Member
W.B. Legislative Assembly



EGRA SARADA SHASHI BHUSAN COLLEGE

ESTD: 1968

(Reaccredited by NAAC with 'B' Grade with a CGPA of 2.32)

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Date:16.05.2023



PRESIDENTIAL ADDRESS

Respected dignitaries, esteemed guests, faculty members, and dear participants,

I feel privileged and honoured to extend a warm welcome to all of you to the Two-Day National Level Seminar on Bioactive Natural Compounds and Their Effects on Animal Function, Health, and Welfare. It is a momentous occasion for us as we gather here today to delve into the fascinating world of bioactive natural compounds and their potential impact on animal well-being.

First and foremost, I would like to express my heartfelt gratitude to all the distinguished speakers, experts, and researchers who have graciously accepted our invitation to share their knowledge and insights with us.

Through this seminar, we aim to explore and understand the effects of bioactive natural compounds on animal function, health, and welfare, and how they can contribute to sustainable and ethical practices in animal husbandry. Over the next two days, we have a rich and diverse program lined up for you. We are fortunate to have experts from academia and research institutes, who will present their cutting-edge research findings, share their experiences, and engage in meaningful discussions.

I would like to express my gratitude to the organizing committee, faculty members, and staffs who have worked tirelessly to make this seminar a reality. I wish you all a fruitful and engaging seminar. May these two days be filled with enlightening discussions, new insights, and lasting connections. Let us collectively strive to unlock the potential of bioactive natural compounds in enhancing animal function, health, and welfare.

Thank you and best wishes for a successful seminar.



Dr. Dipak Kumar Tamili
16.05.2023
Dr. Dipak Kumar Tamili
Principal

Principal
EGRA S. S. B. COLLEGE
P. O : Egra, Purba Medinipur
West Bengal

From Organizer's Pen

Bioactive natural compounds have been used for centuries in traditional medicine for their therapeutic properties. They are typically derived from plants, animals, or microorganisms and can be extracted through various techniques such as steam distillation, solvent extraction, or chromatography. These compounds have been found to possess a wide range of biological activities, including anti-inflammatory, antimicrobial, antioxidant, and anticancer properties. In recent years, there has been a growing interest in the use of bioactive natural compounds in animal production for their potential to improve animal health, welfare, and performance.

Effects of Bioactive Natural Compounds on Animal Health

Bioactive natural compounds have been found to have a positive impact on animal health. For instance, phytochemicals such as flavonoids and phenolic acids found in plants have been shown to possess antioxidant properties that protect cells from oxidative damage. Antioxidants help to prevent diseases by neutralizing free radicals that cause cellular damage, leading to inflammation and tissue damage. In animal production, the use of plant-based bioactive compounds has been found to enhance animal health by reducing the incidence of diseases such as mastitis, lameness, and respiratory infections.

Moreover, bioactive natural compounds have been found to possess antimicrobial properties that help to prevent and treat infections. For instance, essential oils derived from plants such as oregano, thyme, and rosemary have been found to possess antimicrobial properties against a wide range of bacterial and fungal pathogens. The use of essential oils in animal production has been found to reduce the need for antibiotics, which in turn reduces the risk of antimicrobial resistance. In addition, bioactive natural compounds such as prebiotics and probiotics have been found to improve animal gut health. Prebiotics are non-digestible food ingredients that stimulate the growth and activity of beneficial bacteria in the gut, while probiotics are live microorganisms that confer health benefits on the host when administered in adequate amounts. The use of prebiotics and probiotics in animal production has been found to improve nutrient absorption, enhance immune function, and reduce the risk of gastrointestinal disorders such as diarrhea.

Effects of Bioactive Natural Compounds on Animal Welfare

Animal welfare is a complex concept that encompasses physical, behavioral, and emotional well-being. The use of bioactive natural compounds in animal production has been found to have a positive impact on animal welfare. For instance, the use of essential oils in animal housing has been found to reduce stress and improve behavior in animals. Essential oils such as lavender and chamomile have been found to possess calming properties that reduce stress and anxiety in animals. The use of essential oils in animal housing has been found to reduce aggressive behavior in pigs, improve milk production in dairy cows, and reduce feather pecking in poultry. Moreover, the use of bioactive natural compounds in animal feed has been found to improve animal welfare by reducing the risk of heat stress. Heat stress is a common problem in animal production that can lead to reduced feed intake, decreased milk production, and increased mortality. Bioactive natural compounds such as flavonoids and phenolic acids found in plants have been found to possess cooling properties that reduce heat stress in animals.

Effects of Bioactive Natural Compounds on Animal Performance

Bioactive natural compounds have been found to have a positive impact on animal performance. For instance, the use of prebiotics and probiotics in animal feed has been found to improve nutrient absorption and feed conversion efficiency, leading to improved growth rates and increased weight gain. The use of prebiotics and probiotics in animal production has been found to improve the feed efficiency of pigs, poultry and ruminants. This, in turn, reduces the amount of feed required to produce a unit of animal product, leading to cost savings for farmers.

In addition, bioactive natural compounds such as essential oils and plant extracts have been found to have growth-promoting effects in animals. Essential oils such as eucalyptus and peppermint have been found to increase feed intake and improve weight gain in pigs. Plant extracts such as yucca schidigera extract have been found to improve feed intake and growth rate in broiler chickens. The use of growth-promoting bioactive natural compounds in animal production has the potential to increase the efficiency of animal production and reduce the environmental impact of animal agriculture.

Challenges and Limitations

While bioactive natural compounds have the potential to improve animal function, health, and welfare, their use in animal production is not without challenges and limitations. One of the main challenges is the lack of standardization in the extraction and formulation of bioactive natural compounds. The potency and composition of bioactive natural compounds can vary depending on factors such as the plant species, growing conditions, and extraction methods used. This variability can make it difficult to determine the optimal dosage and efficacy of bioactive natural compounds. Moreover, the safety of bioactive natural compounds in animal production is not well understood. While many bioactive natural compounds have been used in human and animal medicine for centuries, their safety and efficacy in animal production have not been fully evaluated. Some bioactive natural compounds can have toxic effects at high doses or when used in combination with other compounds. The use of bioactive natural compounds in animal production requires careful evaluation of their safety and efficacy.

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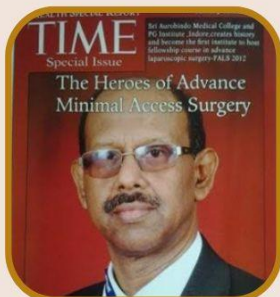
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Bioactive Endogenous Peptide Catestatin: Regulation of Hypertension and Diabetes

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Abstract

Hypertension, the chronic elevation of blood pressure (BP, mmHg \geq 140 systolic or \geq diastolic), is expected to rise from 918 million adults in 2000 to 1.56 billion in 2025. The large increase in hypertension globally is due largely by rapidly rising prevalence in low-middle-income countries. BP is regulated via a complex integrated process, which requires contributions from vasculature, heart, kidney, adrenal glands, and central nervous system. Diabetes, the chronic elevation of blood glucose, is also a leading cause of death. Diabetes affects more than 10% of the adult population in the world and contributes to trillions of dollars in healthcare costs. Insulin resistance (IR) is the hallmark of diabetes, which is characterized by a reduced ability to stimulate glucose uptake in muscle/fat and restrain glucose production by the liver leading to hyperglycemia. Among metabolic tissues, the liver is the first organ to develop IR, followed by skeletal muscle and adipose tissue. In the liver, IR leads to increased gluconeogenesis and glycogenolysis as well as decreased glycogenesis. This results in persistent hepatic glucose production contributing to postprandial hyperglycemia.

Chromogranin A (CgA), a ~48 kDa secretory proprotein, is proteolytically processed to several bioactive peptides including catestatin (CST: hCgA₃₅₂₋₃₇₂) with broad implications and therapeutic potentials. Compared to healthy individuals, plasma CST levels are low in hypertensive and diabetic patients as well as in mice. Consistent with these findings, we found that systemic CST knockout (CST-KO) mice are hypertensive and insulin-resistant on a normal chow diet, implicating CST as an important regulator of hypertension and diabetes. Supplementation of CST-KO mice with CST reversed both hypertension and diabetes, implicating that CST regulates monogenic mode of hypertension and diabetes. To prove whether CST exerts similar effects in polygenic mode of hypertension and diabetes, we treated hypertensive and diabetic mice with CST and found that CST was able to restore both hypertension and diabetes, confirming CST as an endogenous antihypertensive and antidiabetic peptide. Studies are in progress to establish the therapeutic potential of CST in ameliorating hypertension and diabetes.

Key Words:

Catestatin, Hypertension, Diabetes, Insulin resistance, Chromogranin A, CST knockout

Bioactive Potential of *Bellamyia bengalensis*

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Abstract

Bellamyia bengalensis, a freshwater gastropod mollusk commonly known as Bengal spike, is known for its potential as a source of bioactive compounds. Studies have identified and characterized several bioactive compounds occurring in *Bellamyia bengalensis*, including alkaloids, terpenoids and flavonoids. These compounds exhibit a wide range of biological activities, including antioxidant, antimicrobial, antiparasitic, and antitumor properties. Free radical scavenging and oxidative stress inhibition are the main mechanisms responsible for the antioxidant activity of *Bellamyia bengalensis* compounds.

Oxidative stress plays a critical role in the pathogenesis of various diseases, including cancer, cardiovascular disorders, and neurodegenerative conditions. The antioxidant activity of these compounds suggests their potential for therapeutic applications in managing these diseases.

Furthermore, the antimicrobial activity of the bioactive compounds has been investigated against various pathogens, including bacteria and fungi. Inhibitory effects of these compounds have been found against Gram-positive and Gram-negative bacteria, as well as against pathogenic fungi. This antimicrobial activity makes them potential candidates for the development of novel antimicrobial agents to combat drug-resistant microorganisms.

Moreover, studies have also explored the antiparasitic activity of *Bellamyia bengalensis* bioactive compounds. Their effectiveness has been demonstrated against parasites that cause significant health problems for humans and animals, including trematodes and nematodes.

The antiparasitic activity of these compounds opens avenues for developing new treatments for parasitic infections. Moreover, some bioactive compounds from *Bellamyia bengalensis* have antitumor properties.

They have demonstrated promising results in inhibiting tumor cell growth, inducing apoptosis, and suppressing angiogenesis. These properties make them potential candidates for the development of anticancer therapeutics.

In conclusion, *Bellamyia bengalensis* is a promising source of bioactive compounds with diverse biological activities. They are useful for a wide range of applications, including medicine and agriculture, due to their antioxidant, antimicrobial, antiparasitic, and antitumor properties. Further research is needed to explore the full potential of *Bellamyia bengalensis* bioactive compounds and optimize their use for practical applications.

Key Words:

Fresh Water mollusks, anti cancer activity, antiparasitic compounds, angiogenesis

Biodiscovery of Marine Metabolites for Societal Benefits- Understand the Coastal Ocean

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Abstract

The coastal Bay of Bengal of South Asia is home to variety of biotopes with rich biodiversity, influences regional climatic patterns and supports the livelihood of millions of communities. Sundarbans, the world's largest contiguous mangrove ecosystem, an UNESCO World Heritage Site and a RAMSAR site, located along the north east coast of the Bay of Bengal and shared between India and Bangladesh, is home to unique biodiversity and abundant marine bioresources. However, there is a limited understanding of the microbial biocomplexity that is shaped by prevailing environmental gradients such as in Sundarbans which could have huge consequences towards targeted biodiscovery of marine metabolites. Using state-of-art genomics and cultured based approaches the importance of coastal oceanic ecosystems such as Sundarbans could provide reliable marine metabolites that can help towards achieving affordable drugs for Atmanirbhar Bharat. In this lecture, some of the approaches undertaken to date for targeted biodiscovery so as to cater for societal benefits will be highlighted.

Key Words: Bioactive molecules, marien metabolites, societal applications

Joint Venture of Chemistry and Biology for Achieving the Sustainable Development Goals

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Abstract

Alchemists had fixed two objectives – (i) Transformation of Iron to Gold that means transformation of useful material to precious material and (ii) Elixir of Life to sustain long-healthy active life. The origination, growth, survivability and death of living body is controlled by chemistry in general and Molecules/Ions in particular. Chemistry explains the cellular activity, evolution of energy and proteins, breathing and blood flow, quality of foods and vitamins, importance of nutrition etc. With a basic understanding of chemistry, one can realise why organ's function. They involve in cellular and subcellular functions. Precipitation of chemical substances (toxic or nontoxic) in the environment has impact on the equilibrium and sustainability and has direct impact on human health. Chemistry democratically helps for the development of every branch of science, engineering, medicine, forensic, law, humanities and is the growth indicator of a nation.

Ions and molecules are required for growth and integrated progress of plants and animals. Healthy life also needs clean and toxic free environment. The concentration of ions in biology is to be maintained at optimum level – neither low nor high. Recently, the chemosensors are used in the selective and specific detection of ions/molecules. The characteristic of sensors includes high selectivity, sensitivity, accuracy, high resolution, and low signal-noise ratio as well as easy to synthesize and commercially cheap. Past few years we have been engaged in the developing of fluorophoric receptor and metal complexes of them, which may detect various ions (cations and/or anions) spectro-fluorometrically by tuning emission wavelength or intensity. Our researchers have successfully designed various novel molecules those are showing sensitivity towards Zn^{2+} , Cd^{2+} , Cu^{2+} , Al^{3+} , Mg^{2+} , Cr^{3+} , Pd^{2+} , PO_4^{3-} , CN^- , F^- .

Key Words:

Chemosensors, Fluorophoric receptor, Spectro-fluorometrically

Novel Sulforaphane Analog Compound 4a Inhibits PI3K/Akt Mediated GSK3 β and NRF-2 Signalling and Triggers ROS Mediated Caspase Independent Apoptosis in Human Cervical Cancer Cells

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Abstract

In this age of colossal technological advances and social augmentation, cancer is still marked as one of the foremost common disease of concern and second reason worldwide for human morbidity and mortality. Chemotherapy, irradiation and immunotherapy are the gold customary approaches for cancer treatment worldwide but brings along the toxicity. Hence, the current need is to develop alternate strategies of therapeutics, primarily through the chemical modifications of compounds isolated from natural sources or by conjugating various compounds by means of a pharmacophore with the last word goal to extend effectiveness and minimize toxicity. Sulforaphane, a naturally occurring isothiocyanate, has attracted attention because of its tremendous anticancer potential. Thus, keeping this in mind, an array of sulforaphane analogs were designed, created, and evaluated for their cytotoxic potentials on various murine and human malignant cell lines. One such analog compound, 4a, was chosen as the most potent, with a high cytotoxic effect against cancer cells and low toxicity against normal cell lines. Our present study established a lead compound's mediated reactive oxygen species (ROS) induced mitochondrial dysfunction and apoptosis induction. The inhibition of cell propagation was linked to data confirming G2/M phase arrest. The Bax/Bcl-2 ratio induces mitochondrial dysfunction. This compound interacts with IGFR1 and blocks the PI3K/Akt pathway. Molecular docking and western blot analyses investigation provided these pieces of information. The lead compound suppressed the NRF-2 protein expression, thus increasing the number of free radicals in tumor cells. Compound **4a** induced ROS-mediated caspase-independent apoptosis as confirmed by western blot analysis. The 4T1 injected Balb/C syngeneic tumor model confirmed the augmentation in the inhibitory outcome of the lead compound. This study summarizes the mechanistic pathway by which **4a** mediates its cytotoxic effect in cancer cells. A novel sulforaphane analog, 4a, acts as an antagonist against the IGFR1 receptor, block the PI3K/Akt and NRF-2 pathways and promotes apoptosis via ROS generation in a caspase-independent manner.

Key Words:

Sulforaphane, ROS, apoptosis, Nrf-2, IGF R1, PI3K/Akt

Bioactive Natural Compounds and Role in Cancer Prevention

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Abstract

Bioactive natural compounds have gained considerable attention in recent years due to their potential role in cancer prevention. These compounds, derived from various natural sources such as plants, fungi, and marine organisms, possess inherent biological activities that make them attractive candidates for developing novel therapeutic strategies against cancer. This abstract provides an overview of the bioactive natural compounds and their role in cancer prevention. Bioactive natural compounds, including polyphenols, flavonoids, alkaloids, terpenoids, and phenolics, exhibit a wide range of biological activities, including antioxidant, anti-inflammatory, and anti-carcinogenic properties. Their ability to modulate key cellular processes, such as cell proliferation, apoptosis, and angiogenesis, makes them potential agents for cancer prevention. Several studies have reported the chemopreventive effects of bioactive compounds in various cancer types, including breast, colon, prostate, and lung cancer. These compounds have been shown to inhibit the growth of cancer cells, induce cell cycle arrest, and promote programmed cell death, thereby suppressing tumor development and progression. Moreover, bioactive natural compounds can exert their cancer preventive effects through the modulation of signaling pathways involved in tumor initiation and progression. For instance, polyphenols, such as resveratrol and curcumin, have been found to inhibit the activation of nuclear factor-kappa B (NF- κ B) and mitogen-activated protein kinases (MAPKs), which are key regulators of inflammation and tumorigenesis. Additionally, these compounds can target cancer stem cells, a small sub population of cells responsible for tumor initiation, recurrence, and metastasis. Furthermore, bioactive natural compounds have shown promising synergistic effects when combined with conventional cancer therapies, such as chemotherapy and radiation therapy. These compounds can enhance the efficacy of treatment, reduce side effects, and overcome drug resistance. In conclusion, bioactive natural compounds hold great potential as preventive agents against cancer. Their diverse biological activities and ability to target multiple signalling pathways make them attractive candidates for developing effective and safe strategies for cancer prevention. Further research is warranted to better understand their mechanisms of action and optimize their use in clinical settings.

Key Words:

Bioactive Compounds, Nutrigenomic, Polyphenolic compounds, Flavonoids, Carotenoids, Terpenoid, Anticancer effect

Azaserine and its Derivatives, an Unstable Diazo Group Containing Highly Toxic Natural Products

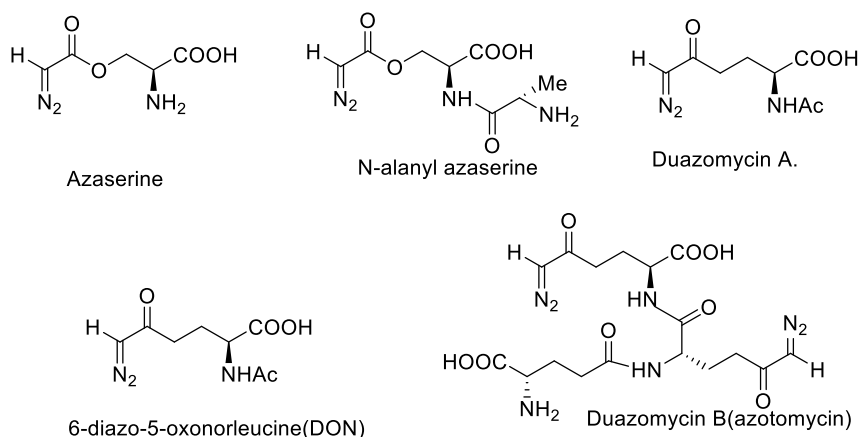
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Abstract

Diazonium salt is a class of organic compound that have the structure $R-N_2^+$. They are highly unstable and quickly decomposes to nitrogen gas and carbenium ion. But certain aromatic diazonium salts are stable enough to be isolated. Although these diazo compounds are taking part an important role in synthetic organic chemistry as versatile intermediate, a small number of such compounds are known in literature as bio active natural products.

Azaserine, a naturally occurring diazo compound was isolated from *Streptomyces fragilis* and reported as antitumour and antibiotic agents. N-alanylazaserine which was isolated from fermentation of *Glycomyces harbinensis* which is more active than azaserine against a range of bacteria. Another azaserine derivative, thrazarine which was isolated from *Streptomyces coerulescens* and showed activity against a wide range of tumours. 6-diazo-5-oxo-L-norleucine (DON) was isolated from a *Streptomyces* strain but the clinical work of this were ceased due to severe side effects. The N-acetyl derivative of DON (duazomycin A) was isolated from *Streptomyces ambofaciens*. Duazomycin B (azotomycin) also obtained from the same micro-organism which exhibited potent anticancer activity. A bis-diazoketone containing natural product is alazopeptin, isolated from *Streptomyces griscoplanus* has attracted attention because of their anti-trypanosomal activity. Another alanine containing diazoketone which is designated as OS-3256-B was isolated from *Streptomyces candidus* strain.



The above diazoketone derivatives are the amino acid anti-metabolites and exhibit potent biological activity, particularly tumours. But finally it was concluded that these compounds are too toxic for clinical use.

Key Words:

Azaserine, Diazonium, Carbenium ion, 6-diazo-5-oxo-L-norleucine, *Streptomyces fragilis*, N-alanylazaserine

Bioactive Compounds from *Lingula anatina*: A Potential Source of Therapeutic Agents

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Abstract

Lingula anatina, commonly known as the duckbill brachiopod, belongs to the phylum Brachiopoda. Scientists have been intrigued by its unique physiological and biochemical properties since it inhabits coastal areas in Southeast Asia. There is a great deal of bioactive compound potential in *Lingula anatina*, according to recent studies. It aims to highlight the potential applications of bioactive compounds derived from *Lingula anatina*. Small molecules, proteins, peptides, and polysaccharides have been identified as bioactive compounds in *Lingula anatina*. There have been diverse biological effects demonstrated for these compounds such as antioxidant properties, anti-inflammatory properties, antimicrobial properties, antitumor properties, and immune modulatory properties. A polysaccharide extract from *Lingula anatina* is capable of protecting cells against oxidative stress-induced damage. Furthermore, these polysaccharides have demonstrated immunomodulatory properties through their ability to stimulate proliferation and activation of immune cells, suggesting their potential for use in immunotherapy. Additionally, *Lingula anatina*-derived proteins and peptides have demonstrated antimicrobial and antitumor activities, making them promising candidates for the development of novel antimicrobial agents and anticancer drugs. Furthermore, small molecules isolated from *Lingula anatina* have shown significant anti-inflammatory effects by inhibiting pro-inflammatory mediators. These molecules hold potential for the treatment of various inflammatory conditions, including arthritis and inflammatory bowel diseases. The unique biochemical composition of *Lingula anatina* and its bioactive compounds make it a valuable resource for drug discovery and development. In order to enhance the bioactivity and therapeutic potential of these compounds, further research is needed to elucidate their mechanisms of action. In conclusion, *Lingula anatina* represents a promising source of bioactive compounds with diverse biological activities. The exploration of *Lingula anatina*'s bioactive compounds offers exciting prospects for the development of novel therapeutic agents in various fields, including medicine, biotechnology, and pharmaceuticals. Further investigation and characterization of these compounds are crucial for harnessing their full potential and transforming them into clinically relevant applications.

Key Words:

Lingula anatina, Living fossil, Brachiopoda, bioactive compounds

Usage of Plant Natural Compounds for Prevention and Control of White Fecal Syndrome (WFS) in Shrimp *Penaeus vannamei* (Boone, 1931) Cultured in West Bengal, India

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Abstract

White fecal syndrome (WFS) is reported to be a serious problem in *Penaeus vannamei* culture ponds in South Asian countries. The microsporidian parasite, *Enterocytozoon hepatopenaei* (EHP), along with a huge amount of pathogenic *Vibrio* spp., may be responsible for WFS. Plants have a profound impact on controlling numerous microbial infections because of their diverse and rich supplies of active substances, such as alkaloids, flavonoids, pigments, phenolics, terpenoids, tannins, glycosides, steroids and essential oils. The wide variety of active substances in herbal preparations improve hepatoprotective action, growth promoting action, antioxidant activity and greatly minimize or control EHP issues, minimize or control the condition. WFS is a digestive system disorder and treatment with herbal active ingredients, in particular, has been shown to improve the health of the hepatopancreas and the digestive system, which may help to minimize or control the condition. Products made from *Citrus limon*, *Allium sativum*, *Zingiber officinale*, *Borassus flabellifer* and *Vigni mungo* have a significant impact on the shrimp's health status in relation to EHP infection. The opportunistic pathogen *Vibrio* spp., which is prevalent in shrimp's digestive tract, is decreased by leafflower (*Phyllanthus urinaria*) herbal extract. *Gracilaria verrucosa* has a bioactive component that can boost resistance to harmful microorganisms by stimulating innate immunity. In addition to enhancing the shrimp's immunity, *G. verrucosa* extract promotes *P. vannamei*'s resistance to *V. harveyi*. It is necessary to conduct a complete trial in which the pure herbal compounds are given to the shrimp and their effects on EHP and *Vibrio* spp. are examined at the molecular level.

Key Words:

White fecal syndrome, *Enterocytozoon hepatopenaei*, *Vibrio* spp., antioxidant, innate immunity

S-allylcysteine from *Allium sativum* L. Shows Antidiabetic Properties

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Abstract

Diabetes mellitus is one of the common endocrine disorder leads to hyperglycemia causing various disorders in the eyes, nerves, blood vessels, skin, and kidneys. Increased glycation of proteins and the accumulation of advanced glycation end-product (AGEPs) have been used in monitoring the pathogenesis of diabetic complications. Glycation, together with AGEP formation, is also accompanied by the formation of free radicals via acetoxidation of glucose and glycated proteins. Compounds with combined antiglycation and antioxidant properties may offer therapeutic potential. Recent studies suggested that AGE suppresses the production of AGEPs in-vitro, and formation of glycation derived free radicals. S-allylcysteine, a key component of aged garlic, is a potent antioxidant and can inhibit AGEP formation. Aged garlic extract and S-allylcysteine observed more attention, is reduced in in-vivo AGEPs. Although, experimental studies demonstrated a clear hypoglycemic effect of garlic, the effect of garlic on human blood glucose is still not clear. Many studies showed that garlic could reduce blood glucose levels in diabetic animals. Garlic was effective in the reduction of blood glucose in streptozotocin-as well as alloxan-induced diabetes mellitus in rats and mice. Short term benefits of garlic on dyslipidemia in diabetic patients were shown. Garlic significantly reduced total serum cholesterol and LDL cholesterol and moderately raised HDL cholesterol as compared with placebo in diabetic patients. S-allylcysteine, a bioactive component derived from garlic, restored erectile function in diabetic rats by preventing reactive oxygen species (RDS) formation through modulation of NADPH oxidase subunit expression. Metformin and garlic treatment in diabetic patients for 12 weeks reduced fasting blood glucose (FBG), but the percentage of change in FBG was more substantial with metformin supplemented with garlic than with metformin alone. Chronic feeding of garlic extracts showed a significant decrease in blood glucose levels. However, some other studies showed no change in blood glucose levels in humans. Therefore, the role of garlic in diabetic patients needs to be further investigated. The beneficial effect of garlic on diabetes mellitus is mainly attributed to the presence of volatile sulfur compounds, such as allicin, diallyl disulfide, diallyl trisulfide, diallyl sulfide, S-allyl cysteine, ajone, and allyl mercaptan. Garlic extracts have been reported to be effective in reducing insulin resistance.

Key Words:

AGEP, Hyperglycemia, Acetoxidation, FBG, S-allylcysteine

***Suaeda maritima* (L.) Dumort. - a Potential Source of Bioactive Triterpenoids, Growing Along the Coastal Belt of West Bengal, India**

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Abstract

Suaeda maritima is a herbaceous, succulent, annual salt marsh growing along the different regions in the coastal belt of West Bengal. This plant species is generally found to grow along the coastal belts of Indian subcontinent as well as other tropical and subtropical regions, usually between 25N and 25S latitude throughout the world and growing preferably in salt-marshes of the sea coast. This annual salt marsh is one of the dominant mangrove associates in the said coastal belt and quite regularly used by the local people for food and pharmaceutical aspect. This species contains several different phytochemical compounds like triterpenoid, Sterols, Alkaloids, Acids, Glycosides, Proteins and amino acids. Among them pentacyclic triterpenoids are pharmacologically drawn more attention to the researcher. Triterpenoid content appears to be positively correlated with reduced symptoms of chronic obstructive pulmonary disease and decreased risk of thrombotic stroke and exhibits cardio-protective activities as well as anti-inflammatory and anti-oxidant properties. The health benefits of dietary triterpenoids, a group of plant secondary metabolites, are a more recent discovery. Research also suggests a positive association between reduced reported incidences of coronary heart disease with consumption of triterpenoids found in natural resinous materials and plants. For estimation and quantitation of triterpenoid compounds in *S. maritima* collected from different regions of the coastal belt of West Bengal and normal phase high performance thin layer chromatography (HPTLC) has been used for estimation. The present study has furnished an account of showing the amount of triterpenoid compounds in the plant individuals of the studied species of different places of said coastal belt, revealed through the HPTLC study.

Key Words:

Suaeda maritima; triterpenoids; HPTLC

Crystal Engineering: Small Molecule to Pharmaceutical Compounds

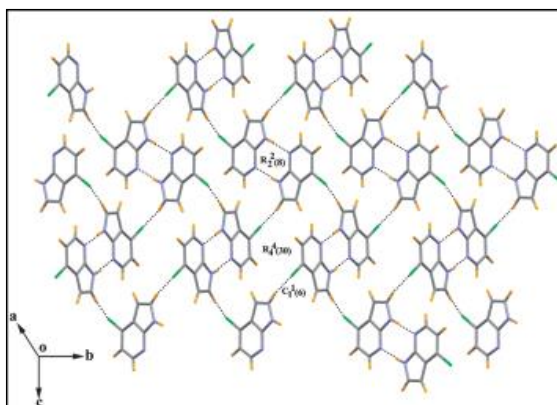
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Abstract

Intermolecular interactions, especially hydrogen bonds, have been a topic of wide scientific interest due to their role in crystal engineering and biological recognition processes. Many of the synthons identified so far in supramolecular chemistry involve N–H/N, N–H/O, O–H/N and O–H/O hydrogen bonds, which provide the requisite robustness and reproducibility to create new solid-state structures. Systematic studies on the nature of hydrogen bonds and intermolecular interactions lie at the heart of directed self-assembly. From the very strong negatively-charged hydrogen bonds and metal–heteroatom coordination bonds to strong and weak hydrogen bonds and inter heteroatom interactions span an energy range of 50 kcal/mol. In addition to these relatively strong hydrogen bonds, weak interactions such as C–H/...acceptor (O, N) are also important in describing the self assembly process. In this context, the chlorine atom with its low electro negativity has been labelled as a weak acceptor, and its acceptor potential usually overlooked. While the weak O–H/Cl and N–H/Cl interactions are considered as hydrogen bonds, the nature of even weaker C–H/Cl interactions is not yet fully understood. The potential development of crystal engineering as robust and recurring hydrogen bond patterns offers good opportunity for the design and construction of supramolecular architectures, notably the pharmaceutical compounds are wide range of interest for a variety of physical and chemical purposes.



Key Words: Crystal structure, Hydrogen bond, Self assembly, Supramolecular architectures

Climatic Change and its Impact on the Occupational Health Status of Fishermen in West Bengal

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Abstract

Fishing is one of the fastest-growing and employment-generating sectors in India. Approximately four lakh fishermen directly and six lakhs indirectly engage and depend on this industry in West Bengal. Inland and marine fishing have an important role in the socio-biology-economic development not only in India but also in West Bengal. Fishing is the riskiest and health-hazardous occupation that involves physical hazards, chemical hazards, and biological hazards. According to ILO, nearly 24000 fishermen or fishery industry people are killed every year globally due to their occupational hazards. National Policy on Climate Change in 2009, referred to “any change in climate over time that directly and indirectly affects humans and their activities as well as natural systems and processes”. According to Global Climate Risk Index, 2019 India obtained 7th position in World. Climate change has short-term as well as long-term impacts on Physico-chemical parameters of waterbodies due to alteration of their salinity, pH, dissolved oxygen, TDS, temperature, nitrogen compounds, and the emergence of a new variety of pathogens. Such pathogens invade as opportunistic pathogens directly or are transmitted through zoonotic infection (e.g. *Vibrio* sp.) and create diseases frequently by their toxic genes. These long- or short-term climatic changes may be predictable or unpredictable and predictable climatic changes include cyclones, sea level rise, acidification, etc. Other hand unpredictable climatic changes are changing water current, Strome etc. As a result, fisherfolk are most vulnerable all types of impacts (short/long) of these climate changes (predictable/unpredictable). These climatic impacts and environmental crises also reduce the resilience of fishermen and threat to human health, well-being, and livelihoods. In India, the fishery is the oldest as well as important livelihood for the people of coastal areas and such occupation is totally dependent upon the climatic conditions. So, the consequences of climate change are directly or indirectly affecting fishermen and fishermen facing a lot of multi-dimensional (socio-economic, socio-biology, socio-environmental) problems. The paper discusses the climatic change and its impact on the occupational health of fishermen especially in West Bengal

Keywords:

Fishermen, Climatic change, occupational hazards, West Bengal

Bioactive Compound from Skin By-Product of Marine Fishes and Their Health Benefit

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Abstract

By-product is regarded as an ordinary unsaleable product but can be used after processing. Marine finfishes processing generates 10–50% of the total weight as non-edible parts, which includes fish frame, head, internal organ, skin, bone, and scales. Researcher are isolate and identified various **bioactive components** from these fish by-product. **Skin** of marine fish rich in gelatine, collagen, protein, lipid, and flavour. Collagen is a most abundant protein in skin and Gelatin is produced by partial hydrolysis of collagen. Different bioactive compound from marine fish skin is derived by variety of extraction method like acid-alkaline hydrolysis, enzymatic hydrolysis, and fermentation. Fish protein hydrolysate (FPH) from collagen used as a drug carrier, treatment of osteoarthritis pain, **hypertension** and act as inhibitor of angiogenic disease. Gelatine and collagen derived peptides having anti angiotensin-converting enzyme (ACE) activity, ACE convert angiotensin I into Angiotensin II which is a potent vasoconstrictor that causes blood vessels to narrow resulting in increased blood pressure. ACE inhibitor activity peptides purified from skin of the fishes like *Raja clavata*, *Gadus chalcogrammus*, *Gadus macrocephalus* etc. Antioxidant activities which reduce **Reactive oxygen species (ROS)** is also found in skin of fishes like *Hemiramphus far*, *Gadus chalcogrammus*, *Otolithes ruber*, *Raja clavata*, *Megalaspis cordyla*, *Johnius belengerii*, *Lates calcarifer*, *Navodon septentrionalis* etc. ROS are usually generating during oxidative metabolism at mitochondria and peroxisome. Excess of ROS can damage cellular lipids, protein, DNA, inhibit normal cellular functions and induced lipid peroxidation which plays a critical role in cell death. Gelatin contains hydrophobic amino acids and a range of peptides with potent lipid peroxidation inhibitory activity as well as having high emulsifying ability for hydrophilic-hydrophobic partitioning and powerful antioxidant activities that are capable of scavenging 61%-69% of hydroxyl radicals. Gelatin also used in capsules for controlled drug delivery system. Further, antimicrobial activity is found in *Katsuwonus pelamis*, *Thunnus albacares*, *Pleuronectes americanus* etc. their skin possesses **antimicrobial peptides (AMPs)** which are involve in natural defense mechanism. Skin Peptides *Raja kenoei*, *Oncorhynchus keta* exert as Anti-Alzheimer's and neuroprotective activity. The activity of Matrix metalloproteinases (MMPs) or matrixins are thought to play a central role in the breakdown of extracellular matrix also inhibited by skin derived peptides of *Gadus chalcogrammus* and *Pangasius hypophthalmus*. Skin of *Hippoglossus stenolepis* very potent against hyperglycemia. Subcritical water-hydrolyzed fish collagen peptide (SWFCP) derived from tuna skin having adipogenic regulatory activity. Recently anti-photoaging activity also found in peptide LMWCP purified from catfish skin (*Pangasius hypophthalmus*). Recently a study investigates crude skin extract from marine catfish *Tachysurus dussumieri* having **anticancer activity** on human colon cancer cell line. So, fish skin can potentially be utilized in the development of pharmaceutical and nutraceutical products due to presence of rich bioactive compound.

Key Words:

Bioactive component, marine fish skin, hypertension, Reactive oxygen species, antimicrobial peptides, anticancer

Effects of Plant Secondary Metabolites on Animal Function, Health and Welfare

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Abstract

Plant secondary metabolites, which include a wide variety of phytochemicals, have always been constituents of the diets of man and other animals. Phytochemicals are natural bioactive chemical compounds in plants with different biological properties and therapeutic benefits. Recent studies show that various plant phytochemicals not only act as functional additives by improving animal health and growth performance, but also, enhance their productivity when incorporated into animal feed. Additionally, the inclusion of phytochemicals in the diets of animals alters and stabilizes the intestinal microbiota, thus reducing the microbial toxic metabolites in the gut, owing to their direct antimicrobial properties on various pathogenic bacteria, which results in relief from intestinal challenge and immune stress. However, phytochemicals have been shown to have adverse effects on animals when ingested. The effects depend to a great extent on the chemistry of the compounds, their concentration in the diet and the amount consumed by the animals, and are further dependent on the health status of the animals. Traditionally, most studies of the effects of these compounds on animals have focused on their adverse effects and how to alleviate them. However, recent public concern about the use of synthetic compounds in animal diets to enhance performance and health and welfare issues, coupled with changes in regulations on the use of synthetic medicaments, has stimulated interest and research in the use and effects of phytochemicals in the diets of farmed animals. Phytochemicals vary in their chemistry but can be divided into hydrophilic and hydrophobic compounds, of which a wide variety of polyphenolic and terpenoid compounds, as well as alkaloids, carbohydrates and non-protein amino acids, invoke special interest due to lack documentation, research and standardization. In this study, the biochemistry and mechanisms of action of these compounds in plants and their effects in animals when ingested are investigated.

Key Words:

Plant secondary metabolites, Phytochemicals, bioactive chemical compounds, functional additives, animal health and welfare

Odonata Assemblages in the Gaya Region: Differential Impacts of Urban and Rural Agricultural Land Transformation

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Abstract

This study examines the differential impacts of land transformation in urban and rural agricultural areas on Odonata assemblages in the Gaya region. The transformation of farming land poses an issue to the biodiversity of the Gaya region. The region in concern portrays an identifiable prevalence of endemic species within certain taxa, such as Odonata. These insects exhibit a high degree of sensitivity towards variations in the physical structure of their habitat, rendering them efficacious as bioindicators. The present study was conducted to examine the impact of transformations of agricultural land in rural and urban areas on the diversity and composition of Odonata species in the region. Two different land use type were identified and classified based on their land use as either rural agricultural or urban agricultural. Throughout the year, adult odonata and four distinct environmental variables were documented. The composition of Odonata assemblage was significantly impacted by land transformation, however, it did not consistently result in a significant reduction in species richness. The composition of Odonata assemblage and species richness were both negatively impacted by the average height of vegetation. The Odonata assemblages in rural agricultural land use exhibited variations in comparison to those observed in urban agricultural land regions. The utilisation of urban agricultural land has resulted in decreased opportunities for certain species, while simultaneously facilitating the survival and establishment of more prevalent, adaptable species. The establishment of this area is crucial for the conservation of various taxa, especially in a region with an amount of endemic species, as it helps to alleviate the negative impacts of land transformation.

Keywords:

Odonata, Gaya, Vegetation, Land transformation, Conservation

The Potential Use of Odonata Larvae as an Instrument of Assessing the Concentration of Pesticides in the Keleghi River Basin

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Abstract

The study focuses on the use of odonata larvae as an indicator of pesticide contamination in both river and rice field environments. The present study aimed to assess the prevalence of odonate larvae in the Keleghi river system. The survey was conducted at six stations, including three midstream stations that were surrounded by rice fields with and using manual sprinkling, and three downstream stations that were located in rice fields with aerial and ground spraying. The downstream stations exhibited a notable reduction in both species diversity and richness. The presence of pesticides resulting from ground spraying was highest at all downstream stations. The observable evidence of harm inflicted upon the odonata larvae was limited to the downstream station. The concentration of insecticides appeared to be significant ($p=0.05$) for Odonata naiads at the downstream stations. The presence of pesticide contamination in downstream areas of this river may result in limitations for odonata larvae, thereby serving as a potential indicator of pesticide contamination.

Key Words:

Odonata larvae, Pesticide contamination, Keleghai river, Rice field, Indicator

The Impact of Administering Letrozole as a Selective Aromatase Inhibitor on the Reproductive Performance of Male *Rattus norvegicus* (Order: Rodentia, Family: Muridae)

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Abstract

The present study was set up to examine the impact of the administration of a selective aromatase inhibitor, letrozole, on the parameters of rat sperm (*Rattus norvegicus*) and testicular histomorphology. In this study, a cohort of 10 male *R. norvegicus*, approximately 4 months of age and with an average weight of 165 ± 8.2 g, were randomly assigned to two groups, with each group consisting of 5 rats. The samples underwent a six-week treatment regimen. The initial cohort (C) was administered solely with normal saline, serving as a control group. Groups T, and C were administered doses of 0.75 mg/animal and 1.5 mg/animal of letrozole, respectively. Upon completion of the experiment spanning 42 days, all animals were subjected to euthanasia and samples were procured for further analysis. The study's findings indicate a notable increase in sperm quality ($P\text{-value} \leq 0.05$) and a significant reduction in sperm abnormality within the T group when compared to the C group. Furthermore, a noteworthy disparity was observed in terms of enhanced sperm quality and reduced sperm abnormality within the T group in comparison to the C group. The control group exhibited typical somniferous tubules with elevated spermatocopy counts, as evidenced by histologic sections. Primary and secondary spermatocytes, along with spermatozoa, were observed. The T group exhibited sufficient spermatogenesis accompanied by a dense basement membrane. The findings of the present investigation indicate that letrozole exhibited a positive impact on sperm parameters, without inducing any observable pathological modifications in the testicular tissue.

Key Words:

Aromatase inhibitors, Histomorphology, Letrozole, Rat sperm, Sperm parameters

Plants: “A Major Natural Resource for Curing Disease Diabetes in Paschim Medinipur and Jhargram District of West Bengal”- An Exploration”

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Abstract

Research has been carried out in different remote villages of Paschim Medinipur and Jhargram district of West Bengal to find out plants traditionally used and transmitted only orally generation after generation mainly by tribal people and other villagers. As diabetes is seen in the district as an epidemic disease among all age group (mainly type-II diabetes), interest has been grown to reveal and document another pathway to prevent the disease apart from the orthodox highly cost allopathic medicine. Type-II diabetes is a metabolic disorder but food habit of the inhabitants and some environmental factors of the area are also responsible for the epidemicity of the disease. Vigorous survey was carried out for last one year to recognize the antidiabetic ethnomedicinal plants used in the said area. 12 medicinal plants belonging to 9 families namely, *Gymnema sylvestre* (Retz.) R.Br.exSchult. (Apocynaceae), *Swietenia mahagoni* (L.) Jacq.(Meliaceae), *Scoparia dulcis* L.(Plantaginaceae), *Rauvolfia tetraphylla* L.(Apocynaceae), *Mangifera indica* L. (Anacardiaceae), *Ficus hispida* L.f.(Moraceae), *Tribulus terrestris* L.(Zygophyllaceae), *Tinospora cordifolia* (Willd.) Miers ex Hook.f.&Thomson (Menispermaceae), *Pterocarpus marsupium* Roxb.(Fabaceae), *Tinospora sinensis* (Lour.) Merr.(Menispermaceae), *Coccinia cordifolia* (L.) Cogn.(Cucurbitaceae), *Catharanthus roseus* (L.) G.Don (Apocynaceae), *Achyranthes aspera* L.(Amaranthaceae) are vividly used and effectively tackled the said disease. The scientific name, local name, family of the said plants with the preparation of medicines and method of application were documented properly. The same monoherbal/polyherbal formulations used by different herbal practitioners and market sellers proves the genuinity of ethnomedicinal study. It can be said confidently and safely that these formulations are not only a matter of folklore but scientific also. Different users' satisfactory wellness again proves and indicates about the active ingredients present in the monoherbal/ polyherbal formulations. It inspires the researchers to reveal these in future bio-chemical, molecular and in-vitro study and not to confined in ethnobotanical documentation. According to CBD, 1992 the present documentational work will enrich the data in TKDL and also PBR's.

Key Words:

Diabetes, ethnobotanical formulation, orthodox allopathic medicine, mono herbal and poly herbal formulation, herbal practitioners, marker sellers, folklore

Vannamei Shrimp farming in Contai Coast Area of Purba Medinipur under West Bengal: Special Risks in all Aspects Especially in Terms of Crop Production and Food Security

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Abstract

The coastal area of the Bay of Bengal of Contai sub-division under Purba Medinipur district of West Bengal was rich in various agricultural and aquatic productions of great environmental significance. But to meet the needs of developed countries and for quick economic benefit, the salt flats, mangrove areas, wetlands and mainly cultivable lands in coastal areas are being converted into shrimp farms for the last almost three decades. Due to shrimp farming, salt from the ponds can easily leach into groundwater and agricultural lands. This has long-lasting effects by altering the hydrology that provides the foundation of wetland ecosystems. Unregulated vannamei shrimp farming is associated with several negative environmental and social impacts that hinder the sustainable development of this prospering sector. This farming has had a devastating impact on indigenous biodiversity. This includes deterioration of soil and water quality, lessening of mangrove forests, and reduction in populations of native fish and shellfish species among others. Loss of mangroves has destabilized coastal areas; with negative impacts on coastal communities. Damage of soil quality due to salinity infiltration raises thousands of questions about the future crop- productivity and food security of the area. Now income in this farming is not like before. There have also been some socio-economic concerns on the livelihood patterns of the local people. At this stage, a more sustainable and integrated approach, different from current unscientific shrimp farming practices, is needed, which is responsible for ecological integrity and social cohesion.

Key Words:

Vannamei shrimp farming, sustainable development, indigenous biodiversity, salinity infiltration, crop-productivity, food security, socio-economic concerns, ecological integrity, social cohesion

The Insulin Plant (*Costus igneus*) and its Potential as a Glycemic Regulator: a Systematic Study

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Abstract

Costus igneus, a member of the family Costaceae, is a newly introduced plant in India from South and Central America. The common term "insulin plant" comes from the fact that it often grows as an ornamental plant in southern India and whose leaves are used as herbal remedies for diabetes. The leaves of *C. igneus* are rich in protein, iron, and antioxidants such as ascorbic acid, tocopherol, carotene, terpinoids, steroids and flavonoids. The bioactive compounds quercetin and diosgenin, a steroidal sapogenin, were isolated from *C. igneus* rhizomes. Quercetin is a flavonoid that exhibits antidiabetic effects. Other flavonoids, such as astragalín, kaempferol, isovitexin and naringenin, demonstrated antioxidant and anti-inflammatory properties. Several studies found that the methanolic extract markedly reduced serum glucose levels and increased liver glycogen, demonstrating its antidiabetic efficacy. Additionally, it revealed an improvement in the lipid profile and a rise in plasma insulin level, indicating it is effective in treating hyperglycemia brought on by diabetes mellitus. It has a regulatory role in glucose homeostasis through muscarinic receptors. The existence of medicinally valuable reducing sugars in the leaf extract of *C. igneus* is revealed as a result of the synergistic effects of bioactive compounds. Glycemic control in diabetics was achieved in a cross-sectional clinical study when patients consumed either one fresh leaf or one teaspoon of shade-dried powder of *C. igneus* daily in addition to other modalities of treatment. Diabetes-induced hyperlipidemia was found to be reversed when methanolic and aqueous extracts were administered at a dose of 200 mg/kg body weight. The goal of this review is to investigate the potential therapeutic benefits of *Costus igneus* with regard to its glycemic profile so that appropriate formulations can be developed for human use in the future.

Key Words:

Costus igneus, diabetes, quercetin, antioxidant and anti-inflammatory effects, glucose homeostasis

Nemertean Toxin and Their Pharmaceutical Applications

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Abstract

Nemerteans are a phylum of marine invertebrates that possess an array of fascinating biological properties, including the production of potent toxins. Proboscis of nemertean containing several types of toxins such as pyridine alkaloids, tetrodotoxin and cytolytic or neurotoxic peptides. Nemertean toxins have attracted considerable interest due to their diverse chemical structures and remarkable biological activities. These toxins are known to exhibit cytotoxic, neurotoxic, and haemolytic effects, among others. They typically function as defensive mechanisms, aiding the Nemerteans in capturing prey and deterring potential predators. These toxins possess unique pharmacological properties that make them promising candidates for drug development. For example, certain nemertean toxins have shown potential as anticancer agents by selectively targeting cancer cells and inducing apoptosis. Other toxins exhibit antimicrobial activity, which could be utilized in the development of novel antibiotics to combat drug-resistant bacteria. Moreover, nemertean toxins have demonstrated interesting effects on cellular signalling pathways, ion channels, and receptors. This opens up possibilities for their use in drug discovery and the development of therapeutics that target specific biological pathways associated with various diseases, such as neurological disorders. However, harnessing nemertean toxins for pharmaceutical purposes poses challenges. Extracting these toxins in sufficient quantities, understanding their complex mechanisms of action, and ensuring their safety and efficacy are areas that require further exploration and research.

Key Words:

Nemertea, Toxin, Proboscis, Bioactive compound

The New Species, *Conilia minor* sp. n. under the Sub-order Enoplina from the Estuary of Subarnarekha River

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Abstract

A new species of free living marine nematode belonging to the Sub-order Enoplina is identified from the estuary of Subarnarekha River. *Conilia minor* sp. n. is specified by elongated and slender body with blunt cephalic end and conical caudal end, developed lip, cup shaped buccal cavity with three big teeth, wide band like constriction differentiate the head from whole body, peri-buccal swelling of pharyngeal tissue surrounding the buccal cavity, obliquely striated single long spicule, spatulated gubernaculum covering the dorsal side of spicule, and funnel shaped paired telamons with two hook like projections, obviously bent to ventral side of male tail and glandular pre-cloacal supplement appear as bump.

This species is different from its closely related species, *Conilia sinensis* by small measurement of whole body and other organs and by the presence of funnel shaped proximal end of spicule and telamon, curve spatulate shaped gubernaculum, terminal setae on tail tip.

Also differ from *Conilia monospiculata* by small measurements of whole body and various organs, presence of striated spicule, spatulated gubernaculum, funnel shaped telamons, one pair short terminal setae, pre-cloacal supplement, obviously bent to ventral side of male tail, absence of amphid.

Conilia minor sp. n. is distinguished from *Conilia divina* by short measurement of whole body and various organs length, presence of single pre-cloacal supplement, terminal setae, developed lip, obviously bent to ventral side of male tail.

Key Words:

Marine Nematodes, *Conilia sinensis*, Spicules, Terminal setae, Gubernaculum

Control Strategy of Parasitic Nematodes Using Secondary Metabolites of Mangroves

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Abstract

Parasitic nematodes pose a significant threat to agriculture, causing substantial yield losses and economic damage worldwide. Traditional control methods, such as chemical nematicides, have limitations due to their harmful effects on the environment and human health. Therefore, there is an urgent need to develop environmentally friendly and sustainable alternatives for nematode management. Mangroves are unique coastal ecosystems that harbour a diverse range of plant species known for their chemical complexity and biological activities. Secondary metabolites produced by mangrove plants have exhibited a wide array of bioactive properties, including antifungal, antibacterial, and insecticidal activities. These metabolites have the potential to interfere with nematode physiology and disrupt their lifecycle, providing a natural solution for nematode control. The extraction and isolation of secondary metabolites from mangroves require careful optimization to ensure maximum yield and purity. Furthermore, their application methods need to be refined to enhance their efficiency and stability in soil environments.

The use of secondary metabolites from mangroves for nematode control offers several advantages over conventional chemical nematicides, including their biodegradability, low toxicity to non-target organisms, and potential for sustainable production. However, challenges such as cost-effectiveness, scalability, and regulatory approval need to be addressed for their successful implementation in agricultural systems.

Key Words:

Parasitic nematode, Nematicides, Secondary metabolites, mangrove

Bioactive Compounds from Cephalopods: A Potential Source of Pharmaceuticals

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Abstract

Cephalopods are a group of marine animals that includes squids, octopuses and cuttlefish. They have been traditionally used as food and they are now being studied for their potential as source of bioactive compounds. Cephalopods are known to contain a wide range of bioactive compounds including protein, peptides, lipids and carbohydrates. These compounds have various pharmacological activities such as antimicrobial, antioxidant, antitumor and antiviral properties. Example of bioactive compound found in cephalopods is **Cephalotoxin**, has antitumor activity by inducing cell death in cancer cells, **Tetradotoxin** has analgesic properties and is being studied for its potential use as a painkiller. **Cyanophycin** is a bioactive compound found in the ink sacs of cephalopods. It is a biodegradable polymer composed of aspartic acid and arginine residues. Cyanophycin has potential applications in drug delivery system and tissue engineering. **Spermidine** is a polyamine that has been identified in various cephalopods. It plays a role in cell growth, proliferation and aging. **DOPA** (3,4-Dihydroxyphenylalanine) is a bioactive compound found in the ink of certain cephalopods. It is involved in the chemical defense mechanism of these animals. DOPA has adhesive properties and has been studied for its potential applications in biomaterials and tissue engineering. Cephalopods are a promising source of bioactive compounds with pharmaceutical potential. These compounds have been shown to have various pharmacological activities and can be used to develop new drug to treat disease such as cancer, Alzheimer's disease and viral infections.

Key Word:

Cephalopods, Bioactive compounds, Cephalotoxin, Tetradotoxin, Cyanophycin, Spermidine, DOPA

A New Species of *Zygonemertes* (Nemertea: Enopla: Monostilifera) from Subarnarekha Estuary, Odisha, India

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Abstract

Nemerteans, commonly known as ribbon worms or proboscis worms are a diverse group of marine invertebrates known for their elongated bodies and impressive regenerative abilities. In this study, we report the discovery of a new monostiliferous nemertean species *Zygonemertes odishi* sp. nov. and present a comprehensive analysis of its morphology, behavior, and phylogenetic position. The newly discovered nemertean, was collected from muddy flat of Subarnarekha estuary, Odisha during a research expedition through meticulous sampling and careful observation. Detailed morphological examination revealed unique features, including “epidermal hook absent, apical organ present, 10 proboscis nerves, anterior pouch of the intestine don’t reach the brain, posterior end of the stylet is lobed, transverse or oblique furrow is absent, ratio of central stylet length to basis length is 0.13-0.18) sanctioned the species to be encompassed in the genus *Zygonemertes*”. To elucidate the phylogenetic position of the species, molecular analyses were performed using DNA sequencing techniques. Phylogenetic reconstructions, placed the species within a distinct clade of monostiliferous nemerteans. This study underscores the importance of continuous exploration and documentation of marine biodiversity, emphasizing the potential for novel discoveries even within well-studied taxa. The newfound monostiliferous nemertean serves as a testament to the incredible complexity and diversity of marine ecosystems, captivating researchers and stimulating further inquiries into the hidden wonders of the underwater world."

Keywords:

Nemertea, Proboscis, Stylet, Phylogeny, Subarnarekha Estuary

Morphological and Molecular study on New Heteronemertean Genus from Subarnarekha Estuary, Talsari, India and its Phylogenetic Position within the Family Lineidae

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Abstract

The coastal belt of Bay of Bengal is diversified by many benthic fauna. The new heteronemertean is described based on material collected inter tidally at a sandy muddy beach in Subarnarekha estuary, Orissa, India. Many nemertean fauna found muddy beach, one new heteronemertean genus is described based on their morphological characters and molecular characterization. Ninety heteronemertean genus under lineidae family was described previously. *Bengalaura* genus nov. is morphologically difference from all the congeners by the following combination of characters: outer circular and inner longitudinal muscle layer in proboscis. Rhynchocoel wall circular muscle interwoven with body wall musculature. Dermal gland cells separated from body wall outer longitudinal muscle layer by distinct connective tissue stratum. The foregut splanchnic musculature circular and longitudinal. Neurochord cell is absent. Horizontal cephalic slits are lacking. Eyes are absent. Caudal cirrus present. Multilocus phylogenetic analyses based on the mitochondrial cytochrome C oxidase subunit I (COI) among heteronemerteans suggest that *Bengalaura* belongs to new genus under lineidae family.

Key Words:

Nemertea , taxonomy, DNA barcoding, COI gene

A Rarely Studied Species -Antlion (*Myrmeleontidae* sp) and a New Aspect on Medecinal Biology by Using Antlion -Toxin

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Abstract

The antlion are a group of about 2,000 species of insect in the Neuropteran family myemeleontidae. They are known for the predatory habits of their larvae, which predates on Ants and other prey. Antlion larvae snare ants by making conical pits in loose sand, An unwary ant or other insect slip down the treacherous slop , to be met by a partially buried antlion larvae that is eager and ready to suck it dry. To ensure that the prey does not escape, the antlion inject it with a paralizing neurotoxin.

Present study focused on the medicinal uses of chemical compounds that present on Antlion toxin , like GroEL- helps to reduse blood glucose, Chaperonin- helps to relief from pain in eyes, headache and helps in increase memory,4-Hydroxyquinoline-implicated in infection and autoimmune disease and 2-(2-hydroxyethyl)-4-hydroxyioindoline-1-Use in antimicrobial activity.

Key Words:

Antlion, Myemeleontidae, larvae, toxin, medicinal use, GroEL, Chaperonin

Potential Use of Bioactive Compounds from Sea Weeds in Skincare

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Abstract

Bioactive molecules are compounds that have specific biological activity and are found naturally in various sources such as plants, animals, and microorganisms. Many of these molecules have been identified and used in the skincare industry due to their unique properties that provide numerous benefits to the skin. Some of the widely used bioactive compound in skincare includes Retnoides, Vitamin C, Hyaluronic Acid , Alguronic acid , Fucoxanthin , etc. Currently, many synthetic chemicals have been used in cosmetic products. For example, chemicals like hydroquinone, arbutin, and kojic acid are being used as a skin whitening agent, but they are reported to be unstable and they also cause dermatitis and induce cancer. Due to this , in recent years, the demand for cosmetic products that containing natural ingredients is rapidly expanding. From this perspective, the marine environment provides numerous marine organisms, including seaweeds with potential bioactive compounds. Seaweed, also known as marine macroalgae, is a type of aquatic plant that grows in the ocean, rivers, and other bodies of water. Seaweeds come in many different forms, from tiny single-celled organisms to large, complex plants that can reach lengths of over 50 meters. Seaweed is a rich source of bioactive compounds that have been found to provide numerous benefits for the skin. These compounds include alguronic acid, fucoidan, carrageenan, fucoxanthin, and polyphenols, which have been shown to have antioxidant, anti-inflammatory, and anti-aging properties. Seaweed extracts are increasingly being used in the skincare industry as they have been shown to nourish and rejuvenate the skin, promote collagen production, and improve skin texture. In addition, seaweed extracts are often used in cosmetic formulations to enhance product stability and provide a natural source of color. The use of seaweed bioactive compounds in skincare products is also environmentally sustainable, as seaweed is a renewable resource that can be harvested without damaging the ecosystem. In conclusion, the use of seaweed bioactive compounds in skincare products offers a promising and effective approach to achieving healthy, glowing skin while also promoting sustainability.

Key Words:

Bioactive molecule, Seaweed, Skin care

A Comprehensive Study on Bioactive Compounds from Marine Fishes and their Impact on Human Health

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Abstract

Marine fishes have always a positive impact on human health due to the rich source of easily digestible animal protein as well as other micronutrients (vitamins A, D, E, B₃, and B₆; minerals like calcium, iron, zinc, phosphorus, and selenium) and essential fatty acids. But recent advancements in research it is established that marine fishes can provide several molecules that help to prevent human disease and are also a potential candidate in a therapeutic role. The bioactive peptides and protein hydrolysate are found in *Sardina pilchardus* and *Merluccius productus* respectively which have antihypertensive activity (by inhibition of angiotensin-I) and antioxidative role. The molecules from by-products of marine fishes like *Salmo salar* (Skin: collagen hydrolysate), *Oncorhynchus keta* (Skin: oligopeptides), *Rastrelliger kanagurta* (bone: bioactive peptides), *Oncorhynchus mykiss* (viscera: protein hydrolysate) and *Lutjanus campechanus* (viscera: protease) have the potential function as an antioxidant, antihypertensive, protein recovery, antidiabetic, antibacterial, antimicrobial and protolithic agent. Marine fishes like sardine, anchovy, halibut, mackerel, and salmon are rich sources of omega-3 fatty acids which help to prevent coronary, cardiac, arthritis, diabetes, and other inflammatory diseases. These fatty acids also help in brain and other neural developments. It has also a crucial role in cancer prevention. So, we believe that the use of marine fish-derived bioactive molecules in the human diet will be beneficial to human health and disease prevention. The development of new techniques for the extraction of these molecules is also beneficial to medical industries and economy.

Keywords:

Marine fish, Fish by-products, Bioactive molecules, Human health

Jellyfish (*Cassiopea andromeda*) as Source of Bioactive Compound with Nutraceutical Value

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Abstract

Cassiopea andromeda (Forsskal, 1775) is marine aquatic invertebrate belongs to phylum Cnidaria. Traditional Chinese medicine utilized jelly fish as a treatment of bronchitis, high blood pressure, asthma, tracheitis and gastric ulcers. Hydrolyzed Collagen, collagen and low molecular weight compounds are used as antioxidant activity, protective effects on skin UV damage, immunostimulatory effect. Several jelly fish venoms are used to prevent cancer. Different types peptides of jelly fish are used as antimicrobial compound. Collagen from jelly fish is similar to mammalian collagen type I. The bioactive molecules from jelly fish collagen are used in modern biotechnology. Collagen use in biomedical sector like immunostimulatory, Rheumatoid arthritis and osteoarthritis therapy, cosmetic surgery, bone grafts, tissue regeneration, reconstructive surgery, drug delivery and wound care. On others side collagen also use in food/food industry like gelatin, thickeners, dietary supplements, and functional food. The bioactive peptides of jelly fish used in antimicrobial activity. The peptides are small protein fragments (3-20 amino acid residues) providing several health benefits, they are lipid lowering and high fisher ratio, use in liver disease treatment. The species *C.andromeda* have antioxidant activity, oral arms rich in proteins and phenols, anti proliferative activity on cancer cells. Jelly fish can be regarded as a novel source of active natural compound for current and future applications in biomedical and nutraceutical studies.

Key Words:

Cnidaria, Collagen, peptide, jelly fish, cancer cells, biomedical

Not Medicine but Less Harmful: Herbal Cigarettes

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Abstract

Herbal cigarettes known as tobacco free or nicotine-free cigarettes are those recognized as being-tobacco free, being composed of a mixture of various herbs claimed to lessen the smoking habit hazards. However, controversial data regarding its properties occur in the literature with no comprehensive overview or analysis of its effects.

Like herbal smokeless tobacco, they are often used to substitute for tobacco products (primarily cigarettes) regarded as a “non-smoking” aid .This review capitalizes on herbal cigarettes with regard to their quality characteristics sensory attributes, chemical composition, and health properties to rationalize their choice as a non-smoking aid. Some herbal smokes may produce notable metabolic problems that increase the risk of several chronic metabolic diseases. In general variety negative effects on the body attributed to toxic chemicals, such as carbon monoxide, nitrosamines etc.

Herbal or organic cigarettes are paper rolls comprising herbs such as basil lemon-grass, spearmint leaves, rose petals, green tea and the like. These herbs are blended in different proportions to change flavours. They do not contain nicotine or tobacco.

Benefits of smoking herbal are safe for passive smokers; tobacco and nicotine free cigarettes natural quit smoking products, rejuvenates the body and mind instant; bonus benefits for singers and seakers : Improves lung function; fights bad breath and not foul smell.

Keyword:

Herbal cigarettes, Antitumor property , Alternative cigarettes

Bioactive Compound from Octopus Ink Extracts Exhibits Antioxidant, Antiproliferative, Antimutagenic, Anti-inflammatory and Proapoptotic Effects

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Abstract

Marine food products cephalopods may be source as bioactive compounds providing health benefits (cancer treatment). This study aimed that anti mutagenic, anti-proliferative, antioxidant, anti-inflammatory & pro-apoptotic effects from ink in cephalopods extracts (hexane, ethyl acetate, dichloromethane & distilled water) on human cancer cell lines using colorectal & breast cancer (HT- 29/ HCT116 & MDA-MB 231, respectively).The water extract exhibited the highest anti mutagenic effect. Among DM fractions (F₁/F₂/F₃), DM-F₂ showed that highest anti proliferative effect (LC₅₀ = 52.64), inducing pro apoptotic morphological disruption in HCT116 cell, reactive species modulation, early-apoptosis induction (42.9%) and nuclei disruption in cells. DM-F₂ also showed the lowest nitrites reduction and up-regulation of key-cytokines from the JAK-STAT, PI3K-Akt, and IL- 17 pathways. Compared to control, DM-F₂ increased IL-4 and decreased NF-κB fluorometric expression in peripheral blood mononuclear cells (PBMCs).In silico analysis predicted high OPC affinity with Cyclin D1 (−6.70 kcal/ mol), suggesting its potential impact on cell cycle arrest. These compounds also exhibited high in silico binding affinity (− 4.6 to − 5.8 kcal/mol) to IL-1α, IL-1β, and IL-2. These results highlight the anti mutagenic and anti proliferative potential health benefits derived from underutilized marine food products such as ink. Further investigations at in vitro or in vivo levels are required to elucidate mechanisms and health benefits from ink.

Key Words:

Octopus (*Octopus vulgaris*), Anti-proliferative effect, Cytokine modulation, Colorectal cancer, Ink

Pharmacological and Therapeutic Potentialities of *Trigonella foenum-graecum*

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Abstract

The extensive use of medicinal plants in traditional cultures globally has enhanced the incorporation of phytochemicals into contemporary products for disease treatment and health benefits. *Trigonella foenum-graecum* (methi) is used as a food condiment as well as for its multiple therapeutic characteristics since ancient times due to its diverse nature of phytoconstituents such as steroids, alkaloids, saponins, flavonoids, gingerol, cumarin, lipids & vitamins. *T. foenum-graecum* is used for the treatment of diabetes mellitus. Insulinotropic and antidiabetic properties have been associated with the acid 4-hydroxyisoleusine that occurs in it at a concentration of about 0.55%. Fenugreek seeds have been linked to a possible protective effect against 7,12-DMBA-induced breast cancer. Nicotinic acid and other anti-microbial compounds found in the seeds help to treat scalp infections and dandruff. Fenugreek seeds, due to their high antioxidant content, can help prevent hair loss and damage. Fibre-rich seeds may lower appetite and make you feel satiated faster, both of which can aid in preventing overeating and facilitating weight loss. It also has antimicrobial activity and is effective against *Escherichia coli* and *Salmonella typhi*. Supplementing nursing mothers with fenugreek seed extract has been shown to improve milk production. A number of studies have shown that *T. foenum-graecum* can help lower oxidative stress and reduce free radical generation. Recent research suggests that *T. foenum-graecum* can boost both testosterone and sperm count in men. These days, very few of us know about fenugreek's many uses and advantages in our daily lives. Scientists and researchers are still hard at work uncovering fenugreek's untapped potential and plethora of positive effects. This study addresses the traditional and pharmacological uses of fenugreek and summarises its physical, chemical, and bioactive components that have been identified for medical use.

Key Words:

Trigonella foenum-graecum, phytochemicals, antidiabetic properties, antimicrobial compound, oxidative stress, antioxidant properties

Bioactive Novel Indole Alkaloids, Steroids and Cytotoxic Indole Alkaloids and Polyketides from Deep-Sea Derived Fungus

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Abstract

Marine-derived micro-organisms are widely distributed in the marine ecosystem. Marine fungi are known to be rich sources of biologically active compounds for medicinal and agricultural applications. Indole alkaloids have attracted a great deal of attention due to their diversified structures and potent biological activities, such as cytotoxicity anti-feedant and anti-micro-bial activities.

Two new alkaloids, fumigatosides E(1) and F(2) a new natural product, 3,7-diketoccephalosporin P₁ (6) along with five known compound (3, 4, 5, 7, 8) were isolated from deep –sea-derived fungal *Aspergillus fumigatus*.

Bioactivity – guided isolation of the marine deep-sea-derived fungus *Aspergillus flavipas*. Led to the characterization of four indole alkaloids (compounds 1-4) four polyketides (compounds 5-8) such as two new indoles, flavonoids A(1) and B(2) with a C-6 reversed prenylation, and a new azaphilone, flaviazaphilone A(5). Their chemical structures have been unambiguously established by spectroscopic data.

Since thyroid cancer is one of the leading cancers worldwide chemotherapy is currently needed. Compound 1 showed strong activity against human thyroid cancer cells CAL-62(96.16%), with an LC₅₀ value, indicating that it may possess certain potential for the development of antitumor lead compounds.

1. Antimicrobial compounds from the marine derived fungus *Penicillium* sp.
2. Alkaloids from the sponge – associated fungus *Aspergillus* sp.
3. Cytotoxic secondary metabolites isolated from the marine alge – associated fungus *Penicillium chrysogenum*.
4. Prenylated indole alkaloids isolated from a marine derived fungus *Aspergillus* sp.

Key Words:

Deep-sea-derived fungus, Indole alkaloids, steroids, Antibacterial activity, Antifungal activity, Cytotoxic indole alkaloids, Polyketides

Thymoquinone and Its Therapeutic Potential

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Abstract

Herbal medicine has attracted great attention in the recent years and it increasing day by day. Several lines of evidence support the positive impact of medicinal plants and their uses in prevention and cure of various types of diseases. Thymoquinone is the most abundant constituent of the volatile oil of *Nigella sativa* seeds. The pharmacological property of Thymoquinone is antimicrobial, antioxidants effects, immune modulator anticancer activities etc. Thymoquinone are shown to support brain health, liver function, joint function, cardiovascular health, hair and skin health and much more. In addition, a data shows that Thymoquinone has very low adverse effect and no serious toxicities.

More recently, a great deal of attention has been given to this phytochemical with an increasing interest to investigate in clinical researches for its health benefits.

Thymoquinone is naturally occurring quinone derivative commonly called black caraway seeds or black cumin. According to some studies, black seeds may help control blood sugar level. The evidence report suggests that thymoquinone should be developed as a noble drug in clinical trials.

Key words:

Medicinal plants, Thymoquinone, *Nigella sativa*, Pharmacological properties, Immunomodulator, Phytochemicals

From Waste to Wealth: Snake Venom Perspective

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Abstract

Snake venoms have components with diverse biological actions that are extensively studied to identify elements that may be useful in biomedical sciences. In the field of autoimmunity and rheumatology, various findings useful for the study of diseases and potential drug development have been reported. The study of disintegrins, proteins that block the action of integrins, has been useful for the development of antiplatelet agents and principles for the development of immunosuppressants, and antineoplastics. Several proteins in snake's venoms act on the coagulation, activating factors that have allowed the development of tests for the study of coagulation.

Including Russell's viper venom time, which is useful in the diagnosis of Antiphospholipid syndrome. Neurotoxins with either pre-or postsynaptic effects have been used to study neurogenic synapses and neuromuscular plaques and the development of analgesics, muscle relaxants and drugs for neurodegenerative diseases, various components act by inhibiting cells and proteins of the immune system, which will allow the development of anti-inflammatory and immunosuppressive drugs. This review summarizes the usefulness of the components of snake venoms in the fields of autoimmunity and rheumatology, which can save as a basis for diver's translational research.

Medicinal application of the venom-

- Scientists are also studying and exploring of using snake venom as a potential source of painkilling compounds some examples are cancer pain.
- Medical tests indicate that small dosages of the venom from Malayan pit viper help to dissolve stroke related blood clots and prevent new clots from forming.
- Medicines derived from neurotoxins are used to treat brain, injuries strokes and diseases such as Alzheimer's and Parkinson's.
- Scientists think that this property of snake's toxic venom could be used to disrupt the flow the blood to a tumor and thus preventing its growth since the venom toxins act on certain types of cells, hence the healthy cells would not be unaffected.

Key Words:

Benefits of snake venom, Anti – venom, Snake bite

Longshore Sediment Transport (LST) and Shoreline Development: A Numerical Approach for Talsari Offshore Coastal Zone, West Bengal, Odisha Coastal Tract

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Abstract

Long-shore sediment transport propagation by the wave and as well as currents are the major factor of shoreline development. This zone is reached in a highly proactive function for sediment deposition. Sometimes, the presence of a river mouth has enhanced its depositional activities due to its autogenic attachment of it. This paper attempts to measure the depositional relief condition which has been inherent performance of sediment deposition. Talsari estuarine mouth is considered for this work, where laterally spread mouth stretch is dominated as Subarnarekha River delta. The purpose of the estimation is to assess the long-shore transport rate of the beach-forming material during various wave conditions. For the calculation of long-shore sediment transport (LST), programme OMNI, NIOT (National Institute of Ocean Technology, Chennai) Buoy (BD09) data has been considered, which is installed at 17 degrees 50-minute latitude and 89-degree 12-minute longitude. The wave and tide near the long-shore cross-shelf sediment transport has been assembled for quantification of the LST values. Moreover, the long-shore sediment transport rate is related to the long-shore components of the flux energy, which has propagated by waves at the shore at a particular angle (Q, ranges between 30 - 45 degrees). Considering some effective constant (K), the coefficient has been calculated (ranges from 0.25-0.49), through Bayram's estimation and Leont'yev's estimation at cubic meters per hour. The results reveal that the relation of sediment transport rate and deposition is positively correlated on each other.

Keywords:

Sediment Transport Rate (STR), Bayram's estimate, Leont'yev estimate, Shoreline development

Mangiferin: A Natural Miracle Bioactive Compound

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Abstract

Mangiferin (2- β -D-glucopyranosyl-1-3, 6, 7-tetrahydroxyl-9H-xanthen-9-one) is a phenolic compound. Its melting temperature is 271°C. Mangiferin first found from *Mangifera indica* (mango tree). Mango tree's leaf, fruit, and its byproducts (peel, seed, and kernel) are the best source of mangiferin. Mangiferin also found from other plants like *Folium mangiferae*, *Gentiana lutea*, *Phaleria macrocarpa*, etc. Mangiferin has antioxidant with tremendous health related properties such as antimicrobial, antidiabetic, antiallergic, anticancer, hypocholesterolemic. Mangiferin plays important role against cancer through the suppression of tumor necrosis factor α -expression, and induction of apoptosis. In the case of neural and breast cancer mangiferin suppress the expression of matrix metalloproteinase (MMP)-9 and MMP-7 and inhibit enzymatic activity, metastatic potential and activation of β -catenin pathway. Lipid peroxidation can be blocked by mangiferin capacity. Monocyte macrophage system capacity can be enhanced by mangiferin and shows antibacterial activity against gram-positive and gram-negative bacteria.

Key Words:

Mangiferin (2- β -D-glucopyranosyl-1-3,6,7-tetrahydroxyl-9H-xanthen-9-one), *Mangifera indica*, Matrix metalloproteinase (MMP)-9 and MMP-7

Use of Indigenous Plants as an Anticancer Agent

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Abstract

Cancer is the second leading cause of death worldwide. Although great advancements have been made in the treatment and control of cancer progression, significant sometimes occur during chemotherapy. Natural therapies, such as the use of plant-derived products in cancer treatment, may reduce adverse side effects. Currently, a few plant products are being used to treat cancer. The toxicity of chemotherapeutic drugs sometimes creates a significant problem in the treatment of cancer using allopathy of established medicine. Various therapies have been propounded for the treatment of cancer many of which use plant-derived products. There are four classes of plant –derived anticancer agent in the market today, the vinca alkaloids (vinblastine, vincristine and vindesine), the epipodophyllotoxins (etoposide and teniposide), the taxanes (paclitaxel and docetaxel) and the camptothecin derivatives (canptotecin and irinotican).

The anticancer properties of plant have been recognized for centuries. Isolation of podophyllotoxin and several other compounds (known as lignans) from the common mayapple (*Podophyllum peltatum*) ultimately led to the development of drugs used to treat testicular and small cell lung cancer.

The anticancer characteristics of a number of plants are still being actively researched and some have shown promising result. Some plants that have shown promise as anticancer agents are –*Tinospora cordifolia*, *Ziziphus nummularia*, *Andrographis paniculata*, *Centella asiatica* Linn, *Curcuma longa* Linn.

Keyword:

Medicinal plants, natural products, Ayurveda, cancer, alternative medicine.

A Current Perspectives of Key Bioactive Natural Compounds as Future Potential Drug Candidates on Parkinson's disease

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Abstract

Natural compounds from plants, animals and fungi have auspicious effects against neurodegenerative diseases with antioxidant, anti-inflammatory and neuroprotective properties. Parkinson's disease (PD) is currently the second most common neurodegenerative disease that affects the central nervous system causing symptoms such as Bradykinesia, tremors, stiffness, and emotional changes. Although there is no cure, treatments focus on controlling symptoms. PD can affect people of any age with a higher rate in people over 60 years of age. But some types such as juvenile parkinsonism affect teenagers or adults in their twenties. Other factors such as medications, environmental factors, brain damage, and such "Bohemian lifestyle" can stimulate Parkinson's disease. Bioactive natural compounds such as polyphenols, caffeine, resveratrol, CBD, silibinin, curcumin, EGCG, Levodopa, quercetin etc. are notably identified as therapeutic alternatives of PD through experimental studies. Studies show that caffeine can prevent and treat Parkinson's disease by blocking adenosine receptors in the brain which helps reduce neuroinflammation and oxidative stress. Resveratrol protects dopaminergic neurons and improves motor function in PD while L-dopa is used as a precursor to dopamine, used for over 50 years which is the best medicine to treat the motor symptoms of PD. Natural compounds for the treatment of Parkinson's disease are still in their early stages despite preclinical/clinical promises. Further research is needed to determine their effectiveness, safety and appropriate dosages. However, biologically active natural compounds have potential as an additional treatment for PD and require further exploration.

Key Words:

Parkinson's Diseases, Caffeine, Resveratrol, Levodopa, Neuroinflammation

In-vitro Anthelmintic Assessment of Quercetin-3-O-β-D-glucopyranoside Isolated from *Polygonum barbatum* (Polygonaceae), Against Avian Intestinal Flatworm *Raillietina* spp.

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Abstract

The flavonoid compound Quercetin-3-O-β-D-glucopyranoside (QG) has been isolated from the methanol leaf extract of *Polygonum barbatum* (Polygonaceae) and an in-vitro anthelmintic assessment is done against a group of avian intestinal tapeworms *Raillietina* spp. The anthelmintic study was done with several applied concentrated doses (0.5mg/ml, 1mg/ml and 1.5mg/ml), against model cestode. The methanolic extract indicates its highest effect on worms at 20 mg/ml concentration and mean time of death taken by parasite is 0.30±0.01h. Isolated compound QG shows its outrangous consequence at 1.5mg/ml concentration taking 2.24±0.01h death time. Genistein derived from *Flemingia vestita* (Fabiaceae) and praziquantel, the broad spectrum anthelmintic has been used as the reference standard and 0.9% PBS (Phosphate buffer saline) taken for controlled group of cestodes. The alteration in the ultra structural organization of the cestode tegument was observed in electron microscope. Deformities in tegument are occurred by formation of blebs, inflammations and destruction of microthriches structural organisation. The result of the anthelmintic efficacy and electron microscopy study suggests QG to be a potential anthelmintic agent against avian tapeworm parasitic infection.

Key words:

Polygonum barbatum, anthelmintic, Quercetin-3-O-β-D-glucopyranoside, scanning electron microscopy, *Raillietina* spp.

Penaeid Prawn Diversity with Special Reference to Seasonal Variation in Digha Coast

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Abstract

Prawn communities of the coastal habitat of the Digha coast were dominated by family Penaeidae. Seasonal variation in the relative abundance and species diversity of Penaeid prawns was derived from sampling of 3599 individuals representing twenty five species of seven genera. The most abundant species of Penaeid prawn were *Parapenaeopsis stylifera coromandolica* (14.36%), *Metapenaeus lysianassa* (13.08%) and *Helleropenaeopsis sculptilis* (10.16%), *Parapenaeopsis stylifera stylifera* (8.44%), *Penaeus monodon* (6.89%), *Alcockpenaeopsis unta* (6.83%), respectively. Relative abundance varied seasonally within the species between the seasons. Highest species richness in the Digha was observed in the period of postmonsoon and the lowest in premonsoon, whereas diversity was found to be highest in postmonsoon season and emerged to be influenced by the Equitability of distribution of individuals among the species. Temperature, Salinity, pH and dissolved oxygen influenced both the abundance and the diversity of prawn in the Digha coast. Present study will be helpful to the prawn fishery managers and researchers of the study region.

Key Words:

Diversity, Seasonal abundance, Species richness, Equatibility, Digha

Role of 1,4-naphthoquinone Derivatives in Our Life

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Abstract

A key component of numerous natural products, 1,4-naphthoquinone is structurally similar to naphthalene and well-known Michael acceptor. Its derivatives has a wide range of pharmacological activities including anti-bacterial, anti-fungal, anti-inflammatory, anti-thrombotic, anti-platelet, anti-viral, anti-cancer, apoptosis and human DNA topoisomerase I and II inhibitory.

Plumbagin(5-hydroxy-2-methyl 1,4-naphthoquinone) was derived from the root of *Plumbago zeylanica* (also known as chitrak) and has been utilised in Indian medicine as an antiatherogenic, cardiogenic, hepatoprotective, and neuroprotective drug since 750 BC, during the time of Charaka.

Lapachol was extracted from the bark of *Tabebuia avellanae*. It is anticancer in nature. Deoxylapachol is antifungal and cytotoxic towards p-388 leukaemia cells.

Henna is made from the leaves of the *Lawsonia alba* plant, which contain the chemical lawsone (2-hydroxy 1,4-naphthoquinone). Used for imparting colour to the hair as well as the skin.

The redox properties of carbonyl groups in the formation of 1,4-naphtho-semiquinone and/or 1,4-naphthoquinol are mainly responsible for the biological activity of 1,4-naphthoquinone.

Electrochemical capture of CO₂, by redox cycle of 2,3-dichloro-1,4-naphthoquinone in 1-butyl-3-methylimidazolium tetra fluoroborate (BMIMBF₄), reduce the concentration of CO₂.

Key Words: 1,4-naphthoquinone, Plumbagin, Lapachol, Doxorubicin

Quality of Goat Meat and its Impact on Human Health

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Abstract

Today goats are spread throughout the world. They live in small or large herds and in different areas and environments. Because of its distinctive taste and desired chemical composition, goat meat is increasingly consumed in Serbia. As animal foods, it is rich in protein, vitamins and minerals, but contains very little fat, especially cholesterol. The aim of this review paper is to highlight some health benefits, nutritional values and potential use of goat meat. On the chemical composition of goat meat effect race, gender, productivity and adaptability to stress, environment, management, diet and health condition. Average chemical composition of lean goat meat contains about 75.42% water, 3.55% fat, 19.95% protein and 1.06% mineral matter. The energy value is about 580KJ per100gm. The goat meat has about the same nutritional value as well as sheep meat. Due to low content of saturated fatty acids and cholesterol, goat meat in the human diet is healthier alternative compare to other types of red meat. Polyunsaturated fatty acids prevalent in goat meat, and the diet rich in unsaturated fatty acids is correlated with a reduced risk of stroke and coronary disease. In addition, in goat meat are present the essential amino acids such as lysine, threonine and tryptophan. Regardless to the nutritional value, goat meat is still less appreciated due to their specific small and taste, the more if the animal is older.

Key Words:

Goat meat, quality, nutritional value, health

Applicability of Polycyclic Aromatic Compounds

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Abstract

A polycyclic aromatic compound is a class of aromatic compounds that is composed of multiple aromatic rings. They are a complex class of condensed multimembered benzenoid ring compounds (two or more fused benzene ring in linear, angular or clusture arrangement which sometime include a five membered ring). Polycyclic aromatic compounds used in fullerenes, carbon nanotubes, graphene and other carbon nano structures. Extended polycyclic aromatic hydrocarbons with nano sized planar geometries can be considered as “nanographenes”. The electronic and self-assembling properties of some fully benzenoid polycyclic aromatic hydrocarbons, such as triphenylene or hexa peri-hexabenzocoronene have been used in electronic or optoelectronic devices. Some polycyclic aromatic compounds are used as antiviral, antibacterial, antifungal and anticancer agent.

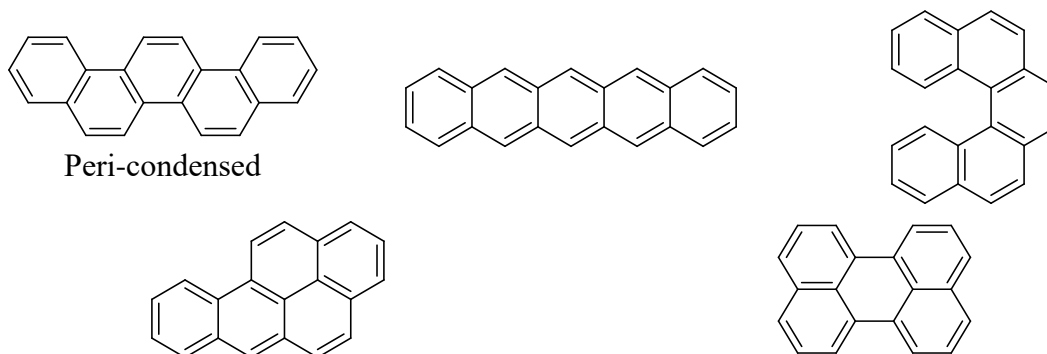
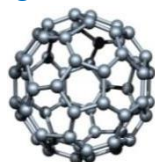
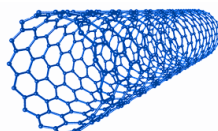


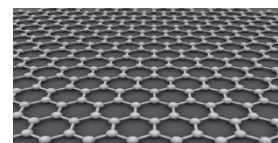
Figure 1. Cata condensed and peri condensed polycyclic aromatic compounds



Fullerene



Carbon nanotube



Graphene

Key Words:

Fullerene, Carbon nano tube, Graphene, Benzenoid ring, Nanographenes

Napthoquinone Based 1, 4-thiazines-1, 1 dioxide and 1, 4-dithiine Containing Bioactive Natural Products

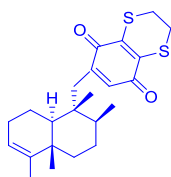
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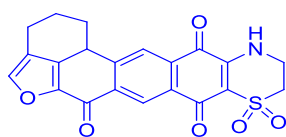
Abstract

In present time, human society comes in contact with different types of problems related to health and some of them are pandemic in nature. In this type of situation society put their eyes towards research communities, especially chemist but synthesis of new bioactive compounds is quite very difficult in short range of time. To overcome the challenge, researchers gives more focus on natural products already reported in journal, exhibits pharmacological activity such as anticancer, antibacterial, anti-inflammatory, antiviral, antimicrobial. If natural products are isolated from nature and used as drugs or medicines then ecosystem becomes misbalance so overcome this situation chemists synthesize compounds, like bioactive natural products. One of them, nitrogen and sulphur atoms containing heterocyclic compounds have unique properties towards pharmacological activity. In present case there are several bioactive natural products shown here naphthoquinone based containing 1,4-thiazines-1,1 dioxide and 1,4-dithiine moiety.



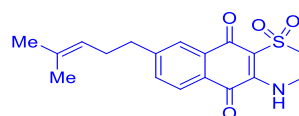
Avarone

(Antiproliferative activity towards tumor cells)

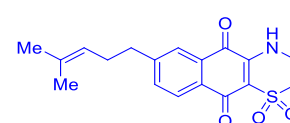


Adociaquinone A

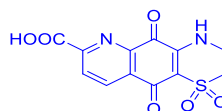
(Selectively inhibit iron chelator-induced HIF-1 Activation in T47D cells)



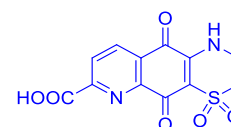
Conicaquinone A



Cocicaquinone



Ascidiathiazone A



Ascidiathiazone

Anti-inflammatory activity

Key Words:

1,4-thiazine-1,1 dioxide, 1,4-dithiine, anticancer, antibacterial, anti-inflammatory, antimicrobial

Scope and Limitation of Nucleophilic Aromatic Substitutions Using Ethyl-3-mercaptopropionate as Nucleophile

Prasenjit Bera

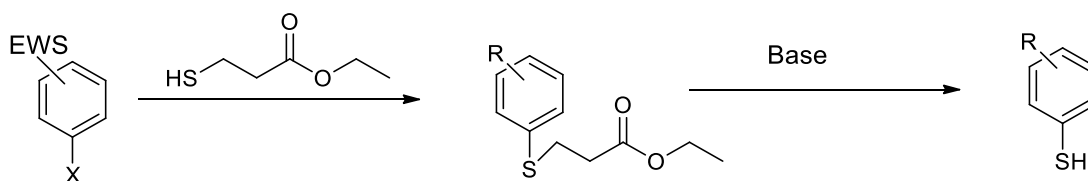
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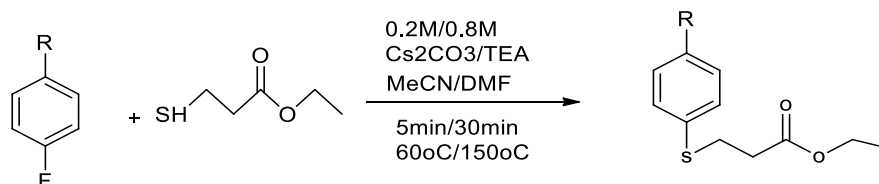
Abstract

Electrophilic aromatic substitution is the reaction in which an electrophile substitutes hydrogen in aromatic ring. In contrast, nucleophilic aromatic substitution is the reaction in which a nucleophile substitutes a leaving group in the aromatic ring. The scope and limitations of nucleophilic substitutions of aryl halides has been studied using ethyl 3-mercaptopropionate as nucleophile and microwave heating. A diversity of aromatic compounds have been investigated according to different types of leaving groups, regio isomers and substituents. Experimental design has been used as a tool to optimize the reaction. An electron-withdrawing group in ortho or para position of the leaving group proved to be necessary for a positive outcome of the reaction. Fluorine was, without competition, the best leaving group. To overcome the challenge, researchers give more focus on natural products already reported in journal, exhibits pharmacological activity such as anticancer, antibacterial, bioactive, antiviral, antimicrobial. Some examples of how the synthesized aryl sulfanyl propionates can be used as starting material for producing aryl thioethers, sulfoxides and unique benzothiophenes are described.

Nucleophilic substitution using ethyl 3-mercaptopropionate as nucleophile. The use of a strong base releases the thiol.



General scheme for optimization by Experimental design.



Key Words:

Aryl sulfanyl propionates, aryl thioethers, sulfoxides, benzothiophenes, ethyl 3-mercaptopropionate, anticancer, antibacterial, bioactive, antiviral

Bioactive Compound from Marine Sponges: Application in Various Field

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Abstract

The open oceans and deep seas cover about 70% of the earth's surface and are a natural habitat to approximately 80% of the world's plant and animal species. Marine sponges are sessile invertebrates that can be found in temperate, polar and tropical regions. They are known to be major contributors of bioactive compounds, which are discovered in and extracted from the marine environment. The compounds extracted from these sponges are known to exhibit various bioactivities, such as antimicrobial, antitumor and general cytotoxicity. For example, various compounds isolated from *Theonella swinhoei* have show various bioactivities, such as those that are antibacterial, antiviral and antifungal. Marine sponges are filter feeders; they cope with potentially hazardous particles by producing neutralizing bioactive compounds. Around 11 genera of sponges have been discovered to contribute to the discovery of bioactive compounds, including the three genera Haliclona, Petrosia and Discodemia, which are known to produce compounds with powerful anti-inflammatory and anti-cancer activities. Marine sponges that show the ability to act as antibacterial, antiviral, anti-malarial and antifungal agents against human pathogens and fish pathogens in the aquaculture industry. The application of such compounds as antimicrobial agents in other veterinary commodities, such as poultry, cattle farming and domesticated cats, is discussed, along with a brief discussion regarding the mode of action of these compounds on the targeted sites in various pathogens.

Key Words:

marine sponge; bioactive compounds; microbial symbionts; antimicrobial activity; aquaculture

Effect of Topical Administration of Cashew Nut Shell Liquid (CNSL) on Skin of Albino Rat

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Abstract

Cashew nut (*Anacardium occidentale*) is a profitable earning crop throughout the world. Cashew nut shell liquid (CNSL) has been reported for its adverse effect on integument as well as internal structure though it has several industrial applications. This oily liquid of cashew exists between the outer and inner layers of the shell. Components of this liquid are anacardic acid, cardol, and cardanol. The international literature reports this corrosive effect throughout the history of the chain (with long side chain substitution at the meta position). This study had been performed to highlight stress that arises by free radicals and apoptotic expressional variation within the hepatic tissue of Wistar rats in response to this Cashew Nut Shell Liquid. Rats weighing between 100-150 gm body weight were maintained under a standard atmosphere in polycarbonate cages with standard food and water and the animals were acclimatized for 15 days prior to their use in experiments. This study was performed following the guidelines of the Institutional Ethical committee. Rats were randomly distributed in three equal groups of six rats and the treatment with this oil was continued for 45 days. On day 46 earlier to sacrifice the final body weights (BW) were recorded, skin, and were collected, weighed, and preserved at -20°C until use. However, the general toxicity study suggests that CNSL may have important toxicological effect in albino rats (topical administration). Skin damage caused by repetitive topical encounter by CNSL. Rats model viewing depilated sections of skin earlier application of CNSL, detachment of skin during treatment with CNSL and afterward contact of CNSL for 45 days. Toxicity also indicates granular appearance around the inflammatory region of skin. Histologically, CNSL treated group (CN) showing arrangement disorder in the form of discontinuous epidermal and dermal cells and flocculation. Dialation of hair follicle epithelial cells, keratin layer damage (breakup of keratin fibres). Dialation of stromal matrix. Thinning of capillaries. Glandular structure rupture and flabby. Dermis layer was severely affected. Vacuolation of skin also occurs, whereas Control and SF oil treated group shows normal histological architecture. CNSL also up-regulate p53, BAX gene expression and down regulate Bcl2 gene expression. TNF α , IL-6 (inflammatory marker) also up-regulate were also up-regulated. The antioxidant status also considerably decreases in CNSL treated group in respect to Control and SF oil treated group. CNSO suggesting that CNSO may be harmful and cannot be used as edible oil as well as skin tattoo because of its toxicity. However, CNSO may be useful in the industry for the production of paints, varnishes, wooden material, road construction and surface coating materials. It is therefore recommended that the suitable protective measures essential for occupational health safety, especially for those directly involved in cashew nut processing industries.

Keywords:

Cashew Nut Shell Liquid; topical administration; albino rat; skin damage; Antioxidative status; necrotic and inflammatory response; gene expression; histological changes

Bio-active natural compound and their effects on animal function and health and welfare

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Abstract

Bio-active natural products are a large and varied class of bio-chemical compounds with an even wider variety of biological activity which originate from secondary metabolite of bacterial, fungal, plant, animal, or marine sources. Collection of different methods for the extraction and characterization of bioactive compounds, covering the most important applications in food, pharmaceuticals, chemicals, energy. To meet society needs for agricultural products developed with minimal chemicals used, less impact on the environment ('green'), and more concern for the animals ('ethical'), the concept of 'clean, green, and ethical' animal agriculture has been promoted. Besides with increasing livestock productivity, research is being carried out to find bioactive natural product that improve animal health, alters the nutritional value of animal products, and increase the sustainability of livestock production by reducing its adverse impacts on the environment. The discovery of novel characteristics of such compounds leads to the variety of their uses, which range from cosmetics and functionalized biomaterials to bioremediation. Nonetheless, we want to accumulate data about their sources, fixations and design, as well as get information on their retention, digestion and organic consequences for the creature to assess their future use in domesticated animals creation. Even though medicinal plants have been used for centuries and are still used to treat animals and increase their productivity in developing nations, there is typically no documentation, research, or standardization of these practices. Utilizing the bioactive properties and secondary compounds of plants is a topic of worldwide interest.

Key Words:

Secondary metabolites, sustainability, bioremediation, pharmaceuticals product

Bioactive Compounds and Biological Functions of Sea Cucumbers as Potential Functional Foods

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Abstract

Sea cucumbers are a group of economically important invertebrate marine animals that have been widely used as tonic foods in Asia countries. Various bioactive compounds in sea cucumbers including peptides, triterpene glycosides, polysaccharides, phenols, and lipids have been reported. These compounds demonstrate a myriad of salubrious biological functions such as anti-oxidant, anticancer, anti- inflammation, anti- thrombus, anti-microbes, anti-diabetes, anti- obesity, and learning and memory improvement. This review is to provide a comprehensive and most recent update of these biological functions and their associated bioactive compounds. The management practice to keep sustainable sea cucumbers including natural stock fishery and aquaculture were discussed. The extraction and purification of the bioactive compounds were also summarized, providing a perspective of preparing sea cucumber derived nutraceuticals. It is expected that this review can provide academia and industry an insight of sea cucumbers and their potentials in the development of high value nutraceutical products.

Key Words:

Sea cucumber, bioactive compounds, antioxidant nutrients, triterpene glycosides, glycosaminoglycan, functional peptides, biological activities, medicinal health functions

Bioactive molecules of the *Aloe vera*: A Review

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Abstract

Aloe vera is *Aloe barbadensis miller* belongs to *Asphodelaceae* family. It grows in Africa, Europe, America, India etc. *Aloe vera* contains antioxidants used in cosmetic, pharmaceutical and food industry. Its' chemical composition depends on harvesting time, aloe species, climate etc. Aloe contains a large number of bioactive molecules or compounds such as proteins (lectin etc), carbohydrates (pure mannans etc), lipids (sterols etc.), vitamins (B1, B2, B6, B12, C, A etc), enzymes (amylase, lipase etc), hormone (Auxin etc), inorganic(Ca etc), anthraquinones (Aloe-emodin, aloetic & anthrone acid). *Aloe vera* is traditional medicinal plant. It provides 20 amino acids for human and contains salicylic acid; the anti-inflammatory and antibacterial compound. Glycosaminoglycan protects human stomach, influence blood flow, moisture skin. Acemannan activates macrophages to destroy microbes. Glycoproteins help to identify antibodies and prevent proteolysis. Aloctin A & B help in cell division and growth of B and T- lymphocytes. Aloctin destroy cancer cell. *Aloe vera* help to maintain blood sugar, cholesterol, body weight, regeneration of damaged skin. Glucomannan help in healing. Aloe gel protects skin from UV radiation. Oral aloe is not recommended during pregnancy. Oral over consumptions of aloe causes abdominal cramps, red urine, hepatitis etc.

Key Words:

Antioxidants, Anthraquinones, Anti-inflammatory, Glucomannan, UV radiation, Hepatitis

Psychological Factors Affecting Changes the Tourist Behavioral Intention during the Digha-Sankarpur Coastal Tourism

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Abstract

Psychological factors are highly impacted during the tourism time at the coastal zone of Purba Medinipur coast. The psychology of the different age groups of people has changes the behavioral intentions then domestic tourists. This paper is a quantitative research of tourist behavior factors that affects tourist preferences and choices with their attitude, marketing and recreation strategies. The Digha- Sankarpur area is the hotspot of coastal tourism in recent eras in West Bengal since last 30 decades. The quantitative study has been of the tourist psychological factors on the basis of schedule 'questionnaires'. The important objectives of this paper are survey techniques which were used to collect the data and manipulated to assume the possible and trusted hypothesis. To understand the tourist mentality during coastal tourism and the lifestyle of different age groups in our study area are the main focus of this paper. At the same time, this approach highlights the distinction between the tourist event and its precursors of effects on them. The study reviewed a variety of contemporary research articles, journals, newspapers, and statistical data from worldwide tourism organizations, and websites in order to observe and understand the changing travel behavior. A comprehensive review of the existing literature has conducted, with a focus on the changing patterns of tourist's behavior and future trend in this study area.

Key Words:

Coastal tourism, tourist behavior, mental perspective, tourist marketing style, tourism psychology

Estimation of Rural Development Index (RDI) of Four Coastal Blocks of Purba Medinipur District, West Bengal, India

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Abstract

It is pertinent to initiate our study of rural economic status by examining the compositional factors of the Gender Disparity Index of Literacy, basic amenities Deprivation Index and Rural Development Index (RDI). We have selected four blocks from the coastal area of East Medinipur district of West Bengal. These considered blocks are Khejuri-I, Khejuri-II, Nandigram-I and Nandigram- II. The region has a prominent rural agrarian economy. The socio-economic status of the people here has been discussed in this paper. Secondary data have been collected from HLPCA (House Listing Primary Census Abstract), census of west Bengal, 2011 & PCA (Primary census Abstract), census of West Bengal, 2001 and 2011 data set are used for this work. Each block has been mapped village-wise by determining Gender Disparity Index of Literacy, Deprivation Index of basic amenities and overall Rural Development Index. 8 variables have been identified to determine the deprivation index of basic amenities. These variables are source of drinking water near premises, source of lighting by Electricity, number of households having latrine facility, number of households having bathroom facility, waste water outlet connected to close drainage, kitchen facility, LPG/PNG used for cooking and number of households availing banking services. Results have shown that considered blocks having with a standard level of status due to satisfied level of the Rural Development Index value. We did the graphical presentation of the result by the help of Arc GIS 10.6 and Microsoft office excel.

Keywords:

Gender Disparity Index of Literacy, Deprivation Index, Rural Development Index

A Study in Vandana Shiva's Oneness vs the 1%

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Abstract

Dr. Vandana Shiva's most radical and important ideas are represented in lucid form in this essential primer for those who wish to understand the forces that threaten our planet. Her vision of "one earth, one humanity" and its scientific and cultural roots are explained in depth; the monopolistic economic machinations of the 1% are exposed; the genetic manipulations of Monsanto and its Nazi roots are uncovered; and "philanthropists" such as Bill Gates are exposed as the new Robber Barons. The economic system that governs our lives benefits exclusively the top 1% (or 0.001%) while the rest (meaning us humans and all other life on this planet) are left with the toxic results of their greed. It is in the legal contest to keep Bill Gates and his billionaire cohorts from patenting seeds that the true nature of what is at stake can be seen in sharp outline. If some rich humans are allowed to patent seeds, that is they are granted control - ownership - over a process that they did not develop, then all of life as we know it will be owned and sold by the richest among us. The absurdity of their idea that they can own a process that no human has originated is terrifying. Vandana Shiva has practiced a set of principles based on inclusion, nonviolence, reclaiming the commons, and freely sharing the earth's resources. These ideals, which she calls "earth democracy," serve as an urgent call to peace and as the basis for a just and sustainable future. The book exposes the global elite, uncovering their links to the rising tide of fundamentalism, violence against women, and planetary death. This paper aims to analyse the book critically.

Keywords: Monopolistic economic machinations, Genetic manipulations, Philanthropists

Anticancer Compounds Derived from Marine Diatoms

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Abstract

Diatoms are single-cell eukaryotic microalgae that act as photosynthetic organisms in the oceans or natural environments where water is present. The wide distribution, abundance and diversity of chemical compounds make them ideal to be explored for applications such as anticancer therapy and their use as a carrier for targeted drug delivery. Diatoms have been found to contain a diverse range of bioactive compounds with various biological activities that could be harnessed for cancer treatment. The use of diatom bio-silica as a nanocarrier for targeted drug delivery in cancer therapy is particularly promising due to its unique properties, including high surface area, nano-porosity, bio-compatibility, and bio-degradability. These properties allow for efficient drug delivery to cancer cells with minimal damage to healthy tissues, thus reducing the side effects associated with conventional cancer treatments. Different types of compounds such as Monoacylglycerides (MAGs), Oxylipins (OXLs), Chrysolaminaran polysaccharide, Fucoxanthin, Fatty alcohol ester (nonyl 8-acetoxy-6-methyloctanoate, NAMO), Adenosine and metabolites, Stigmasterol and Marennine, and Haslenes (hasla-6(17),9,13,23- tetraene) lipid, have been identified as the potential anticancer compounds from diatoms. Moreover, the short growth cycle and high yield of diatoms make them an attractive option for large-scale production of bioactive compounds and bio-silica-based nanocarriers. This could potentially lead to more affordable and accessible cancer therapies. While in vivo studies have shown promising results in animal models, further research is needed to fully understand the efficacy and safety of diatom-based systems as nanocarriers in cancer therapy. Nevertheless, the potential of diatoms in the development of new and effective cancer therapies is a promising area of research that could have a significant impact on global health.

Key Words:

Bioactive compound, Nano-porosity, bio-compatibility, bio-degradability

Study of Phytochemical Analysis and Pharmacological Effects of *Allium sativum*

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Abstract

Garlic (*Allium sativum*) has been widely used as a spice and homoeopathic medicine all over the world since ancient times. Garlic contains several bioactive compounds like allicin, alliin, diallyl sulfide, diallyl disulfide, ajoene and S-allyl-cystine, which play many effective roles. Numerous studies have demonstrated the protective effects of garlic and its bioactive ingredients, which include antioxidant, anti-inflammatory, antibacterial, antifungal, immunomodulatory, hepatoprotective, digestive system protective, anti-diabetic, anti-obesity, and neuroprotective properties. Garlic extracts reduced tumour necrosis factor- α (TNF- α) and the IL-1 receptor-associated kinase-4 and enhanced the activity of AMPK in the liver. Garlic extract inhibits the growth of the fungus *Penicillium funiculosum*, probably destroying its cell infrastructure. Garlic paste was found to be an effective treatment for White Fecal Syndrome (WFS) in a recent study, which led farmers to utilize it in *Penaeus vannamei* culture fisheries. Many farmers mixed raw garlic extract with shrimp feed (5-7g/kg feed) and then used the mixture feed in WFS-affected ponds, and the farmers showed much more effective results against *Vibrio parahaemolyticus*. Garlic extracts moderately inhibit the growth of bacteria. Garlic contains a variety of polysaccharides that modulate the immune system and control the expression of IL-6, IL-10, and TNF- α . Additionally, recent research has demonstrated that the active components in garlic are effective against a number of cancers, including colorectal, lung, gastric and bladder cancers. It has been demonstrated that garlic extract increases the *in vitro* production of interferon- γ in splenocytes and increases the ratio of CD4+/CD8+ on implanted fibrosarcoma tumours in BALB/c mice, which suppresses tumour growth. Additionally, garlic extracts can be used to effectively prepare nanoparticles.

Key Words:

Allium sativum, antioxidant, allicin, nanoparticles, cancer

A New Aspect in Pharmaceutical Applications of Horseshoe Crab (*Carcinoscorpius rotundicauda*)

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Abstract

Horseshoe crabs are marine and brackish water arthropods of the family Limulidae and the only living members of the order Xyphosura, despite their name, they are not true crabs or crustaceans: they are Chelicerates, most closely related to Arachnids, such as spider, ticks, and scorpion. Two out of the four known horseshoe crabs species are found in India, that are *Tachypleus gigas* and *Carcinoscorpius rotundicauda*. Other two are *Tachypleus Tridentatus* from Malasiya and *Limulus polyphemus* from Atlantic. Horseshoe crab are widely use in both traditional and modern pharmaceutical application. Most of the previous studies on horseshoe crab focus on their blood. Which contain hemolymph and amebocyte lysate. My presentation aimed to determine the potential antibacterial and antifouling properties of different extract from the carapace and book gill of *Carcinoscorpius rotundicauda* . The results obtained indicated that the extract of carapace had stronger antibacterial and antifouling effect compared to the book gill . Extracts obtained from the male displayed more activity compared to the extracts from the female with a few exceptions. Methanol and acetone carapace crude extracts showed the best overall performance. A sterol compound was isolated from the carapace acetone extracts of the male of *C. rotundicauda* . Crude extracts of the carapace were developed on TLC plate and visualized to check for the existence of certain compounds. Both carapace shared some similarities in terpenoids which is the most abundant compound detected from the vanillin reagent test. Saponin-like molecules, terpenoid molecules have been shown exert complex membrane destructive activities such as hemolysis and killing of Protozoa, Bacteria and Viruses which can be related to the presentation. Tetrodotoxin also newly found in *Carciscorpius rotundicauda*, that can be used to treat moderate to severe cancer-related pain. The formation and composition of the natural material from the Horseshoe crab shell foam are believed to be multifunctional in mobility, use for natural defense mechanisms and thermal stability.

Key Words:

Carcinoscorpius rotundicauda, TLC, Tetrodotoxin, vanillin reagent test

Aloe vera: A Potential Herb and its Medicinal Importance

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Abstract

Aloe vera, a succulent plant that grows in arid and subtropical climates is best known for its medicinal properties and is used in Ayurvedic, Homoeopathic and Allopathic streams of medicine and not only tribal community but also most of the people for food and medicine. The plant leaves contains numerous vitamins, minerals, enzymes, amino acids, natural sugars and other bioactive compounds with emollient, purgative, antimicrobial, anti-inflammatory, anti-oxidant, aphrodisiac, anti-helmenthic, antifungal, antiseptic and cosmetic values for health care. The combination and balance of the plants ingredients are what purportedly gives its healing properties. The part of the Aloevera which is used is the leaves. The Aloe is an Emollient, purgative and vulnerary. The external use in cosmetic primarily acts as skin healer and prevents injury of epithelial tissues, cures acne and gives a youthful glow to skin, also act as extremely powerful laxative.

Key Words:

Aloe vera, bioactive compounds, laxative

Novel Bioactive Components from *Helix* sp. & their Application

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Abstract

Snail is a common name that is applied to most often to land snail terrestrial pulmonate gastropod molluscs. Snail is applied to most often to land snail terrestrial pulmonate gastropod molluscs. Snail is been prepared by purging them for (ten days) so that will dislodge their toxin that they contains 80% of water, 15% protein and 2.4% of fats. Snails can provide a considerable variety of bioactive components for cosmetic and pharmaceutical industries, useful for the development of new formulations with less toxicity and post effects compared to regular compounds used of the purpose. Compound from crude extract, mucus, slime consist of glycans, polypeptides, proteins etc. and can be caused for curing diseases like viral lesions, warts, and different dermal problems.

Snails are great source of the valuable lectin, possess anti-cancer properties and helps in boosting the immune system and fighting against cancerous cells.

Serum secreted by these snails is an excellent source of oligosaccharides that act as a hydrator for the skin. When applied directly on the skin, this serum works wonders for ache, enhances natural glow and protects skin cell from environmental damage.

The snail slime is extremely rich in allantoin, collagen and elastin, which is beneficial for the treatment of skin diseases and broken bones.

The protein content of snails is similar to the protein found in pork and beef, but snails come with a much lower fat content. In addition to containing significant sources of protein and low amounts of fat, snails are also good sources of iron, calcium, vitamin A, and number of other minerals.

Key Word:

Snail, mucus, biotechnology, health benefits, bioactive compounds, cosmetics

Therapeutic Health Effects of Ginger (*Zingiber Officinale*)

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Abstract

Ginger (*Zingiber Officinale*) has been investigated for its potentially therapeutic effect on a range of chronic conditions and symptoms in humans, However a simplified and easily understandable examination of the mechanisms behind these effects is lacking and, in turn, hinders interpretation and translation to practice, and contribute to overall clinical heterogeneity confounding the results.

Therefore, drawing on data from nonhuman trials, the objective for this narrative review was to comprehensively describe the current knowledge on the proposed mechanisms of action of ginger on conferring therapeutic health effects in humans. Mechanistic studies support the findings from human clinical trials that ginger may assist in improving symptoms and biomarkers of pain, metabolic chronic disease, and gastrointestinal condition.

Bioactive ginger compound reduce inflammation, which contribute to pain; Promote vasodilation, which lower blood pressure; obstruct cholesterol production, which regulates blood lipid profile; translocate glucose transporter type 4 molecules to plasma membrane to assist in glycemic control; stimulate fatty acid break down to aid weight management; and inhibit serotonin muscarinic, and histaminergic receptor activation to reduce nausea and vomiting.

Additional human trials are required to confirm the antimicrobial, neuroprotective, antineoplastic, and liver - and kidney protecting effects of ginger. Interpretation of the mechanisms of action will help clinicians and researchers better understand how and for whom ginger may render the therapeutic effect and highlight priority areas for future research.

Key Words:

Zingiber Officinale, chronic disease, gastrointestinal condition, ginger, mechanisms of action, pain

Turmeric: An Ancient Spice with Modern Medical Significant

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Abstract

Turmeric, derived from the plant *Curcuma longa*, has been utilized for centuries in traditional medicine systems such as Ayurveda and traditional Chinese medicine. This vibrant yellow spice contains a bioactive compound called curcumin, which has gained significant attention for its potential health benefits. This article highlights the important and medical uses of turmeric in human health.

Curcumin, the primary active component in turmeric, exhibits remarkable anti-inflammatory properties. It inhibits the activity of various pro-inflammatory enzymes and molecules, making it a promising candidate for managing inflammatory conditions such as arthritis, inflammatory bowel disease, and chronic pain.

Additionally, turmeric's antioxidant properties have garnered attention in combating oxidative stress. Curcumin scavenges free radicals, reducing cellular damage and potentially protecting against chronic diseases, including cardiovascular disorders, neurodegenerative conditions, and certain cancers.

Turmeric has also shown potential in promoting digestive health. It stimulates the production of bile, aiding in fat digestion, and exhibits anti-ulcer properties, potentially protecting against gastric ulcers and other gastrointestinal disorders.

In conclusion, turmeric, with its bioactive compound curcumin, holds immense potential in human health. Its anti-inflammatory, antioxidant, digestive, neuroprotective, and antimicrobial properties make it a valuable therapeutic agent for managing various diseases. However, further research and clinical trials are warranted to fully understand its mechanisms of action, optimal dosage, and potential drug interactions. Nonetheless, turmeric remains a promising natural remedy with broad-ranging health benefits.

Key Words:

Turmeric, Curcumin, Antioxidant, Neuroprotective

The *Centella asiatica* Juice Effects on DNA Damage, Apoptosis and Gene Expression in Hepatocellular Carcinoma (HCC)

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Abstract

Centella asiatica, commonly known as Indian pennywort and Asiatic pennywort, is a herbaceous, perennial plant in the flowering plant family Apiaceae. It is native to tropical regions of Africa, Asia, Australia, and islands in the western Pacific Ocean. It is consumed as a culinary vegetable and is used in traditional medicine. My Presentation is focused on the effects of *Centella asiatica* on HepG2 (human hepatocellular liver carcinoma cell line). The *Centella asiatica* juice inhibited the proliferation of a malignant HepG2 cell line through apoptosis or programmed cell death. Flow cytometry and comet assay analysis showed that juice increased DNA damage in HepG2 cells when they were exposed for 72 hr. In addition, juice reduced the level of c-myc gene expression but increased the level of c-fos and c-erbB2 genes in HepG2 cells. Such changes increased apoptosis in the liver tumor cells. It was concluded that the *Centella asiatica* juice can maintain the health of liver and reduce the incidence of liver cancer. Different methods including flow cytometry, comet assay and reverse transcription-polymerase chain reaction (RT-PCR) were used to show the effects of juice exposure on the level of DNA damage and the reduction of cancerous cells.

Key Word:

Centella asiatica , Cancer, HepG2, apoptosis

Bioactive Molecules from Sea hare (*Aplysia dactylomela*): A Promising Source for Cancer Treatment

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Abstract

Sea hares, *Aplysia dactylomela* have a diversity of anti-predatory defenses. One is an actively released chemical defense: an ink secretion that is a mixture of two glandular products – ink from the ink gland and opaline from the opaline gland. Sea hares belong to the order Opisthobranchia, subclass Gastropoda, are mollusks which have a soft internal shell made of protein. Sea hares are herbivores, and are typically found on seaweed in shallow water. Recently, however, greater attention has been paid to biomedically interesting sea hare isolates such as dolastatins, bursatellins, aplysin, trabectedin. Dolastatins are a series of antitumor peptide/microlides isolated from *Dolabella auricularia*. Another series of bioactive peptide/macrolides, as represented by Bursatellins, have been identified as potential anti-cancer agents, and studies have shown that they can induce cell deaths in various cancer cell lines. On the other hand, Aplysin have been shown to be effective against a range of cancers, including breast, lung, prostate, and ovarian cancers. Besides, Aplysin, Trabectedin has been approved for the treatment of advanced soft tissue sarcoma and is currently being tested for its efficacy against other types of cancer, including ovarian and breast cancers. Sea hares also have effective role in drug discovery and marine biotechnology. Sea hares, have anti-inflammatory diseases such as rheumatoid arthritis. In the development of new antibiotics sea hares could be useful. Overall, continued research and development in this area may lead to the discovery of new and effective treatments for a variety of diseases, as well as innovative solutions for agricultural and environmental challenges.

Key Words:

Bioactive molecule, Sea hare, ink gland, marine biotechnology, drug, and cancer treatment

Importance of a Living Fossil (Horse Shoe Crab); Medical Perspective

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Abstract

Horseshoe crabs have significant medical importance. The blood of horseshoe crabs contains a substance called Limulus Amoebocyte Lysate. LAL is widely used in the pharmaceutical and medical industries for the detection of endotoxins. Endotoxins are lipopolysaccharides (LPS) found in the outer membrane of certain types of bacteria, such as Gram-negative bacteria. These endotoxins can cause severe reactions in humans if present in drugs, vaccines, or medical devices. LAL is used in the pharmaceutical industry to test for the presence of endotoxins in drugs and medical devices. This helps to ensure that these products are safe for human use. Biomedical research - Horseshoe crabs are used in biomedical research to study the human immune system, vision, and neuroscience. They have a unique immune system that can detect and fight off bacteria and other pathogens. Studying the horseshoe crab's immune system could lead to new treatments for human diseases. Vaccine development - Horseshoe crabs are used in the development of vaccines. The LAL test is used to ensure that vaccines are free from bacterial endotoxins, which could cause adverse reactions in patients. Vision research - Horseshoe crabs have excellent vision, and scientists are studying their eyes to better understand how human eyes work. This research could lead to new treatments for vision disorders.

Key Word:

LAL , Endotoxin , Biomedical research

Nutritional Value of Seafood Discards

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Abstract

Seafood discards refer to parts of seafood that are typically discarded or not consumed, such as shells, heads, tails, and offal. While these discards may not be commonly consumed directly by humans, they still possess nutritional value and can be utilized in various ways. Here are some examples of the nutritional value of seafood discards:

Shells of crustaceans like shrimp, lobster, and crab are primarily composed of chitin, a fibrous can be used to create chitosan, a dietary fibre that has various health benefits, including potential cholesterol-lowering effects. The heads and frames of fish, including the bones and other trimmings, can be used to make fish stock or broth. These parts contain collagen, minerals, and some residual flesh, which contribute to the nutritional value of the resulting broth. Collagen is beneficial for skin, hair, joint health, and connective tissues. Offal i.e., organs and internal parts of seafood, such as liver, roe (fish eggs), and intestines rich in vitamins, minerals, and healthy fats. For example, fish liver is a good source of vitamins A and D, omega-3 fatty acids, and trace minerals like iron and zinc. Fish roe is also a valuable source of omega-3 fatty acids, proteins, and essential nutrients. Fish Oils: Discarded fish trimmings and offal can be processed to extract fish oils, which are rich in omega-3 fatty acids, particularly eicosapentaenoic acid (EPA) and docosahexaenoic acid (DHA).

It's worth noting that the nutritional composition and value of seafood discards can vary depending on the specific type of seafood and the processing methods used. Additionally, proper handling and storage are crucial to maintain the quality and safety of seafood discards before they are processed or utilized for consumption

Key Word:

Omega-3 fatty acids , Eicosapentaenoic acid (EPA) , Offal , Shells, Docosahexaenoic acid (DHA)

Aquaculture Potential of *Lingula* sp., a Newly Described Pre – Cambrian Brachiopod as Novel Bioresource from Bay of Bengal

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Abstract

The most productive and dynamic ecosystem of the world is mangrove ecosystem which supports innumerable number of flora and fauna in its diversified habitats and ecological niches. The study of intertidal microbenthic community revealed a great interest among ecologists as it represents a basic component of estuarine food chain. The estuary of Subarnarekha harbors diversified benthic fauna of which the *Lingula* sp. represents a bioenergetically significant ecological and economic important macro benthic faunal group *Lingula* sp, the living inarticulate brachiopod being the oldest of all living genera is considered as living fossil which reveals an ancient lineage of pre-Cambrian period. Mainly three morphotypes are observed in Bay of Bengal Coast, signing them as cryptic species. The studied lophophorate brachiopod inarticulate species is macro benthic infauna can be recognized at its own habitat observing its beautiful bioturbatory architecture. The unique character of *Lingula*, inhabits in mucous lined burrows which seems to differ from other inarticulate brachiopodan species in their ability to reburrow after becoming completely exposed on the sea bottom. The morphological (shape and size of shell, pedicle, muscle, lophophore, mantle, digestive system, coelom, nephridium and gonad etc.) and micro anatomical (histological features of different parts of body) studies of this newly record species from West Bengal Orissa Coast, India have been undertaken and presented. *Lingula*, stored different categories of polyunsaturated fatty acids (PUFA) especially of $\omega 3$ and $\omega 6$ in their different body parts through a process of biotransformation and bioconversion from their primary food sources (planktons, detritus and degraded mangrove leaves) prevailing at this ecotone. These PUFAs are pharmaceutically very important for human beings. It is reported from Thailand, Malaysia, Philippines, that *Lingula* are consumed by local communities in the form of traditional dishes such as spicy salad and some curries as shell fish.

Key Words:

Brachiopod, Lophophore, PUFA



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