

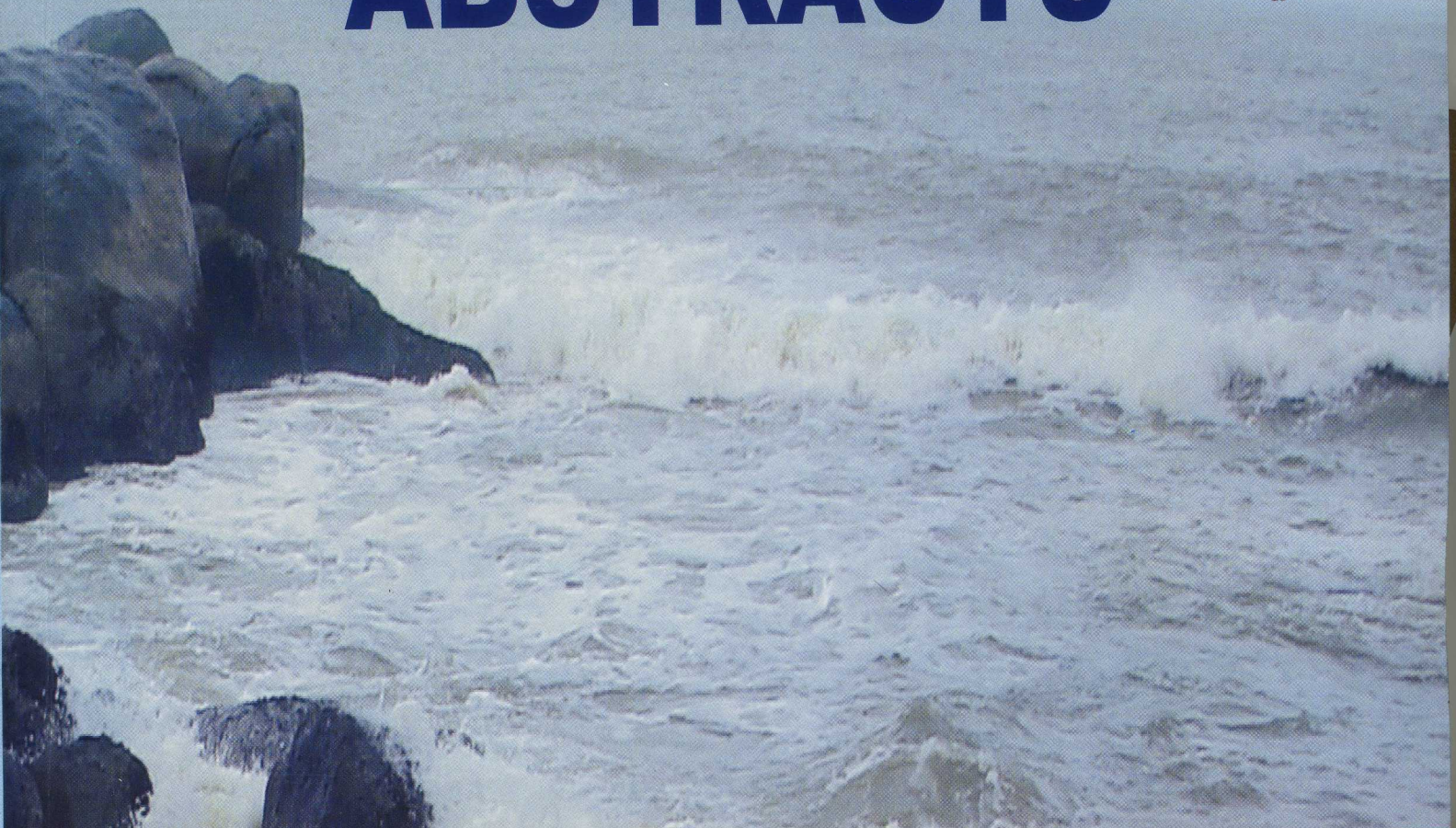
7<sup>th</sup> Asia-Pacific Conference on Algal Biotechnology

Algal Biotechnology in the Asia-Pacific Region: New Challenges and Opportunities for the 21st Century

December 1-4, 2009, New Delhi - India



# ABSTRACTS



Jointly Organized by  
DEPARTMENT OF BOTANY, UNIVERSITY OF DELHI, DELHI, INDIA  
INDIAN PHYCOLOGICAL SOCIETY, NEW DELHI, INDIA



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ON ALGAL BIOTECHNOLOGY**



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New Challenges and Opportunities for the 21<sup>st</sup> Century  
Under the Auspices of Asia-Pacific Society for Applied Phycology**

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# ABSTRACTS

*Edited by*

**DINABANDHU SAHOO**

Notes: The Abstracts have been published as submitted by the participants. However, certain modifications have been made for the sake of format and brevity.

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## Sulfated Polysaccharide Isolated from *Ecklonia cava* Enhances Lymphocyte Activation and IL-2 Production Through the Classical NF- $\kappa$ B-Dependent Pathway

P-68

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Our previous study reported that *Ecklonia cava* (Alariaceae, Phaeophyta) (*E. cava*) has the active compounds such as sulfated polysaccharide and polyphenols having the anticancer, antioxidant and immunomodulatory activities. Sulfated polysaccharide of *E. cava* (E-CSP) used in this study is regarded as fucoidan due to the high content of fucose and sulfate group. The activation of nuclear factor- $\kappa$ B (NF- $\kappa$ B), a well-known transcription factor involved in cellular responses to various types of biological or environmental stimuli, normally leads to development, differentiation and proliferation of T and B lymphocytes and secretion of cytokines by the classical pathway. On immune response in association with E-CSP, we evaluated whether E-CSP may contribute to activate murine lymphocytes through the classical NF- $\kappa$ B pathway by <sup>3</sup>H-thymidine incorporation assay, FACS, Western blot, EMSA and intracellular cytokine staining assays. We showed that E-CSP dose-dependently enhanced the proliferation ability of lymphocytes without cytotoxicity. In addition, the phosphorylation and degradation of I $\kappa$ B $\alpha$  was significantly induced by E-CSP at 15 min as well as the expression of nuclear NF- $\kappa$ B (p65). These results interestingly corresponded with NF- $\kappa$ B p65 DNA binding activities. Additionally, we identified that E-CSP increased the number of CD3+ T cells known as mature T cells and augmented the production of IL-2 in CD3+ T cells. Further experiments showed that the application of TPCK, NF- $\kappa$ B inhibitor significantly blocked E-CSP-induced lymphocyte's proliferation and the total IL-2 production. According to these results, our data suggest that E-CSP increases the IL-2 production through the activation of the classical NF- $\kappa$ B pathway and then the proliferation of lymphocytes may be induced afterwards with the coordination of stimulation of IL-2.

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## Comparison of Free Radical Scavenging Activities of Selected Azorean Seaweeds

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In living organisms the Reactive Oxygen Species (ROS) and Reactive Nitrogen Species (RNS) are known to cause damage to biomolecules, such as lipids, nucleic acids, proteins and other cellular constituents. The degradation and/or modification of these molecules have been related with various chronic diseases, such as coronary heart disease, atherosclerosis, cancer, and some neurological disorders. For this reason, many products with antioxidant properties are widely used in order to minimize oxidative damage to living cells and also to prevent oxidative deterioration

of food. Antioxidant activity of seaweeds has been intensively focused due to the currently growing demand from the pharmaceutical industry where there is interest in anti-aging and anticarcinogenic natural bioactive compounds, which possess health benefits. Furthermore seaweeds have also been used as a new source of novel functional foods with potential nutritional value.

The antioxidant activity (Free Radical Scavenging Activity - FRSA) of the selected Azorean seaweeds was evaluated in methanolic extracts solution with the DPPH (2,2-diphenyl-1-picrylhydrazyl), used as a stable radical. The methanolic extracts were obtained from dried biomass by sequential extractions obtaining a final concentration of 2mg/ml. The seaweeds were collected in Azorean Islands (38°43'48" N, 27°19'18" W) where there is a very low level of sea pollution and consequently a potential good source of antioxidant material with superior benefit effects on human health.

The antioxidant activity of the intertidal Azorean seaweed compounds is mainly due to their redox properties, which can play an important role in adsorbing and neutralizing free radicals, quenching singlet and triplet oxygen, or decomposing peroxides. The used methodology, measure the hydrogen atom or electron donor capacity of an extract to the stable radical DPPH formed in solution. In other words, it measures the capacity of the extract to scavenge free radicals in solution. The FRSA results of the selected seaweed species ranged from 19.54±2.40% to 60.05±4.29% after 30 minutes reaction time and show a standard deviation lower than 6.8% (mean results varied from 1.41% to 6.80%). Among the methanolic seaweed extracts, the greatest antiradical activity was observed for *Fucus spiralis* (60.05±4.29%) followed by *Gelidium microdon* (45.86±5.05%), *Chaetomorfa pachynema* (43.52±4.79%), *Ulva compressa* (39.12±4.30%), *Osmundea pinnatifida* (33.97±3.74%), *Pterocladia capillacea* (27.44±5.90%), *Porphyra sp.* (22.73±4.88%) and *Sphaerococcus coronopoliolus* (19.54±2.40%). The results of FRSA for all seaweed materials show a slightly increased values with increasing reaction time, particularly from 10 to 30 min. The values for each species reflect the influence of geographic origin, climate, season, variety and quality of the sea water.

The DPPH methodology allows to determine the FRSA of the different seaweeds with good repeatability. The results shows different values for different species, and particularly, *Fucus spiralis* and *Gelidium microdon* presented a superior antioxidant activities that can be exploited from the biotechnology and commercial perspectives, taking in account the low level of Azorean sea water pollution.

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## Immune Activity of Phloroglucinol Purified from *Ecklonia cava* and Its Possible Mechanism in Gamma Ray-Irradiated Mice

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Phloroglucinol (PG), a polyphenol compound, has been proposed to exert the free radical scavenging and immunomodulatory effects on immune cells (1). Here, we investigated the immune potentials and its mechanism of PG in gamma ray-irradiated mice. First, we tested whether PG isolated from *Ecklonia cava* (*E. cava*), an abundant brown algae in Jeju island, may contribute to the activation of immune response in murine lymphocytes through the NF B pathway by 3H-thymidine incorporation assay, intracellular cytokine assay, Western blot and electrophoretic mobility shift assay (EMSA). Then, we investigated whether the PG's immunological abilities could contribute to protective effects in gamma ray-irradiated mice via mice's survival rate analysis, colony forming assay, comet assay, DAPI staining, 3H-thymidine incorporation assay and flow cytometry. PG markedly enhanced the proliferation of lymphocytes by inducing the degradation and phosphorylation of I B, which led to the activation of NF B p65 as