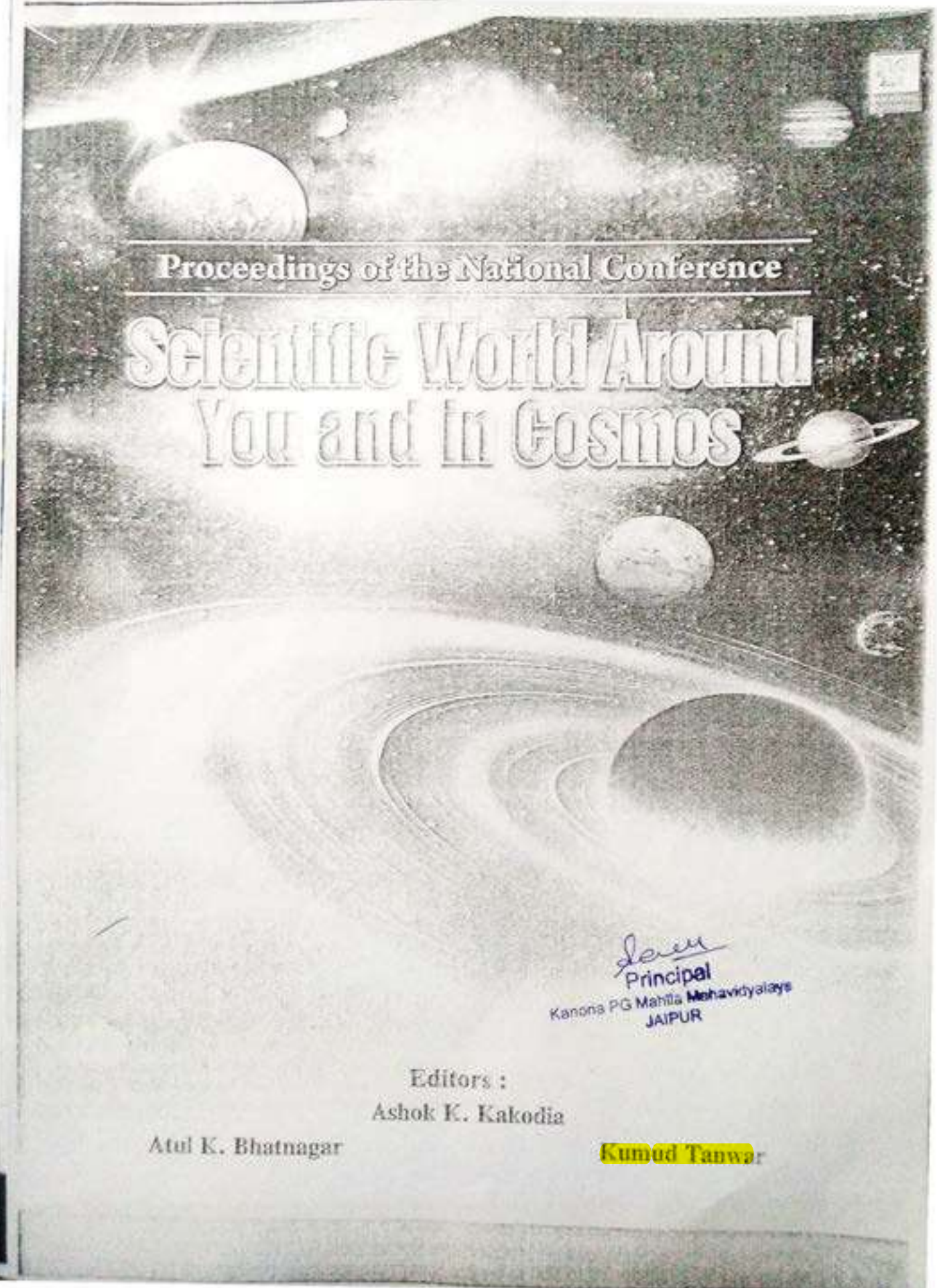

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Characterization of Quercetin from *Parmelia Perlata* Medicinal Plant

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Abstract: The present research work involves isolation and characterization of quercetin compounds, new compounds isolated from the extracts of three different plants, their standardization and biological evaluation for their anti-inflammatory and antibacterial activities.

Keywords: Quercetin, isolation, characterization, biological evaluation.

Introduction

Parmelia perlata, a plant of family parmeliaceae is commonly know as 'Charila' in India and is grown in Indian plains and hills. Some lichen products have antimicrobial activity.[1] A very high activity against Gram positive bacteria has been observed in lichens containing usnic acid. It also possesses antibiotic effect of usnic acid on different biological systems.[2] The *Parmelia cirrhata* has also been reported to show an antifertility activity.[3] The plant is used in traditional system of medicine for the cure of skin ailments.[4] The water extract *Parmelia cirrhatum* can be used a potential source of natural antifungal activity.[5] Some extracts of *Parmilia caperata* demonstrated interesting activities on human cancer cell lines as good selectivity indices.[6] Salazinic acid from *Parmelia saxatilis* showed antimycobacterium activity of lichen metabolites *in vitro*.[7] The sensitivity of the human keratinocyte cell line HaCaT to several lichen metabolites isolated from *Parmelia neglectata* and *Parmelia tinctorum* was evaluated.[8]

Due to these interesting medicinal activities *Parmilia perlata* was selected for chemical investigation and biological activities of the major constituent isolated from petroleum ether extract and ethyl acetate extract.

Isolation and Characterization of Chemical Constituents

Shade dried lichen was powdered and extracted with petroleum on steam bath for 48 hrs. The extract was concentrated under reduced pressure, as a result dark green, semi-solid mass was recorded. The pet ether extract was chromatographed over silica gel column and afforded following compounds.

Characterization of Compound as Quercetin

Compound Quercetin, m.p. 301-02°C was found to be homogenous in TLC. The elemental analysis and molecular weight determination established its molecular as $C_{15}H_{10}O_7$. Its solubility in alkali, blue-green colouration with alcoholic $FeCl_3$ and dark reddish-brown colour in Shinoda's test indicated its flavonoid nature. It developed green spot when TLC was developed with NP/PGE reagent under UV light at λ_{max} 365 nm. This compound showed R_f value 0.82 and 0.67 in system A and B respectively[9-10].

System A: Ethyl Acetate : Formic acid : Glacial acetic acid : Water (100:11:11:27).

System B : Ethyl Acetate : Formic acid : Glacial acetic acid : Ethyl methyl ketone : Water (50:7.3:30:10).

In the infrared spectrum, a broad peak at 3450 indicated the presence of -OH groups. Peaks also appeared at 3010 (aromatic C-H stretching), 1590, 1520 (aromatic C=C stretching), 1239, 1200 and 1180 cm^{-1} (C-O stretching).

The ^1H NMR spectrum displayed a set of doublets at δ6.32 and 6.50 (J = 2.5 Hz) for the meta-coupled protons on C-6 and C-8 respectively. A doublet centered at δ7.00 (J = 8.5 Hz) could be attributed to C-5' proton of ring B. The remaining protons of ring B (C-2' and 6') appeared as an overlapping doublet (J = 2.5 Hz) and quartet (J = 2.5, 8.5 Hz) in the region δ7.62-7.81. Singlet at δ12.31, 10.25, 8.87, 8.68 and 8.31 due to hydroxy group were placed at C-5, C-3, C-7 and C-4' respectively.

Analysis of Compound as Quercetin

The light brown solid obtained after removal of the solvent from fraction no. 20-24 was crystallized from acetone and methanol (1:1) as light yellow needles, m.p. 301-02°C. The compound was insoluble in pet ether, sparingly soluble in benzene, ethyl acetate and acetone, soluble in methanol and NaOH solution. It gave blue-green colour with alcoholic $FeCl_3$, reddish brown in Shinoda's test and yellow colour showing light green fluorescence with conc. sulfuric acid. It gave dark bright yellow spot on TLC plate when viewed in UV light[11-12].

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