

CARBOHYDRATE NEWS LETTER

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**FROM THE
EDITOR'S DESK ...**

Carbohydrates, the building blocks of many macromolecules, initially used for energy, shelter and materials have now gained a high position in different branches of physical, biochemical and biotechnological fields. Their importance in different disciplines of science is due to their involvement in molecular recognition and supra-molecular chemistry. The presence of different functional groups and the well defined stereocentres in this class has enabled to generate diversity in nature. The chemistry and biology of carbohydrates is an emerging field of modern science and the significance of carbohydrates and their conjugates in numerous biological functions is now renowned. In current scenario one cannot imagine even a single biochemical reaction without direct or indirect involvement of carbohydrates or carbohydrate derived material. Glyco-cluster and quantum dots have added another feather in the prestigious cap of carbohydrates. Because of their sustainability and other environment friendly nature, carbohydrates are being extensively used in green chemistry to access organic compounds of high optical purity. The lack of many carbohydrate-based drugs is not surprising considering that our understanding of fundamental glycobiology is a rather recent development. Therefore a revolution in the field of glycochemistry and glycobiology has begun to unravel the mystery of these molecules in biological system. The role of each and every individual functional group present in monosaccharides, the unit of oligosaccharides is being defined with the recent development of glycotecology and biomedical engineering. Carbohydrate modifications of proteins and lipids are important processes that modulate the structures and functions of these biomolecules and affect intercellular recognition in infection, cancer, and immune response. Nevertheless, slowly the recent studies to understand the molecular-level carbohydrate recognition and to enable the carbohydrate-based drug discovery process are gaining momentum. The Carbohydrates present in nucleotides, glycopeptides, and glycolipids communicate with the intercellular- and intracellular environment through a multitude of molecular interactions. Many of these recognition phenomena are involved in events such as metastasis, infection, and inflammation and have become the subject of intensive medical research. The unique functions of carbohydrates, including energy storage, transport, modulation of protein function, intercellular adhesion, signal transduction, malignant transformation, and viral and bacterial cell surface recognition, underlie a significant pharmaceutical potential. Unlike oligonucleotides and peptides, carbohydrates are not just linear oligomers, but are often branched. The nine common monosaccharides found in mammalian cells can be combined in a dazzling variety of ways to form structures more diverse than those accessible with the twenty naturally occurring amino acids or the four nucleotides. This structural complexity renders the isolation of pure carbohydrates from natural sources extremely difficult, even when it is in principle possible. The cell surface of bacteria often contains unique carbohydrates such as 3-deoxy-D-manno-2-octulosonic acid (KDO) and heptoses. Development of small D-peptides that are stable in the circulation and bind the bacterial cell-surface sugar with high affinity may have potential as new antibiotics. Carbohydrates present both potential and problems – their biological relevance has been recognized, but problems in procuring sugars rendered them a difficult class of compounds to handle in drug discovery efforts. The finding that most pathological events involve glycoforms as adhesion molecules has recently stimulated the interest of Academy and pharmaceutical industries. Till now the difficulties in structural characterization and synthesis of oligosaccharidic structures has inhibited the finding of new carbohydrate-based drugs. Furthermore, there is a need of "dialogue" between synthetic glyco-chemists and representatives of pharmaceutical companies or glyco-biologists in order to "conjugate" the synthetic expertise with a deep knowledge of the pharmacological and biological targets.

Season greetings and have a meaningful and fulfilling new Year.

R.P. Tripathi



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Other hydrocolloids	Cassia, Sesbania, Tamarind, Locust Bean Gum.

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Presidential Address at Carbo XXV, Shimla



Dear Participants, guests & Friends,

It gives me immense pleasure to be part of this historic gathering, to be with you all, on the eve of the Inaugural function of the Silver Jubilee Conference, Carbo XXV-organized jointly by the Department of Chemistry, Himachal Pradesh University and Association of Carbohydrate Chemists

and Technologists (India) at this place of Shimla-the city known as the Queen of Hill Stations.

I, in the capacity of the President of ACCTI, would like to pen down some of my thoughts on the contemporary topic: Recent Advances in Chemistry and Technology of Carbohydrates.

Friends, it is very well documented that Carbohydrates play, both directly and indirectly, a pivotal role in our health, nutrition and well being. A lot of advancement in basic and applied aspects of Carbohydrates is taking place in India and worldwide. However, the recent understanding of the involvement of carbohydrate molecules and conjugates in many vital biological processes and consequently, the appreciation of their tremendous therapeutic potential has stimulated the development of new methods for the synthesis of this class of compounds. Leading specialists working in the emerging areas of chemistry and biology on specific topics in the area of carbohydrates have tried to solve the carbohydrate puzzles, in many diverse areas of the specific subject. Carbohydrate micro array technologies are new development at the frontiers of glycomics. While the latest developments take place at its own pace, the contribution of ACCTI is worth mentioning.

This Association with its main aim to foster advancement of knowledge in the field of carbohydrates has been leading organization and frontrunner in the area of research which is focused on growth and development in carbohydrate related and the allied industries.

The Department of Chemistry is one of the prestigious departments of the H.P. University and has set high benchmarks in the academic and research field. Prof. B. N.

Mishra and all his research students especially Prof. Indrajeet Kaur and Prof. Ghanshyam Chauhan has contributed significantly in the area of Modification of Carbohydrates via Grafting and place the department on the international map.

The field of carbohydrate chemistry has occupied the minds and hearts of many scientists for over a hundred years and as we enter the twenty first century, it continues to be both vigorous and challenging. Among the most exciting aspects of organic chemistry in the last few decades has been the interplay between the specialized sub disciplines of carbohydrate chemistry and total synthesis, each enabling and advancing the other in new directions and towards greater heights.

I hope, this conference will be rewarding scientifically and professionally to all the participants and will provide an excellent opportunity to all the delegates to strengthen the bonds of cooperation. The deliberations in this conference will definitely enhance the academic endeavours and provide a common platform for academicians, scientists, technologists and industrialists to exchange and comprehend the new developments in the different research disciplines of Carbohydrate Science and Technology.

Not talking much of your time, I thank all, and honestly desire to see that the participants will discuss each and every issue in a threadbare manner and come out with some concrete plan of action for the benefit of various stakeholders connected with the issue in hand.

On behalf of all the honourable members of the Executive Council of ACCTI & on my personal behalf I also join in welcoming all the delegates, participants, invitees and their spouses to this conference and would like to congratulate Prof. Ghanshyam Chauhan and all his colleagues for organizing this conference successfully. I hope your stay at Shimla will be comfortable, memorable and at the same time scientifically fruitful in all respects.

At last I wish you all a very happy and prosperous New Year.

Thanking you all, JAI HIND

Prof. H.C. Trivedi
President, ACCTI

INVITATION

The organizing committee takes the pleasure of cordially inviting you to participate in the 26th Carbohydrate Conference to be held from November 23-25, 2011 at the Indian Institute of Chemical Biology, Kolkata. The conference provides an open forum for scientists and industrialists to exchange their ideas and foster interactive research among participating members. You are also invited to submit papers/posters for presentation.

Theme of the conference

Carbohydrate: Confluence of Chemistry and Biology

Topics of scientific programme

- ❖ Synthesis of carbohydrates, nucleoside and nucleotides, neo-glycoproteins, asymmetric synthesis etc.
- ❖ Structure and function of plant, microbial polysaccharides and glycoconjugates.

- ❖ Carbohydrates as renewable resource materials of industrial application.
- ❖ Carbohydrate in supramolecular chemistry.
- ❖ Chemical Biology, Glycobiology & Glycotechnology of Carbohydrates
- ❖ Medicinal application of carbohydrates
- ❖ Nutraceuticals and health care
- ❖ Green chemistry

We look forward to your participation in the forthcoming conference and to welcome you to the City of joy, Kolkata. You are requested to contact Dr. Asish Kumar Sen, Convener, CARBO XXVI, Chief Scientist, Indian Institute of Chemical Biology, 4, Raja S. C. Mullick Road, Jadavpur, Kolkata- 700 032, India, Tel: (033)-2473-3491, 24995720, 24298869, Fax: 033-2473-5197, E.mail: carboxxvi@gmail.com or aksen@iicb.res.in. Skype: asish.kumar.sen.iicb.kolkata. Web site: www.accti.in or www.iicb.res.in.

Biocatalytic Route to Sugar-PEG-Based Polymers for Drug Delivery Applications

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There is always a need to have biocompatible drug carriers capable of delivering water insoluble drugs with high transport and controlled release capacity. Poly Ethylene Glycol (PEG) and the materials derived from it are highly applicable in biotechnology and pharmacology. This is due to the excellent water solubility and high biocompatibility of PEG. Moreover PEGylation has proved to be a successful approach to drug delivery. Carbohydrates are known for their target specificity and also as promising candidates for homing molecules. Furthermore, the effectiveness of a drug carrier is determined by its ability to control the time over which drug release occurs or to trigger the drug release at specific location. Drug release can be controlled by stimuli or host-responsive process. In recent years, drug carriers responsive to their environment or to external stimuli have been designed. For example, temperature has been used to modulate drug release from thermoresponsive micelles, ultra- sound has been reported to trigger drug release from pluronic micelles, and change in pH has also been exploited as a useful stimulus in the development of a drug carrier. Numerous pH gradients exist in both normal and pathophysiological states, and it is well established now that extracellular pH of solid tumors is significantly more acidic than normal tissues, with a mean pH of 6.5 in comparison with 7.4 for the blood and normal tissues. Therefore, polymeric micelles that are responsive to pH gradients can be designed to release their payload selectively in tumor tissue or within tumor cells.

Sugar-PEG-based polymers were synthesized by enzymatic copolymerization of 4-C-hydroxymethyl-1,2-O-isopropylidene- β -L-threo-pentofuranose/4-C-

hydroxymethyl-1,2-O-benzylidene- β -L-threo-pentofuranose/4-C hydrox -ylmethyl-1,2-O-isopropylidene-3-O-pentyl- β -L-threo-pentofuranose with PEG-600 dimethyl ester using novozyme-435 (*Candida antarctica* lipase immobilized on polyacrylate). Carbohydrate monomers were obtained by the multistep synthesis starting from diacetone-D-glucose and PEG-600 dimethyl ester, which was in turn obtained by the esterification of the commercially available PEG-600 diacid. Aggregation studies on the copolymers revealed that in aqueous solution those polymers bearing the hydrophobic pentyl/benzylidene moiety spontaneously self-assemble into supramolecular aggregates. The critical aggregation concentration (CAC) of polymers was determined by surface tension measurements, and the precise size of the aggregates was obtained by dynamic light scattering. The polymeric aggregates were further explored for their drug encapsulation properties in buffered aqueous solution of pH 7.4 (37 °C) using Nile red as a hydrophobic model compound by means of UV/vis and fluorescence spectroscopy. There was no significant encapsulation in polymer synthesized from 4-C-hydroxymethyl-1,2-O-isopropylidene- β -L-threo-pentofuranose because this sugar monomer does not contain a big hydrophobic moiety as the pentyl or the benzylidene moiety. Nile red release study was performed at pH 5.0 and 7.4 using fluorescence spectroscopy. The release of Nile red from the polymer bearing benzylidene moiety and pentyl moiety was observed with a half life of 3.4 and 2.0 h, respectively, at pH 5.0, whereas no release was found at pH 7.4.

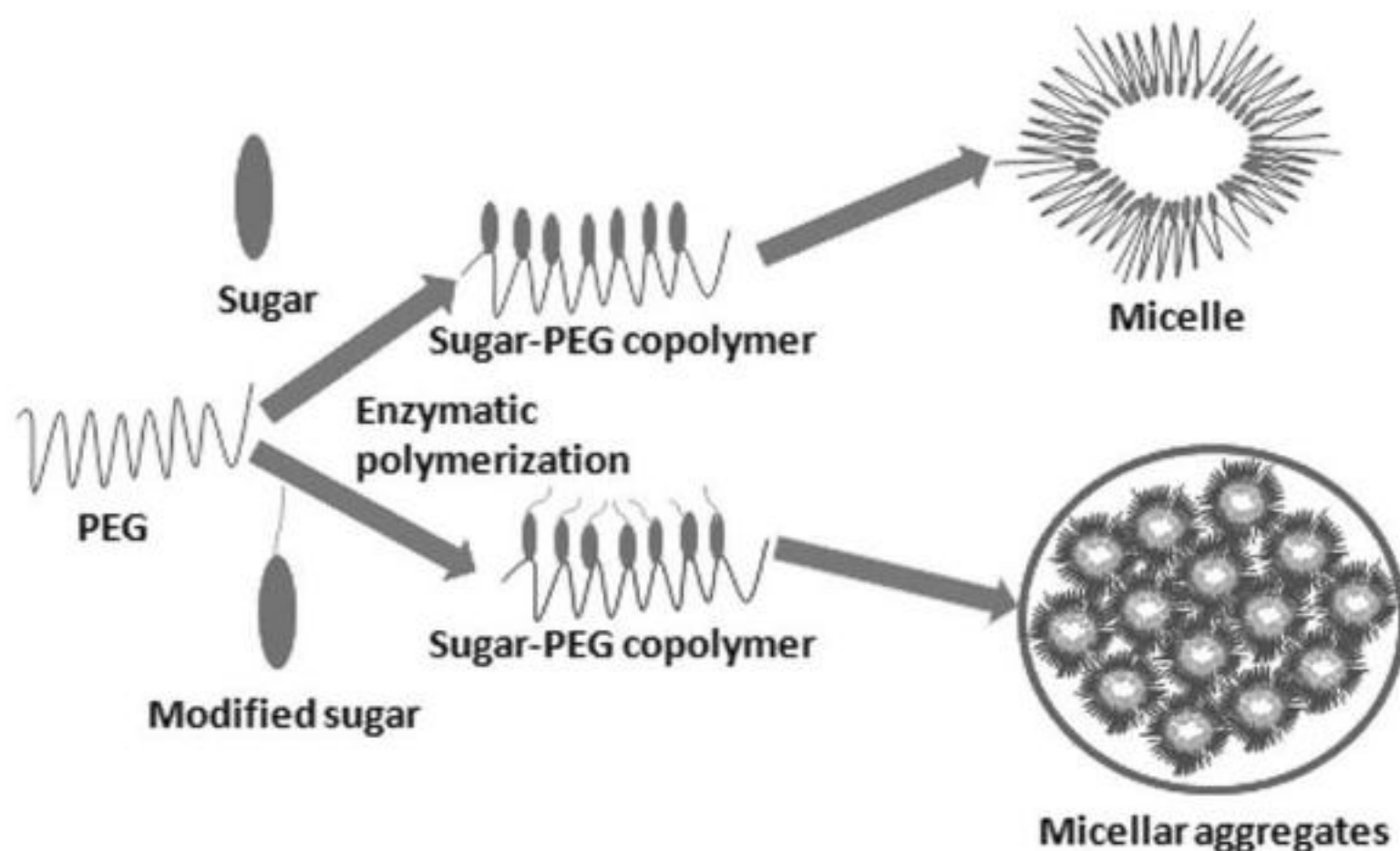


Figure 1: Sugar-PEG-Based Polymers showing Drug Delivery processes

Preparation and functional properties of flour, isolated starch from native and germinated grains of a cereal: pigmented rice(*Oryza sativa*,L), a millet: finger millet (*Eleusine coracana*) and a legume: horse gram(*Dolichos biflorus*)

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Functional properties of dehusked pigmented rice, ragi and horse gram., in the flour and starch form of native and germinated grains were studied. In grain form, hydration was least in paddy, slightly higher in ragi and highest was in horse gram. Horse gram registered highest Equilibrium moisture content on soaking at room temperature, least was by rice and in between was by the finger millet. Ash content was highest in red rice, the content reduced by 25% of the original after germination, least was seen in their respective starches. Native and germinated horse gram showed almost same ash content. Protein content was highest in grains and least in their respective starches. Water absorption capacity (WAC) was almost same in rice flour and flour from germinated rice. Starch from germinated rice showed low WAC compared to its native rice starch. Flour from germinated ragi showed high WAC compared to its native flour. Similar observation was seen in native and starch from germinated ragi. Reverse phenomenon was noticed in the case of horse gram flour and starch before and after germination. High Water solubility index (WSI) was observed for flour from germinated rice compared to its native. WSI was less than 0.8 for native starch and starch from germinated rice. Native and flour from germinated horse gram showed highest WSI of 26 and about 1.0 for their respective starch. Swelling power of rice starch and its germinated one was around 15. Solubility of flour and starch of germinated rice was high compared to their respective

native flour and starch. Swelling power of ragi flour and starch of native and germinated ones were almost same. Solubility of flour of native and germinated was 18 and 44% respectively, and their respective starches were around 15%. Swelling power of horse gram flour, starch were quite low (~9) and that of starch of germinated horse gram was ~13. Solubility of native and flour of germinated horse gram was almost same (~32%) and that of their starches was also almost same (~11%). Amylose content of native rice was ~21% and its starch was 24%. Horse gram flour showed around 17% and that of its starch showed around 34% as amylose content. Ragi flour had 2% less amylose content compared to its starch (26%). These flour showed lesser solubility compared to their respective starches. Ragi flour showed high peak viscosity (PV) compared to rice flour, but rice had 5°C higher gelatinization temperature (GT) compared to ragi flour. Horse gram starch registered highest PV compared to rice and ragi starch, however rice starch showed least GT compared to Horse gram starch and ragi starch. Germinated horse gram flour showed high PV compared to ragi and rice flour. Starch from germinated horse gram showed highest PV compared to germinated ragi and rice starch. Composite flour from native and germinated grains behave differently with respect to pasting profile studies. These studies indicate that cereals, millets and legumes behave quite differently with regard to their functional properties.

From Click to Chelation in Carbohydrate Chemistry

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Click Chemistry, a set of powerful and virtually reliable 1,3-dipolar cycloaddition of organic azides and alkynes in a kinetically-controlled target-guided synthetic approach, is well-known to address a variety of objectives including, synthesis of ordered foldamer architectures, their ligation, conjugation of ligands to carbohydrate scaffolds and their macrocyclization through 1,2,3-triazole skeleton. The protocol has several distinct advantages, most notably the high chemoselectivity, excellent regioselectivity, tolerance to a variety of solvents and functional groups, mild and compatible reaction conditions, efficient, reliable, very low background ligation rates, facile synthetic accessibility, straightforward way for making covalent connections, and moreover, the high stability and widespread applications of the resulting 1,2,3-triazole heterocycle in medicinal chemistry as well in material science [1]. The Cu(I)-catalyzed azide-alkyne cycloaddition (CuAAC) was reported initially by two independent research group of Meldal [2] and Sharpless [3] in 2002, that proceeds under mild conditions to give exclusively 1,4-disubstituted 1,2,3-triazoles and has been recognized as 'Click Reaction'. Interestingly ruthenium-catalyzed cycloaddition of alkyne with azide affords exclusively opposite regioselectivity i.e. 1,5-disubstituted triazoles [4].

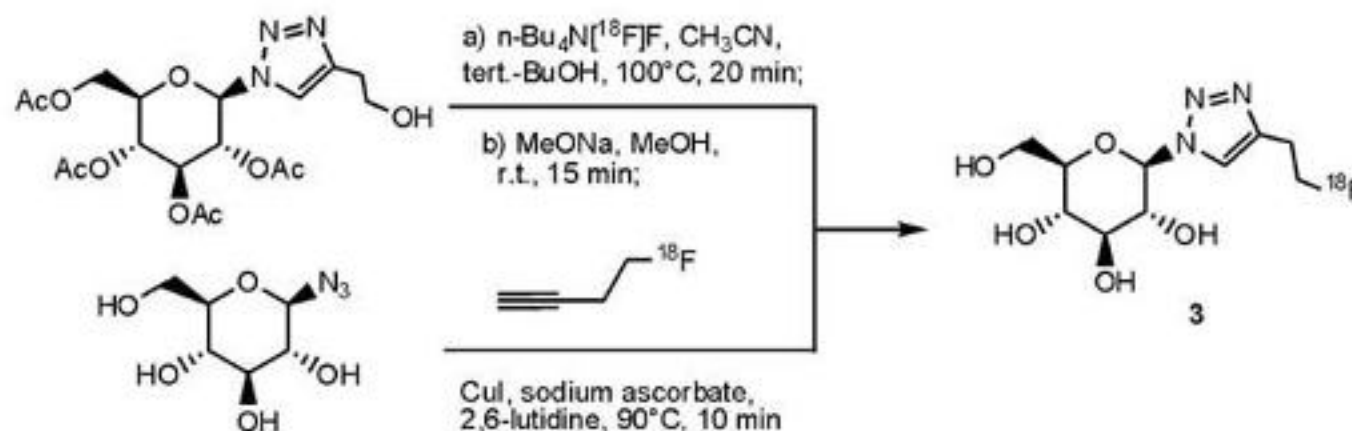
Carbohydrates constitute a major class of biomolecules with diverse structures particularly in the form of glycoconjugates lying inside or on the surface of cells and have been identified to play pivotal roles in various pathologically and physiologically important biological processes [5]. For clear understanding of their role in these biological processes, carbohydrate based molecules are needed for complete chemical, biological, medicinal, and pharmacological investigations [6]. In this direction, tremendous efforts have been made to develop novel and facile procedures to achieve the desired sugar based molecules of great biological interest. An increasing focus on the glycoconjugates, **click reaction** of an azide and an alkyne has been increasingly used in the carbohydrate research field such as in chemical labelling of biomolecules as well as in preparation of oligosaccharide analogues, glycodendrimers, scaffolds and micro-arrays. Thus, the click reaction offers promising solutions in carbohydrate chemistry owing to its orthogonality and efficiency.

The radiolabeling of biologically active molecules has become an indispensable tool for the assessment of novel drug candidates. In recent years, the discovery of new biological targets has imposed the development of innovative and efficient methodologies that can ensure the

firm attachment of biomedically interesting molecules to readily available radionuclides with suitable decay characteristics. The mild reaction condition with the Cu-catalysed alkyne-azide cycloaddition reaction forming stable 1,2,3-triazole linkages can serve as an innovative functionalization strategy for wide variety of biomolecules and are well suited to their modification, where the required azide and alkyne functionalities can be incorporated by standard synthetic transformations or biochemical methods. Additionally, the 1,4-disubstituted 1,2,3-triazoles share structural and electronic features with 1,4-disubstituted imidazoles of *N*-derivatized histidines, which

are extraordinarily good chelators, particularly for organometallic cores of Mo, Tc, and Re.

Now-a-days radiolabeling with the short-lived positron emitter fluorine-18 (^{18}F , $t_{1/2} = 109.8$ min) for the synthesis and application of small alkynes or azides as suitable building blocks via "click chemistry" has been utterly used. Kim *et al.* [7] have developed ^{18}F -labeled carbohydrates via click reaction. The radiosynthesis of 4-[(2- ^{18}F fluoroethyl)-1-(β -D-glucopyranosyl)]-1H-1,2,3-triazole (**3**) has been established as an alternative of most important and widely used PET radiotracer 2- ^{18}F fluorodeoxyglucose (^{18}F FDG) (Scheme 2).

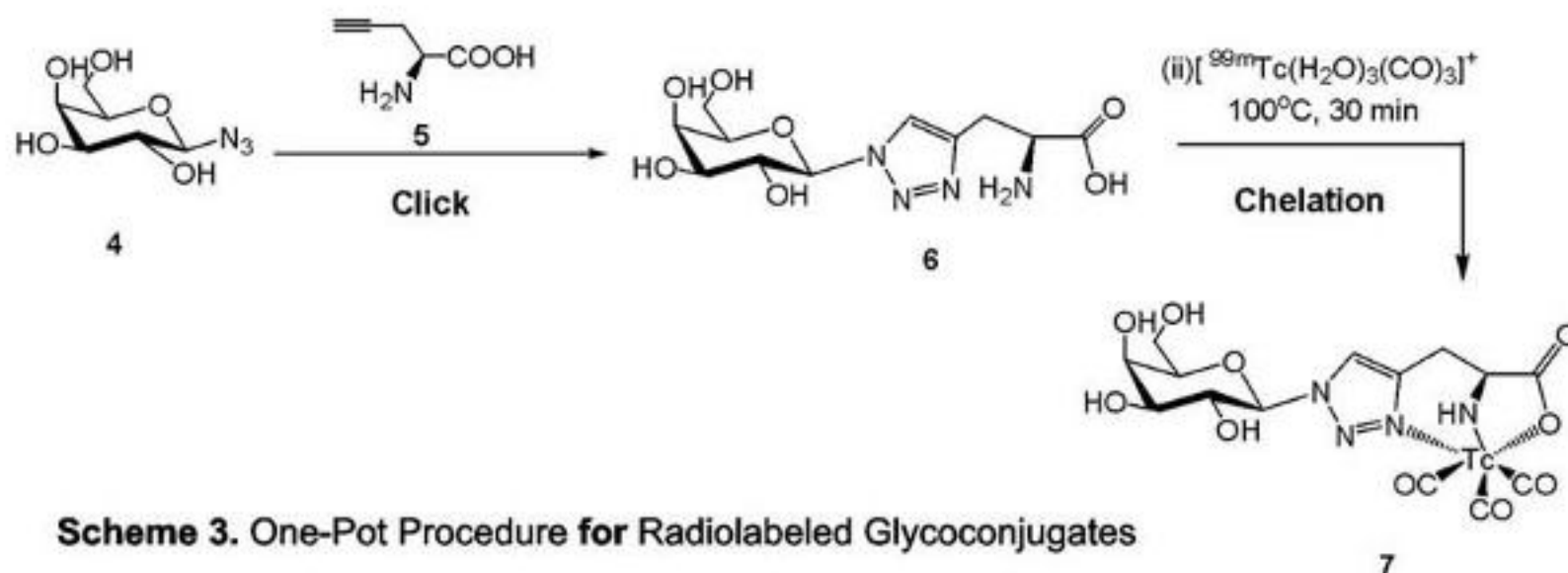


Scheme 2. Synthetic routes for 4-[(2- ^{18}F fluoroethyl)-1-(β -D-glucopyranosyl)]-1H-1,2,3-triazole.

Recently, Kolb and co-workers [8] have used click reaction for the synthesis of carbohydrate containing cyclic peptides as useful imaging agents for the integrin receptor since the ^{18}F galacto-RGD peptide exhibit integrin $\alpha_5\beta_3$ -specific tumor uptake in integrin-positive M21 melanoma xenograft model. The approach was also tested using more complex triazole-containing tridentate ligands such as modified bombesin, D-galactose, thymidine and phospholipid for the further complexation reaction with $[\text{Re}(\text{CO})_3]^+$ or $^{99\text{m}}\text{TcCO}_3^+$.

Mindt *et al* have reported triazole-containing chelators which were successfully proven to be the

extraordinarily good chelators for Rhenium(I)-tricarbonyl and Technetium(I)-tricarbonyl cores with no complex formation. Based on these observations, further investigation of the approach led to the development of a one-pot synthesis avoiding the isolation of triazole containing chelating agents. The probability of the one-pot synthesis was exemplified by the reaction of azide-functionalized D-galactose (**4**) with L-propargyl glycine (**5**) under click reaction condition followed by the addition of $^{99\text{m}}\text{TcCO}_3^+$ to give the targeted $^{99\text{m}}\text{Tc}$ -tricarbonyl complexes (**7**) (Scheme 3) [9].



Scheme 3. One-Pot Procedure for Radiolabeled Glycoconjugates

Bryson *et al* have designed a novel macromolecular MRI (Magnetic Resonance Imaging) contrast agent, a novel β -cyclodextrin click cluster endowed with seven paramagnetic arms in such a way that each contains two water exchange sites (Figure 1), and reveals a high relaxivity profile at high magnetic fields. This discrete paramagnetic agent yields an exceptionally high relaxivity profile ($43.4 \text{ mM}^{-1} \text{ s}^{-1}$ at 9.4 T) and enhanced contrast on a human MRI scanner [10].

Benoist *et al* have developed an efficient protocol to graft $^{99\text{m}}\text{Tc}$ -chelating agents and rhenium complexes onto a glucose scaffold displaying *in vitro* stability against histidine exchange reactions. More interestingly, the feasibility to directly tether a pre-chelated $\text{Re}(\text{CO})_3$ core by click chemistry has been highlighted for the first time (Figure 2). The heterogeneous cyclization protocol developed may also be applicable to other metallic cores and more complex carbohydrate scaffolds [11].

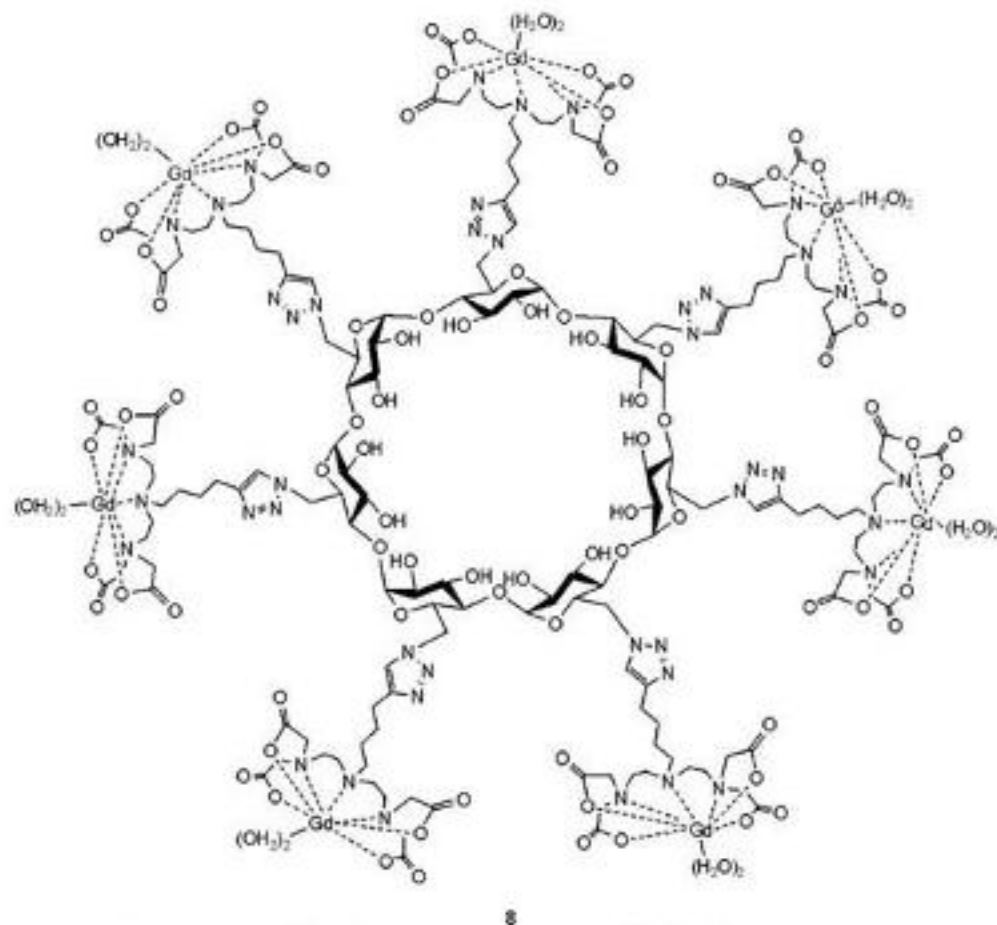


Figure 1. The Paramagnetic Click Cluster

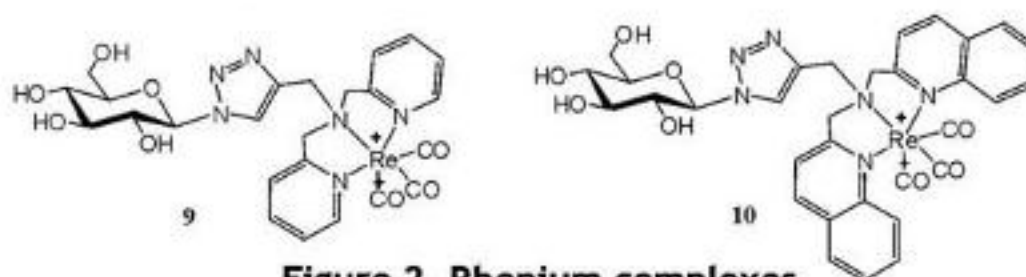


Figure 2. Rhenium complexes

Cu (I) catalyzed 1,3-dipolar cycloaddition (CuAAC reaction) of organic azide and terminal alkynes has been extensively used in adjoining two all together different building blocks, enabling an easy access to complex molecular-level architectures seeking its widespread application in diverse disciplines of sciences ranging from organic synthesis, material sciences, medicinal chemistry to chemical biology. We have tried to provide the recent development and highlight the rapidly increasing advantages of the Click reaction that has extensively been used in the area of from Click to chelation in carbohydrate chemistry. The reaction has widely applied in different field of research and of great future scope in synthesis. The chemistry is well applied in medicinal research, lead optimization in drug research, tissue engineering scaffolds, dispersible nanomaterials, drug delivery agents, surface chemistry, material chemistry, polymer chemistry, macromolecules, dendrimers, glycobiology, and bioconjugation. Some triazoles were successfully used as promising catalyst in several organic reactions including Baylis-Hillmann Reaction, asymmetric synthesis etc., but unfortunately have been explored limited in academia and industry. This report may compel to think medicinal and synthetic chemist to apply the concept of from click to chelation in different field specially to achieve the promission carbohydrate based bi-chelating agents useful as RII and RIT.

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Life Time Achievement Award - 2010



Dr. Asish Sen is receiving the Life Time Achievement Award from Prof. H.C. Trivedi, President, ACCTI in Shimla on 25th Carbohydrate Conference

The Association of Carbohydrate Chemists and Technologists of India (ACCTI) is privileged to honour the most successful chemists, biologists and technologists in the country who are working in the field of Glycoscience by giving them Life Time Achievement Award comprising of a Plaque, Citation, Shawl and cash award of Rs. 25,000 from Lucid Colloid group, Mumbai annually. Recently, Dr. Asish K. Sen was awarded this Life Time Achievement award for the year 2010 at CARBO XXV held at H.P. University, Shimla on Nov. 11, 2010.

Dr. Asish K. Sen, Additional Director (Scientist-G), Department of Chemistry, Indian Institute of Chemical Biology, Kolkata got his master's degree from Jadavpur University, Kolkata (1974), Ph.D. from IACS, Kolkata (1980) and has done post doctoral work with Prof. G. O. Aspinall & Prof. W. A. Szarek in Canada. His area of interest: Structural and synthetic carbohydrate chemistry of biological significance, he has 41 Research Publications, five patents to his credit and guided 6 Ph.D. students. He has delivered many plenary lectures/invited lectures and guest lectures related to his research experience. He is/was Council Member of the National Institute of Pharmaceutical Education and Research (Kolkata), Hon. Asst. Secretary of the ACCT(I) from 2000 to 2003, Hon. Secretary of the ACCT(I) from 2004 to 2007, Hon. Vice

president of the ACCT(I) from 2008- 2010 and presently President of the ACCT(I). His major achievements include:

- Total synthesis of a leprosy specific trisaccharide antigen and its protein conjugate; development of ELISA based diagnostic kit.
- The structural architecture of the O-antigens of selected strains of pathogenic *Vibrio cholerae* and *Vibrio parahaemolyticus* (O3:K6) which had endemic potential. *Vibrio cholera* NRT36S and O-31 (epidemic in Japan and Sudan respectively) were selected for the study. The main objective of the work was to map the change of structural aspect of the very important cell surface lipopolysaccharide antigens of *vibrio cholerae* from apparently latent stage to highly pathogenic stage with epidemic and/or pandemic potential.
- Identified of a new complex sugar molecule in the O-antigenic polysaccharide of *Vibrio parahaemolyticus* O3K6 which was endemic in Kolkata mostly using 2D NMR techniques.
- Have been able to show that human C-reactive protein has different glycosylation pattern under various disease conditions. This unique phenomenon is being utilized for the diagnosis of *Leishmania* in human.
- Isolated an acidic polysaccharide from semi-ripe Bael fruit that can clear *Leishmania donovani* burden (>95%) in rat liver and spleen when used with sub-optimal dose of SAG. This has great potential as herbal drug against visceral leishmaniasis.
- Development of a new strategy for one pot synthesis of a novel pentasaccharide that binds with a novel lectin having two distinct binding sites.

He also serves the institute (IICB) in various administrative capacities. Presently, he is heading the Engineering Services Unit which oversees all new developments, in-charge of the Business Development Group and takes care of parliamentary and audit matters. He is also involved in various other important committees such as Chairman or member that include SPC, Academic affair, Central Instrument Facility etc. He has successfully organized various International (4) and National conferences (several) as convener or member and have been the coordinator of the CPYLS for last 5 years.

Award for the 'Best Paper published in TCR' - 2010

Dr. R.P. Tripathi, Senior Principal Scientists, Deputy Director, Medicinal and Process Chemistry Division, Central Drug Research Institute, Lucknow has been awarded First 'Best Paper published in TCR journal' at the Silver Jubilee year of 25th Carbohydrate Conference held at H.P. University, Shimla, 2010. The award is given every year by the Association of Carbohydrate Chemists and Technologists (India) and includes a citation and a cash award of Rs. 20,000.00 (Rupees twenty thousand only). His educational qualifications is: M.Sc. (Gorakhpur University), M.Phil, Ph. D.(Delhi University). His area of Specialization: Organic Chemistry: Oxygen and nitrogen heterocycles, Nucleosides, carbohydrates, asymmetric synthesis, Combinatorial Chemistry, Medicinal Chemistry: Development of new anti TB molecules, antiparasitic agents (malaria, filarial, leishmania, trypanosome), antivirals, Tuberculosis, diabetes, and antitoxinants. His Membership of scientific bodies are: Life member, Indian



Dr. R.P. Tripathi is receiving the 'Best Paper published in TCR' award from Dr. P.L. Soni, Editor-in-Chief, TCR & Advisor, ACCTI

Chemical Society, Indian medicinal chemists association, UP Association of Advancement of Science and Technology, Society of Biological Chemists of India, Member of Association of Carbohydrate Chemists & Technologists of India, Editorial Board Member ARKIVOC, Trends in Carbohydrate Research, Medicinal Chemistry - An Indian Journal, Associate Editor Carbohydrate News Letter, Editorial board member International Journal of Drug Design and Delivery Reviewer for a number of International Scientific Journals and books Member of

different Selection Committees and Research Boards. Visiting member abroad: France, INSA Exchange Programme, University of Rennes 1, Rennes, France 2006 Pretoria, South Africa ICS-UNIDO Programme-2010. He has more than 120 research publications in journal of high repute with citation of >1000 and H-Index-17. He has given more than 25 invited lectures in different universities and institutes. He has Supervised 17 Ph. D. Students, with 9 Ph.D. students currently working with him.

First "Excellence in Carbohydrate Research" award - 2010



Prof. T. Pathak is receiving the First "Excellence in Carbohydrate Research" award from the M/s. Sunita Hydrocolloids

Prof. Tanmaya Pathak, Department of Chemistry, IIT, Kharagpur has been awarded First Excellence in Carbohydrate Research award by the ACCTI at Silver Jubilee year, the 25th Carbohydrate Conference held at H.P. University, Shimla. The award will be given every year by the Association of Carbohydrate Chemists and

Technologist's (India) and includes a citation and a cash award of Rs. 20,000.00 (Rupees twenty thousand only). The award is sponsored by M/s. Sunita Hydrocolloids Pvt. Ltd., Rajasthan. Prof. Pathak has done Master of Science, Jadavpur University (1982), Doctor of Philosophy, Uppsala University, Sweden (1988), Postdoctoral Research, Southampton and St. Andrews University, UK, (1989 - 1990), University of Karlsruhe, Germany (1997). He started his carrier at Organon (India) Ltd, (1981- 1983) also worked at NCL, Pune (1991-2001) and presently a faculty at IIT, Kharagpur since 2001. His field of specialization is nucleoside modification; acyclonucleoside; backbone-modified oligonucleotides; carbohydrate modification, heterocycles, carbocycles. He was awarded National Scholarship (Certificate of Merit): Ministry of Education and Social welfare, India (1975) and Alexander von Humboldt Fellow (1996-1997) as well as life member of many societies. His visiting assignment as Visiting Professor: Department of Molecular Pharmacochimistry, CNRS/Universite Joseph Fourier-Grenoble 1, France (May-June, 2007 and Jun-July 2008). He has guided more than 12 students for their Ph.D. degrees and has published more than 70 papers in various National and International journal of repute.

First C.G. Merchant Memorial Lecture 2010 on "Development of 'Greener' Methodologies for the Synthesis of Useful Compounds in Health and Industrial Sectors Derived from Polyols, Sugars and Nucleic Acids" by Prof. V.S. Parmar



Prof. V.S. Parmar, Delhi University is receiving the memento from Mr. Dhuldhoya of Lucid Group after delivering the First C.G. Merchant Memorial Lecture at Shimla Conference.

Prof. V.S. Parmar, Chemistry Department, Delhi University gave the First C.G. Merchant memorial invited lecture in Silver Jubilee year at the 25th Carbohydrate Conference held at H.P. University, Shimla. An honorarium of Rs. 10000.00 is given to the speaker along with the traveling allowance.

The award is sponsored by Lucid Hydrocolloids, Mumbai.

His area of research is Synthetic Organic Chemistry, Biocatalysis, Nucleic Acid Chemistry, Polymer Science, Green Chemistry, Enzymology, Nanotechnology, Materials Science and Chemistry of Natural Products): Chemo-enzymatic Selective synthesis of polymeric nanomaterials, and medicinal, agricultural and industrial compounds employing microbial and mammalian lipases and oxidases. Synthesis and identification of biologically active Natural Products and their analogs, in particular heterocyclic compounds containing nitrogen and oxygen. He has more than 100 research paper to his credits which are published in National/International of repute. He has traveled worldwide for his research interest and delivered many invited & plenary lectures. He has received Biotechnology Overseas Associateship of the Department of Biotechnology (DBT, India) in 1996 to work at Harvard University (Cambridge, USA) in the field of 'enzyme inhibitors'. Fogarty International Centre Fellowship Award of NIH (USA) in 1991 to visit National Cancer Institute (NIH), Bethesda (Maryland, USA). He is life member of many societies and has convened/ organized many National/International Conferences.

3rd Dr. H.C. Srivastava memorial lecture 2010 on "An introduction of ICAV (International Consortium on Anti-Virals) and ICAV-India" by Dr. Rajan Shah

Every Year Dr. H. C. Srivastava memorial lecture was given by the eminent Carbohydrate scientist and the speaker is honoured with medal and a cash award of Rs. 10,000.00 by the Association. The 3rd Dr. H.C. Srivastava memorial lecture is given by Dr. Rajan Shah, (Late Dr. H.C. Srivastava's Ph.D. student) in Silver Jubilee year at the 25th Carbohydrate Conference held at H.P. University, Shimla, Nov. 11-13, 2010. Dr. Rajan Shah has divided his career as a medicinal chemist between academia and the biotechnology industry. He graduated (1976) with a Doctorate in Chemistry from Atira, Gujarat University under the supervision of Dr. H.C. Srivastava. After post Ph.D. (1976-78 in applied chemistry at Purdue University, USA with Dr. Roy L. Whistler, he was appointed as R & D Officer in Maize Products, India (1978-82). From 1982-1992, Dr. Shah worked with world renowned Biophysicist Dr. Jeremy Carver exploring three dimension interaction of N-linked carbohydrate with proteins at University of Toronto, Canada. Dr. Shah became Director of Carbohydrate Laboratory at University of Toronto where he subsequently worked upto 2000 as an Asstt. Professor (cross appointment) in the field of Carbohydrate, Department of Medical Genetics, University of Toronto. Dr. Shah was also a visiting scientist at the Harvard Medical Research Center in 2004. As always interested in the applied aspects of Chemistry to Industrial Biotechnology,



Dr. Rajan Shah is receiving the medal & Cash Award from Dr. Naveen Khare, Secretary, ACCTI after delivering the Dr. H.C. Srivastava memorial lecture at Shimla Conference.

Dr. Shah has worked with variety of biotechnology and pharmaceutical companies. Dr. Shah is currently Director of Applied Chemistry for the International Consortium on Anti-Virals (ICAV) and advisor to Dr. Michel Chretienon International Scientific Affairs for ICAV network. He has received many awards both academic and applied for his work in the field of Carbohydrate & Applied Chemistry.

MINUTES OF THE ANNUAL GENERAL BODY MEETING-2010

The Annual General Body meeting of the Association of Carbohydrate Chemists and Technologists (India) was organized by the Department of Chemistry, H.P. University, Shimla on Nov. 11, 2010. Forty three members of the Association attended the meeting along with the participants and guests attending the conference.

President, Prof. H.C. Trivedi gave the introductory speech while Dr. Naveen Khare, Secretary of the ACCT(I), then read out the minutes of the previous AGB meeting held during the XXIV Carbohydrate Conference which was organized by the Lachoo Memorial College of Science & Technology, Jodhpur on 7th Dec. 2009 in the auditorium of Hotel Shree Ram International. The minutes were accepted unanimously as proposed by Dr. B.R. Sharma and seconded by Mr. N.C. Dhuldhoya.

Dr. Naveen Khare then described the previous years' activities of the Association and the agenda finalized by the EC members. The meeting of the Executive Committee members was held on Nov. 10, 2010 in the evening where the EC members exchanged their views for the betterment of the activities of the Association.

In absence of the treasurer of the Association, Naveen Khare presented the audited 'Statement of Accounts' of the ACCT(I). After brief discussion, the 'Statement of Accounts' was accepted by the members. It was proposed by Dr. P.P. Kundu and seconded by Dr. Vineet Kumar. Dr. Naveen Khare, Hon. Editor of the Carbohydrate News Letter (CNL), then placed the 'Statement of Accounts' of CNL (Issue - 11) which was accepted unanimously,

proposed by Mr. B. Joshi and seconded by Dr. Vasudev Singh. The CNL is currently published once a year on 'no loss no gain' basis. The publication of the CNL is partially sponsored by the ACCT(I) and also from the earnings from the advertisements. The members also requested the industrial houses to come forward to sustain the CNL.

As proposed in the EC meeting yesterday, to raise the cash award of young scientist awardees by ACCTI from Rs. 1000 to Rs. 2500, the members unanimously accepted the same. It is proposed by Dr. Vineet Kumar and seconded by Dr. R.P. Tripathi. It was also proposed by the EC members to induct two students' members in the EC. The members of ACCTI discussed at length and accepted with some modification that these two students should have two years research experience before they are nominated to EC. This is proposed by Prof. V.S. Parmar and seconded by Dr. Vasudev Singh.

A new award was proposed in the age group of 36 to 45 years of Rs. 10000.00 in the memory of Dr. H.C. Srivastava which will be sponsored by Local Organising Committee of the annual forthcoming Carbohydrate Conferences. A committee is formed which will look after framing the guidelines for this award. The members of the committee are Drs. V.S. Parmar, B. Joshi, K.P.R. Kartha, R.P. Tripathi and Ashok Prasad. It is proposed by Dr. V.S. Parmar and seconded by Mr. B. Joshi.

Dr. Asish K. Sen then described the status of the International Carbohydrate Conference. The Members discussed about the successful hosting of International Carbohydrate Symposium (ICS) in 2014. Dr. A. K. Sen was

also requested to look after the Satellite symposium for ICS 2014 which he agreed to work vigorously. Mr. Dhuldhoya was given the responsibility to contact the individuals from Industries and update the members in next AGBM so that fund raising for ICS can be evaluated.

It was also finalized by the members that the venue of next XXVI Carbohydrate Conference (CARBO XXVI) which would be at Indian Institute of Chemical Biology, Kolkata in November under the dynamic leadership of Dr. Asish K. Sen. Members also discussed the venue for XXVII Carbohydrate Conference for 2012 which may be at CFTRI, Mysore after discussion with Dr. Vasudev Singh. It was decided that the concerned Institutions should attend the next meeting with definite proposals, based on the merit of which the venue for the forthcoming meeting would be finalized.

The general body of the association congratulated Drs. Asish K. Sen, R.P. Tripathi and Tanmay Pathak for receiving the Life Time Achievement Award, first eTCR award and

first Excellence in Carbohydrate Research award, respectively. The GB also thanked Dr. Rajan Shah and Prof V.S. Parmar for giving the third Dr. H.C. Srivastava memorial lecture and first Mr. C.G. Merchant memorial lecture, respectively. The eTCR award, Excellence in Carbohydrate Research award and Mr. C.G. Merchant memorial lecture was started to commemorate the silver jubilee year (2010) of the Association.

The issue of USD 250.00 for foreign national Life Membership fee for the Association with the provision of registration fee waiver in Carbohydrate Conferences, would be hosted on the ACCTI website.

Since the present executive committee of the Association had already completed two terms, the President then initiated the process of for the election of the new executive committee. The house then selected the following executive members for the term 2010-2011 after elaborate discussion. (Please see Page 15).

It was also decided that the new Executive Committee would take over the charge with immediate effect. The meeting lasted for nearly two hours and was concluded with a vote of thanks to the chair by the Naveen Khare.

Naveen Khare (Secretary, ACCTI)

Organizing Secretary Report on CARBO 25

PREAMBLE

Association of Carbohydrate Chemists and Technologists, India (ACCTI) and Department of Chemistry, Himachal Pradesh University jointly organized the ACCTI's Silver Jubilee Conference CARBO XXV, from November 11-13, 2010.

Carbohydrates are the most important natural products in human life. Not only these serve the basic requirements of food, clothing and shelter; their use as therapeutic agents in the native or the modified forms and in various industrial applications like gels, gums and thickeners is rapidly expanding. In the contemporary times, the depletion of the petroleum feedstock and their cost-prohibitive nature has forced the researchers, technologists and planners to look for the alternate resources of materials, and carbohydrates are the most natural candidates as the alternate materials as carbohydrates are not only the most abundantly available materials of renewable nature these are also attractive to the researchers for the ease and variety of modification. Hence, carbohydrate chemistry and technology are rapidly expanding frontline research activities.

ABOUT THE ORGANIZERS

Himachal Pradesh University, Shimla, founded in 1970, is located at Summer Hill, the West Shimla. Department of Chemistry is one of the prestigious departments of the University owing to its enviable track record of outstanding academic and research accomplishments. Shimla, known as the Queen of Hill Stations, is not only the all season international tourist place famous for its green environs. Shimla is also a renowned education hub. The world famous convents, Himachal Pradesh University and its affiliated colleges, prestigious institutes like Indian Institute of Advanced Studies, Central Potato Research Institute, Himalayan Forest Research Institute, etc., are located at Shimla. ACCTI, a scientific body consisting of academicians, scientists, technologists and industrialists is actively engaged in carbohydrate research and related

areas. ACCTI in collaboration with research institutes, universities and industries, has been organizing 'Carbohydrate Conference', CARBO, since 1984. The work presented in CARBO is published in a book form and ACCTI also publishes Carbohydrate News Letter (CNL) and hosts a Website www.accti.in. Further, in order to promote and utilize the latest research and developments related to the various scientific and technological aspects of carbohydrates, ACCTI publishes an international scientific peer-reviewed quarterly e-journal in the name of "Trends in Carbohydrate Research (TCR)" (www.trendscarbo.com) since January 2009.

ABOUT CARBO XXV

CARBO XXV was the silver jubilee event of ACCTI and it was celebrated in a grand manner. It provided a great platform for the University-industry interactions as many distinguished academics, scientists and technologists, who work in diverse areas of carbohydrate research and technology, many industrialists and entrepreneurs, who are engaged in the production of industrial gums and food hydrocolloids, participated in this event. Distinguished professors from Universities and IITs, scientists from Institutes like CSIR institutes, etc., and industrial representatives from Lucid Colloids, Hindustan Gums, etc., participated and deliver talks in CARBO XXV. The three days event had 08 technical posters, 06 special talks, 17 invited talks and 02 plenary lectures. The topics covered are enlisted as: Biomass and Bio-fuels, Bio-Materials, Bionanocomposites, Biosurfactants, Biologically Active Carbohydrates, Carbohydrates in medicines, Cellulose Chemistry, Food Hydrocolloids, Green Composites, High Performance Polysaccharides; Hydrogels; Industrially Important Gums/Polysaccharides; Polysaccharides as Drug Delivery Devices; Polysaccharides as Platform Molecules; Sourcing of Indian Natural Wealth for Biomedical and Industrial uses; and Wood and Wood-Polymer Composites, Techniques of Carbohydrates Modification and Characterization.

RESPONSE FROM ACADEMIA AND INDUSTRY

CARBO XXV got huge response both from the academia and industry. The response was reflected both in the form of participation and sponsorship. The former will be discussed a little later, while the latter was reflected in the generous funding from the Government Agencies (Department of Science and Technology, Council for Scientific and Industrial Research, Defence Research and Development Organization), Public Sector Undertaking like Oil and Natural Gas Commission, Indian Oil Corporation and Himachal Pradesh University, Shimla. The industrial sponsors were mainly from the carbohydrate industries such as Lucid Colloids, Encore Natural Polymers, Sunita MineChem, Hindustan Gums, etc. Companies like Metrohm India, Anton Paar India, Bioman India, and local chemical and instrument suppliers also supported the conference. Sponsorship or support to this event came from the current relevance of the carbohydrate chemistry. Apart from the conventional areas of significance carbohydrates, including in industries, the main attraction from biomass conversion and its relevance to the oil sector were the main force behind the attraction from all quarters. The polysaccharides or simple carbohydrates are used as platform molecules for the generation of bio-ethanol. The polysaccharides-based gels are useful in the recovery, enrichment or purification of various products. These are also immensely useful in claiming the depleted oil wells. The recent thrust on the synthesis of biosurfactants from carbohydrates is also a topic of interest to the oil sector. The financial support to CARBO XXV was supplemented by the participation of representatives from the various funding agencies of the government and industries. The latter representation was largely at very senior level of the R&D management.

The response from the academia and different research and development organization is reflected from the fact that many of the top researchers in the field of carbohydrate chemistry and technology participated in this event as is self-revealed from the detailed report of the technical sessions. Apart from those who delivered special, plenary and invited talks and made oral and poster presentations, there were a large number of distinguished scientists and academics, apart from the faculty of the Department of Chemistry and ACCTI office bearers. Participants who participated in the event. To name a few, Dr. P.L. Soni, Editor-in-Chief, Trends in Carbohydrate Research and Advisor ACCTI, Professor H.C. Trivedi, former Vice-Chancellor, Bhavnagar University, Gujarat; Dr. U.C. Sarma, Director, CCRI, Kerala; Dr. Hasi Das, Senior Scientist, IGIB, Delhi; Dr. H. Das, GGSIP University, Delhi; Professor Rekha Singhal, and Professor Laxmi, ICT, Mumbai participated in deliberations, chaired technical sessions and thus enriched the proceedings of the conference. Many of these contributed by Chairing the technical sessions.

ACADEMIC PROGRAMMES AND TECHNICAL SESSIONS

OPENING SESSION (NOVEMBER 11, 2010, 100 HOURS ONWARDS)

The conference was inaugurated by Professor G.D. Yadav, Chief Guest, after the lighting of the lamp and the award presentation ceremony. Professor G.D. Yadav is Director, Institute of Chemical Technology. He delivered the key note address of the Conference. Vote of thanks was presented by Professor Ghanshyam S Chauhan, Organizing Secretary of the Conference. The opening session came to

an end at 1140 hours.

SPECIAL TECHNICAL SESSION (NOVEMBER 11, 2010, BEFORE LUNCH)

First Technical Session consisted of two high profile talks of about one hour each. These were titled as Special Lecture I and Special Lecture II. Professor H.C. Srivastava Memorial Lecture: An introduction of ICAV (International Consortium on Anti-Virals) and ICAV-India was delivered by Dr. Rajan Shah (Canada/USA). That was followed by an illustrative talk by Professor V.S. Parmar, University of Delhi. He spoke on Sh. C.S. Merchant Memorial Lecture: Development of "Greener" Methodologies for the Synthesis of Useful Compounds in Health and Industrial Sectors Derived from Polyols, Sugars and Nucleic Acids". This session ended at 1330 hours.

TECHNICAL SESSION (NOVEMBER 11, 2010, POST LUNCH)

First Technical Session was on NEW MATERIALS. In this session one plenary, one invited and two oral presentations were planned. Professor C.P. Rao, IIT-B, who was to speak on 'Glycoconjugates as Novel Molecular Entities in Lab and in Life', could not make it to deliver the Plenary Talk due to some other professional commitments. Dr. R.P. Tripathi, CDRI, Lucknow, delivered his talk on 'Application of Carbohydrate Scaffolds in Synthesis of New Generation of Anti-diabetic Agents' while in two oral presentations Dr. Rajesh Kumar, BHU, delivered his talk on 'Synthesis and Characterization of Five-Arms Star Polymer of N-Vinyl Pyrrolidone through ATRP Based on Glucose' and Dr. Kalpana Chauhan, Shoolini University, Solan, spoke on 'Synthesis and Characterization of Guar Gum-Beads as Potential Matrix for Colon Drug Delivery'.

TECHNICAL SESSION (NOVEMBER 11, 2010, AFTER TEA)

Second technical session was entitled NEW SYNTHETIC ROUTES and the session was very long. Three invited talks were delivered and three oral presentations were made. Professor Ashok Prasad, Delhi University, delivered his talk on 'Efficient Routes to Sugar-modified Nucleosides and Non-ionic Nucleoside Dimers of Therapeutic Importance', Professor Sunil Kumar, Delhi University, delivered his talk on 'Novel Bio-catalytic Methods for the Synthesis of Biocompatible Polymeric/ Dendritic Architectures', and Dr. V.K. Tiwari, BHU, spoke on 'Highly facile Chemoenzymatic Synthesis of GD3 Oligosaccharides and Other Disialyl Glycans Containing Natural and Non-natural Sialic Acids'. Dr. Neha Mahajan, NIPER, Mohali, in her oral presentation spoke on 'Solvent-free Click Chemistry Using Carbohydrate-based Substrates', while Mahesh U. Chhatbar's, CSMCRI, Bhavnagar, Gujarat, presentation was on 'Chemical modification of the polysaccharides of *Cystoseira indica* by grafting with polymerizable substrates' and the final speaker of the session was S.K. Pande, CDRI, Lucknow, spoke on 'Regioselective [3+2] cycloaddition of chalcones with a sugar azide: easy access to 1-(5-deoxy-D-xylofuranos-5-yl)-4,5-disubstituted-1H-1,2,3-triazoles'.

SECOND SPECIAL TECHNICAL SESSION (NOVEMBER 12, 2010, BEFORE TEA)

In this Special Session there were some special talks of the invitees who were awarded ACCTI awards for Life Time Achievement or those who were awarded ACTTI's Excellence Award in the opening ceremony of CARBO XXV. Professor B.P. Chatterjee, one of the Ex-President of ACCTI and Life Time Achievement Awardee who was to speak on 'Sweet Talk on Glycobiology - Implication in Health and Disease' could not make it since he met a serious accident

while en route to Shimla. Dr. Ram Vishwakarma, Director, IIM, Jammu, a high profile speaker of CARBO XXV, delivered his talk on 'Synthesis and Chemical biology of Glycosylphosphatidylinositol (GPI) membrane anchors'. Dr. Ashish Sen, IICB, Kolkotta, who was conferred ACCT(I) Life Time Achievement Award-2010 was the second speaker and he delivered his talk 'Structure and Synthesis of Biologically Important Carbohydrates with Special Reference to Lipopolysaccharides from *Vibrio cholerae*'. Professor Tanmay Pathak, IIT-Kharagpur who was conferred Excellence in Carbohydrate Research Award delivered his talk entitled 'An overview of Our Research on Modified Carbohydrates and Nucleosides'. Professor Siva Kumar Nadimpalli, Central University of Hyderabad delivered the invited talk on 'Glycomics of the Lysosomal Enzyme Sorting Machinery - Evolutionary Aspects'.

TECHNICAL SESSION (NOVEMBER 12, 2010, AFTER TEA)

This Session was entitled **ENVIRONMENT, PLATFORM MOLECULES AND BIOFUELS** was an important hallmark of the Conference as it was based on biomass conversion or its utilization for various technologies including environment management.. Dr. A.J. Varma, Principal Scientist, NCL, Pune, delivered his plenary talk on 'A Carbohydrate Economy: Polymers, Chemicals and Fuels from Agricultural Biomass'. Dr. B. Shrikanth, Consultant, Pune, delivered his talk on 'Ethanol: A Prospective Carbohydrate-Based Bio-Energy Industry for Renewable Sustainable Auto Fuel'. Another speaker Dr. R. K. Jain, CPPRI, Saharanpur, who was to speak on 'Bagasse Pith, a Waste Carbohydrate Rich Biomass from Paper/Sugar Industry - As a Potential Source of Biofuels', could not make it at the last moment. Professor Anuradha Mishra, Sharda University, Greater Noida who presented her talk 'Aging Free Starch As Flocculent' and Dr. Prem Lata, SVNIT, Surat, Gujarat Emerging Usage of Seed Polysaccharides for the Decolorization of Textile Dye Solution' and Ms. Vanshi Uniyal, FRI, who presented her talk 'Effect of Decrystallization on Cellulose in Sodium Hydroxide/Thiourea Systems,' made three oral presentations in this session.

TECHNICAL SESSION (NOVEMBER 12, 2010, AFTER LUNCH)

This session was based on **NANOMATERIALS, SELF-ASSEMBLY AND GELS**. Dr. M.V. Badiger, Senior Scientist, NCL, Pune, delivered his talk on Hydrophobically Modified Polymers [HMPs] from Polysaccharides. Professor P.P. Kundu, Kolkata University, delivered his talk on 'Self-assembled Nanoparticles of Chitosan and p-DNA Gene Therapy', while another young invited speaker Dr. Mohan Das, Madras University, Chennai, delivered his talk on 'Molecular Self-Assemblies and Sugar-Based Hybrid Nanomaterials'. There were three oral presentations as Dr. Anupama Kaushik, Panjab University, delivered her talk on 'A Novel Polymeric Biomaterial Based on Polyacrylic Acid Grafted Tamarind Kernel Polysaccharide - Silica Nano Hydrogel', and Dr. A.N. Jyoti, CTCRI, topic was 'Thermal Behaviour of Thermoplastic Starch Cellulose Nanofiber Nanocomposites Potential of Starch-Based Bionanocomposites for Industrial, Agriculture and Pharmaceutical Applications' and Dr. Anita Das, CCRI, Kalvoor, Allepey, Kerala, delivered her talk on 'Microcrystalline and Nanocellulose from Diseased Coconut Wood'.

POSTER SESSION

In the poster session fifty seven posters were presented by the participants. The quality of the posters was of high quality and wide spectrum areas were covered. The quality

and the range of topics covered in the posters were appreciated by all. Awards were given for the best posters.

TECHNICAL SESSION (NOVEMBER 13, 2010, BEFORE TEA)

This session was titled **GLYCOBIOLOGY**. Dr. Pawan Kumar delivered his talk entitled 'Carbohydrate Modifications Triggering Emergence of Cutting Edge Nucleic Acid Based Technologies' while Dr. Balaram Mukhopadhyay who was to speak on 'Synthetic Carbohydrate Chemistry for Biology' could not make it to the Conference. Dr. Sagarika Biswas, IIGB, Delhi, delivered her oral presentation on 'New biomarker identification in the synovial fluid of rheumatoid arthritis by proteomic and Ms. Deepti Lele, NII, New Delhi, spoke on 'Investigating the role of carbohydrates on structure and function of antimicrobial glycopeptides'.

TECHNICAL SESSION (NOVEMBER 13, 2010, BEFORE TEA)

The last technical session was on **FOOD TECHNOLOGY**. In this technical session Dr. Vasudev Singh, Senior Scientist, CFTRI, Mysore delivered the invited talk on 'Rice: Versatile Food Grain', and Dr. Vineet Kumar, ICFRE, Dehradun, delivered his talk on 'Structure-activity Relationships of Hederagenin Saponins vis-a-vis Sapogenin'. The talks were followed by oral presentation by Lyned Lasrado, CFTRI, Mysore, on 'In vitro Fermentation of Xylo-oligosaccharides by *Lactobacillus* and *Bifidobacterium* Strains', and Dr. Ritu Mahajan, entitled 'An Unusual Trisaccharide From *Marsdenia roylei* (Family: Asclepiadaceae)'.

VALEDICTORY SESSION (NOVEMBER 13, 2010, 1315-1415)

Valedictory Session of CARBO XXV was organized after the culmination of marathon eight technical sessions. Each session was designed with specialty inputs and had separate themes in each session. Thus the spectrum of the talks/oral presentations/posters displayed was very wide. Apart from the diversity of the topics covered the participants Each talk in each session was followed by engrossing discussion. Professor S.K. Lomesh, Registrar, Himachal Pradesh University and Professor of Chemistry, was the Chief Guest on the occasion. The detailed discussions were held on proceedings of the three days as many participants including young participants sharing their views and experiences of CARBO XXV.

SUMMARY

CARBO XXV was organized in a grand manner. It had all the components of a high profile and productive academic, scientific and technological event. The range of the topic covered, academic and high research profile of the participants and the wide range of their Institutes and Universities represented was the hallmark of the event. Apart from the Key Note address and the inaugural session participants were enriched with high profile talks in eight technical sessions and on poster session. Each session was designed with specialty inputs and had separate themes in each session. Thus the spectrum of the talks/oral presentations/posters displayed was very wide. Apart from the diversity of the topics covered the participants each session was followed by engrossing discussion.

Acknowledgement: Organizing Committee of CARBO XXV acknowledges the support financial, academic or in other form from all agencies, industries, institutions and persons named above, and also whose name could not figure in the text.

(Ghanshyam S. Chauhan)

National Workshop on “Carbohydrates based Chemical industry”, held at National Chemical Laboratory, Pune from August 17-18, 2011



A two-day Workshop entitled “Carbohydrates based Chemical industry” was Inaugurated on Aug 17, 2011 at NCL, Pune.

The National Chemical Laboratory, (CSIR-NCL) Pune, is celebrating the International Year of Chemistry in an impressive manner, by holding several lecture series by eminent scientists. In one such initiative, it was decided to hold a Conference on a modern scientific topic in the official language Hindi.

Accordingly, a two-day Workshop entitled “Carbohydrates based Chemical industry” was organized from Aug 17-18, 2011. A galaxy of experts in Carbohydrate Chemistry from across the country, from scientific institutions and industrial research organizations all over Pune as well as from across India. All lectures were presented in Hindi.

The choice of the conference topic was based on the following rationale: World-wide, it is increasingly being realized that waste agricultural residues can provide the raw materials for production of numerous industrial and consumer products such as commodity and specialty chemicals, fuels, paints, detergents, biodegradable polymers, textile fibers, etc. Research seeks to better understand properties of agricultural materials related to

their quality, value, and processing characteristics and to develop innovative products and processes for conversion of agricultural materials to non-food products. The prices of waste agricultural residues as organic materials containing about 70 % carbohydrates, produced in millions of tons quantities, are not subject to price fluctuations, and this is another major advantage of using this as a feedstock for value-added products, and justifies research and development efforts. Other major attractions of this feedstock are that it can provide more value for farm products and create employment opportunities in the rural sector. Indeed, for several countries which have a large agricultural base but do not have significant petroleum resources, such materials are the only resources available for developing their chemical industries. A petrochemical dependent India must evolve strategies to efficiently utilize agricultural residues for its future requirement of chemicals, fuels, and polymers.

Thus, it is clear that in the coming decades, the world is headed for a carbohydrate based economy. In order to deliberate on these topics, the National Chemical Laboratory has organized a two-day Workshop in Hindi, in order to celebrate the International Year of Chemistry.

Topics related to synthesis of chemicals and specialty molecules using glucose as a platform chemical, cellulose based polymers, lignin and hemicelluloses derived chemicals, and carbohydrate based researches in general were the main topics of discussion in this Workshop.

Speakers from CSIR-NCL, Delhi University, Banaras Hindu University, Himachal Pradesh University, Pune University, Agharkar Research Institute, Tata Chemicals Research Centre, and CSIR-CDRI deliberated on their diverse contributions to carbohydrate science. A firm conclusion could be drawn that excellent expertise exists in the country in this important field that will help the country in the coming years.

Dr. K.R. Bhattacharya's Book on Rice Quality released

A book written by Dr. K.R. Bhattacharya (former Deputy Director and Head of the Department of Grain Science and Technology) on “Rice Quality, a guide to rice properties and analysis” published by Woodhead Publishing Ltd., was released by Director Dr. G. Venkateswara Rao on 11th August 2011, at Central Food Technological Research Institute, Mysore.

Initially, Sri. V.M. Pratape, Senior Principal Scientist of the Department, welcomed the gathering. Dr. Vasudeva Singh, Head of the Department of Grain Science and Technology introduced the author of the book (Dr. K.R. Bhattacharya) by informing his achievements in the field of rice science, starting from the year 1960 and till his retirement in the year 1989. He also briefly touched upon the salient achievements of Director Dr. G.Venkateswara Rao in the field of Flour Milling Baking and Confectionary Technology. Dr. C. M. Sowbhagya, Retired Scientist, informed about her association and reminiscences with Dr. K.R. Bhattacharya



Dr. K.R. Bhattacharya, Dr. G. Venkateswara Rao & Dr. Vasudev Singh on the release of the book “Rice Quality, a guide to rice properties and analysis”

during her research career at CFTRI, Mysore.

Dr. K.R. Bhattacharya informed his experiences in rice field, genesis of writing this book consisting of 600 pages, and gave a brief introduction to thirteen chapters of the book. The chapters were 1. An Introduction to rice: its qualities and mysteries 2. Physical properties of rice 3. Milling quality of rice 4. Degree of milling of rice and its effect 5. Ageing of rice 6. Cooking quality of rice 7. Eating quality of rice 8. Effect of parboiling on rice quality 9. Product-making quality of rice 10. Speciality rices 11. Nutritional quality of rice 12. Rice breeding for desirable quality 13. Analysis of rice quality. Finally, he stressed on writing last chapter where he focused on analysis of rice samples for their physicochemical properties.

Dr. G. Venkateswara Rao, Director, released the book on Rice quality authored by Dr. K.R. Bhattacharya and appreciated the author for presenting the story of rice with all the scientific information generated from all over the world and in particular from CSIR-CFTRI. He opined that the book will be a great source of scientific information for the researchers and students engaged in the R and D area of rice. As a mark of appreciation Director presented the author with a Shawl.

Finally, the programme was wrapped up by Sri. A. Srinivas, Principal Scientist of the Department. The function was attended by existing and retired staff of GST Department, and invited Senior Colleagues from CFTRI.

ASSOCIATION OF CARBOHYDRATE CHEMISTS & TECHNOLOGISTS (India) EXECUTIVE COMMITTEE MEMBERS (2010-2011)

The new executive committee members for the years 2010 & 2011 were elected by the General Body in the GB meeting of the ACCT(I) held on 11th Nov. 2010 at the XXV Carbohydrate Symposium (H.P. University, Shimla).

Advisor:	Dr. P. L. Soni	Science Advisor, Carbohydrate Polymer Natural Product and Non-wood Produce Utilization Forest Research Institute, Dehra Dun - 248006. E-Mail: soniplin@yahoo.co.in Ph.: 0135-2773736	Mr. N. C. Dhuldhoya	Manager (R&D), 468, Chadha Mansion, 4 th Floor, S. V. P. Road, Opp. M. V. High School, Mumbai - 400004 E-mail: ndhuldhoya@lucidgroup.com Mobile: 9821041534 Tel: 91-22-4158059 Extn. 208
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Vice President: (Industry)	Mr. Bharat Joshi	Ex. Director, Encore Natural Polymers (P) Ltd. 227/233 GIDC Industrial estate, Naroda, Ahmedabad - 382 330. India E-mail: bjoshi@encoregroup.net, brjoshi00@yahoo.com Ph: +91-79-22822548-22822559, handy: +91-9898943399.	Dr. Vasudeva Singh	Head, Department of Grain Science and Technology Central Food Technological Research Institute Mysore - 570 020. E-mail: singhva2003@yahoo.co.in. Ph: 0821 - 2510843 (O), 0821 - 2510155 (R)
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HONOUR/AWARD

Dr. Vinod K. Tiwari, Assistant Professor of Department of Organic Chemistry, BHU, Varanasi has been awarded three prestigious awards this year. Firstly UPCST Young Scientist Award by Ministry of Science and Technology Govt of Uttar Pradesh for his outstanding achievements in chemical sciences on 30th Jan, 2011. He had bagged second Prestigious —Dr. Arvind Kumar Memorial Award of Indian Council of Chemists in the 29th Annual Conference held at Punjab University, Chandigarh on 19th - 21st December 2010 for his memorable & significant contribution in the field of chemistry. He received yet another award, NESI Medal on 27th December 2010.

Dr Anil Kumar Gupta, Associate Professor, DAV College, Kanpur, had been awarded UGC travel grant to attend XVI European Carbohydrate Symposium, Sorrento (Naples) Italy and presented a paper entitled "A Herbal Oil Composition Controlling blood Sugar Without Any Risk of Hypoglycemia" on 5th of July 2011. The National patent is already filed by National Research Development Corporation of India, New Delhi in favour of this herbal oil Composition. His study revealed the mystery behind how blood glucose is chemically consumed by insulin.

Prof. B. P. Chatterjee, Emeritus Professor, NASI Platinum Jubilee Fellow, W.B.U.T., Saltlake, Kolkata, participated XXI International Symposium on Glycocojugates held in the University of Vienna, Austria from Aug 21 -26, 2011 to chair in a technical session on 23 Aug, 2011 and to display a poster of the Abstract on 25 Aug, 2011. He was also felicitated by the Education Department of W.B. Pradesh Congress Committee during commemoration of Teacher's Day on 5th September by "Sikshak Smarak Samman".

Y.S. Savitha is a Senior Research Fellow (CSIR) with Dr. Vasudeva Singh, Department of Grain Science and Technology, CFTRI, Mysore, has attended the Institute of Food Technologists Annual Meeting (IFT-11) which was held at Ernest N. Morial Convention Centre New Orleans, USA during 11-14th June, 2011 and presented a poster entitled 'Low carbohydrate digestible noodles from brown rice - legume based and studies on their nutritional and functional properties'. The IFT Food Expo brings together buyers and sellers from all corners of the food science and technology world. In addition, more than 1,000 exhibitors and 500 ingredient companies were present to show their latest products and innovations on the expo floor. She is hugely benefited by attending the said conference and convinced that the exposure at this conference certainly helped to analyze present work and mould future research work of her Ph.D. program.

Dr. G. Muralikrishna, F.A.F.S.T(I), M.N.A.Sc, Senior Principal Scientist, Department of Biochemistry & Nutrition, CFTRI, Mysore was bestowed with best Group - IV Scientist annual award for the year 2009-2010 by CFTRI on September 26, 2010. He also gave the Inaugural lecture entitled "Finger millet malt esterases and their role in modulation of the properties of non-starch polysaccharides" at National seminar on "New Frontiers In Industrial Biotechnology" during July15-16, 2011 which was sponsored by AICTE, New Delhi and organized by Department of Biotechnology, Bapatla Engineering College, Andhra Pradesh.

Dr. Vasudev Singh, Head Department of Grain Science and Technology, CFTRI, Mysore visited France from April 14-20, 2011 to attend International Conferences and presented a poster entitled "Preparation and Evaluation of a health

beverage from rice bran" along with A. Jayadeep and S.Z. Ali. He also attended the Conference at Dijon, France on 14th and 15th April, which was a pre-symposium Workshop on Food Safety. Several Scientists have interacted with him on the subject, specially the benefits of defatted rice bran, from which protein is extracted and a beverage is prepared and the authenticity of the beverage base was confirmed by animal experiments where Protein Efficiency Ratio was found to be 3.4 which were almost equivalent to that skim milk powder. In another Conference which was held at Nantes. This place was around 850 KM away from Dijon via Paris. This Conference was 6th International CIGR Technical Symposium on "Towards a Sustainable Food Chain" Food Process, Bioprocessing and Food Quality Management, conducted from April 18-20, 2011. In this Conference, he chaired Technical Session 1 and also delivered an invited lecture on "Preparation, nutritional composition, functional properties and anti-oxidant activity of multigrain composite mixes". In different technical sessions, he could interact with the presenters with constructive discussions.

Prof. H.C.Trivedi has been offered the distinguished Visiting Professorship for doing collaborative research work in the area of Polymer Chemistry at The Technical Institute of Physics and Chemistry, Chinese Academy of Sciences, Beijing, China under the Chinese Academy of Sciences Visiting Professorship for Senior International Scientists Programme for the year 2011-12. He has also been nominated as the Honorary Chairman of the Experts Advisory Committee (EAC) on the Entrepreneurship in Education for a period of three years (4th March 2011 to 3rd March 2014) by the Department of Science and Technology, Ministry of Science & Technology, India.

ACCTI YOUNG SCIENTIST AWARDS, 2010

To encourage young students, the Association of Carbohydrate Chemists & Technologists (India) gives cash award of Rs. 2500.00 (Rupees two thousand and five hundred only) and a citation for the best oral/poster presentation at the 'Carbohydrate Conference' every year. Only research scholars, research associates etc. (below the age of 30) are eligible for this award. At the XXV Carbohydrate Conference held at H.P. University, Shimla from Nov. 11-13, 2010, paper entitled "In vitro fermentation of xylo oligosaccharides by *Lactobacillus* and *Bitido* bacterium" by Lyned Lasrado and G. Muralikrishna of CFTRI, Mysore, was judged as best oral presentation. The paper entitled "Diabetes results in decreased 'E' disaccharide unit of Chondroitin sulfate/Dermatan sulfate in rat kidney. Effect on building to extracellular Matrix component" by J. Darukeshwara, P.V. Salimath and C.D. Nandini of CFTRI, Mysore, was judged the best poster presentation. We express our heartiest congratulation to Ms. Lyned Lasrado and Mr. J. Darukeshwara.



Lyned Dafny Lasrado is working as a Ph.D. scholar (CSIR-JRF) in the, Department of Biochemistry and Nutrition, Central Food Technological Research Institute, Mysore, under the supervision of Dr. G. Muralikrishna, since September, 2010 on the Ph.D. work on "Study on the utilization of

xylo-oligosaccharides by *Lactobacillus* sp. with an emphasis on the biochemical characterization of a xylanolytic enzyme". She completed B.Sc. (Biotechnology) with distinction from St Aloysius College, affiliated to The University of Mangalore in the year 2007 and M.Sc. (Biotechnology) with distinction from St Aloysius College (Autonomos), affiliated to The University of Mangalore in the year 2009. Now, she is actively engaged in scientific research work related to Carbohydrate and their degrading enzymes. Besides scientific research, she has interest in theatre and likes to interact with different people and also a voracious reader with good collection of books. She aspires to contribute significantly to the field of science.



Darukeshwara Joladarashi is working as Ph. D. Research Scholar (ICMR-SRF) in the Dept. of Biochemistry and Nutrition, Central Food Technological Research Institute, Mysore, under the guidance of Dr. P.V. Salimath, since June 2008 on a Ph. D. degree related work on "Studies on changes in chondroitin sulfate / dermatan sulfate in kidney during diabetes and

modulation by a potent plant material". He has completed B.Sc. (Chemistry, Botany and Zoology) with distinction from Veerashaiva College, Bellary, affiliated to the University of Gulbarga in the year 2002 and M. Sc in (Biochemistry) with first class from dept. of Biochemistry, Gulbarga, affiliated to the University of Gulbarga in the year 2004. Subsequently he joined CFTRI as a Project Assistant and awarded with Indian Council of Medical Research - Senior Research Fellowship in the year 2008. He completed his Ph. D work and results were published in Glycobiology. Besides Scientific research he has very much interested in music and dance and would like to contribute both in the area of Science and music world.

MS. LUCID COLLOIDS LIMITED AWARD- 2010

To encourage research on hydrocolloids, Ms. Lucid Colloids Limited, Mumbai, offers a cash award of Rs. 5000.00

(Rupees five thousand only) and a citation for the best paper presentation on hydrocolloids since 2003. At the XXV Carbohydrate Conference held at H.P. University, Shimla from Nov. 11-13, 2010, a poster entitled "Isolation of Cereal starches and effect of acetylation on their physiochemical properties" by D.K. Yadav, P.E. Patki, G.K. Sharma and A.S. Bana of Defense Food Research Laboratory, Mysore was selected for the award. We express our heartiest congratulation to Mr. Dev Kumar Yadav.



Dev Kumar Yadav presently working as Scientist in Cereals & Pulses Technology Division of Defense Food Research Laboratory (DFRL), Mysore, which is one and only Food Lab of our parent organization, DEFENCE R&D ORGANIZATION (DRDO). The area of my research includes isolation, modification and utilization of various starches from different sources for

value addition to many food products viz. RTS and convenience food for armed forces, extruded food, Puffed products, Chapaties, Parothas, Semolina based many sweet and savory products etc. Submitted a patent on Innovative method to develop a retorted curry concentrate. Developed a shelf stable sweet corn based Dosa batter. He was awarded the best student scientist of the year 2001 and Gold Medalist during graduation (2005) at Ewing Christian College, University of Allahabad, also recipient of Coondo Memorial award and medal for securing highest marks in B.Sc. (Botany and Zoology, 2005). Best Student award in M.Sc. Food Technology (2008) from Center of Food Technology, University of Allahabad and is a International Transactional Analysis Association (ITAA101) Certificate holder. He is also Life Member of Indian Science Congress Association, Life Member of Nutrition Society of India (NIN, Hyderabad), Life Member of ACCT(I), Member of Botanical Society of India, Member of AFST(I) (Association of Food Scientist and Technologist of India)

FOLLOWING ARE THE ABSTRACTS OF YOUNG SCIENTIST AWARDEES AT CARBO XXV

Studies on the physicochemical properties of Isolated and acetylated cereal starches and effect on prepared RTS tomato soup

D. K. Yadav, P. E. Patki, G. K. Sharma, A.S. Bawa

Defence Food Research Laboratory, Siddhartha Nagar, Mysore-570011

The proximate and physicochemical characterization of extracted and isolated wheat, corn and rice starch was attempted. The properties of chemically modified (acetylated) wheat, corn and rice starches have been determined after incorporating acetyl groups (acetylation). Acetylated starches with different degrees of substitution (DS) were synthesized by the reaction of isolated wheat, corn and rice starch with two levels (6% and 8%) of acetic anhydride under alkaline followed by acidic reaction condition. The acetylated wheat, corn and rice starches showed different acetyl (%) and degree of substitution (DS) that may be attributed to their specific granule morphology. The proximate composition of native starches before and after treatment, in terms of percentage ash, crude protein and crude fat was studied.

Acetylated starches showed slightly high amylose content than their native counter parts. The swelling capacity of acetylated starches was found to be significantly higher than native starches. Visco-elastic properties revealed lowering of pasting temperature (Tp), gelatinization temperature (Tg), but slight up-rise in hot paste viscosity (HPV), cold paste viscosity (CPV) and peak viscosity (PV). Present modification enhanced the stability of prepared tomato soup using acetylated corn starch on cold storage at 4°C (for 72 H) as there was a significant increase in water holding capacity or decrease in syneresis (%). The effectiveness of acetylation in reducing retrogradation was more evident from observed values of set back viscosities with RVA than syneresis (%).

Diabetes results in decreased 'E' disaccharide unit of chondroitin sulfate /dermatan sulfate in rat kidney: Effect on binding to extracellular matrix components

J. Darukeshwara, P.V. Salimath and C.D. Nandini

Dept. of Biochemistry and Nutrition, Central Food Technological Research Institute, Mysore-570 020

Chondroitin sulfate (CS) /dermatan sulfate (DS) are a group of sulfated glycosaminoglycans which are characterised by the presence of repeating disaccharide of Glucuronic acid (GlcA) / Iduronic acid (IdoA) 1-3 linked to N-acetyl-D-galactosamine (GalNAc) which can be differentially sulphated¹. They are present in the extracellular matrices and on the surface of many cell types and play an essential role in various biological activities². Kidney has significant amount of CS/DS which is known to play an essential role in kidney morphogenesis³. An attempt was made to explore the structure-function relationship of kidney CS/DS during diabetes using experimentally induced diabetic rat as a model. Total glycosaminoglycans and CS/DS decreased significantly in diabetic rat kidney compared to non-diabetic control.

Disaccharide composition analysis by HPLC showed significant presence of E unit (20%) [Glucuronic acid B1-3 N-acetyl D-galactosamine (4,6-O-Sulfate)] which was significantly reduced in diabetic rat kidney (14%). This was accompanied by decrease in degree of sulfation as well as chondroitin sulfate/heparan sulfate ratio. Semiquantitative PCR to determine mRNA expression levels of various CS/DS biosynthetic enzymes revealed that majority of them showed a decrease during diabetes. These had implications on ligand-binding properties of CS/DS when tested in vitro for binding with important extracellular matrix components such as type IV collagen, laminin and fibronectin. This study provides insight into structure-function relationship of CS/DS in kidney during diabetes.

In vitro fermentation of xylo-oligosaccharides by *Lactobacillus* and *Bifidobacterium* strains

Lyned Lasrado & G.Muralikrishna

Department of Biochemistry & Nutrition, Central Food Technological Research Institute, Mysore-570020,

In humans non-starch polysaccharides such as arabinoxylans and their degradation products i.e xylooligosaccharides are not digested in the small intestine and serve as fermentation substrates for various bacteria, which grow in the large intestine¹. Xylo-oligosaccharides are known to be prebiotic and exert several health benefits to human beings with respect to alleviation of disease symptoms such as atherosclerosis and colon cancer². In order to study the enzymes responsible for the prebiotic potential of xylo-oligosaccharides, defatted, destarched brans of ragi and wheat were subjected to xylanase treatment followed by Charcoal-Celite chromatography to obtain xylo-oligosaccharide mixtures devoid of monosaccharides in 0.6 and 4.2% yields, respectively. The xylo-oligosaccharide

mixtures of ragi and wheat bran consisted of xylobiose, xylotriose, xylopentose and xylohexose as determined by electrospray ionization mass spectrometry (ESI-MS). The above xylo-oligosaccharide mixtures (0.5%) were inoculated with *Lactobacillus brevis* 01 and *Bifidobacterium adolescentis* 236. The aforementioned bacterial strains readily utilized xylooligosaccharides derived both from ragi and wheat bran as indicated by (a) increase in turbidity of the culture broth (b) the presence of xylanase, xylosidase and arabinofuranosidase activities. Among the enzymes, xylosidase is the most preponderant followed by xylanase and arabinofuranosidase in *L.brevis* 01 culture filtrates whereas xylanase activity was not detectable in *B.adolescentis* 236.

ACCTI Membership Fee

Application along with subscription fee (only by DD or M.O.) in favour of "Association of Carbohydrate Chemists & Technologists (India)" payable at Dehradun to be sent to Hon. Treasurer, Dr. P.K. Gupta, Chemistry Division, Forest Research Institute, P.O. New Forest, Dehradun-248006, U.A.

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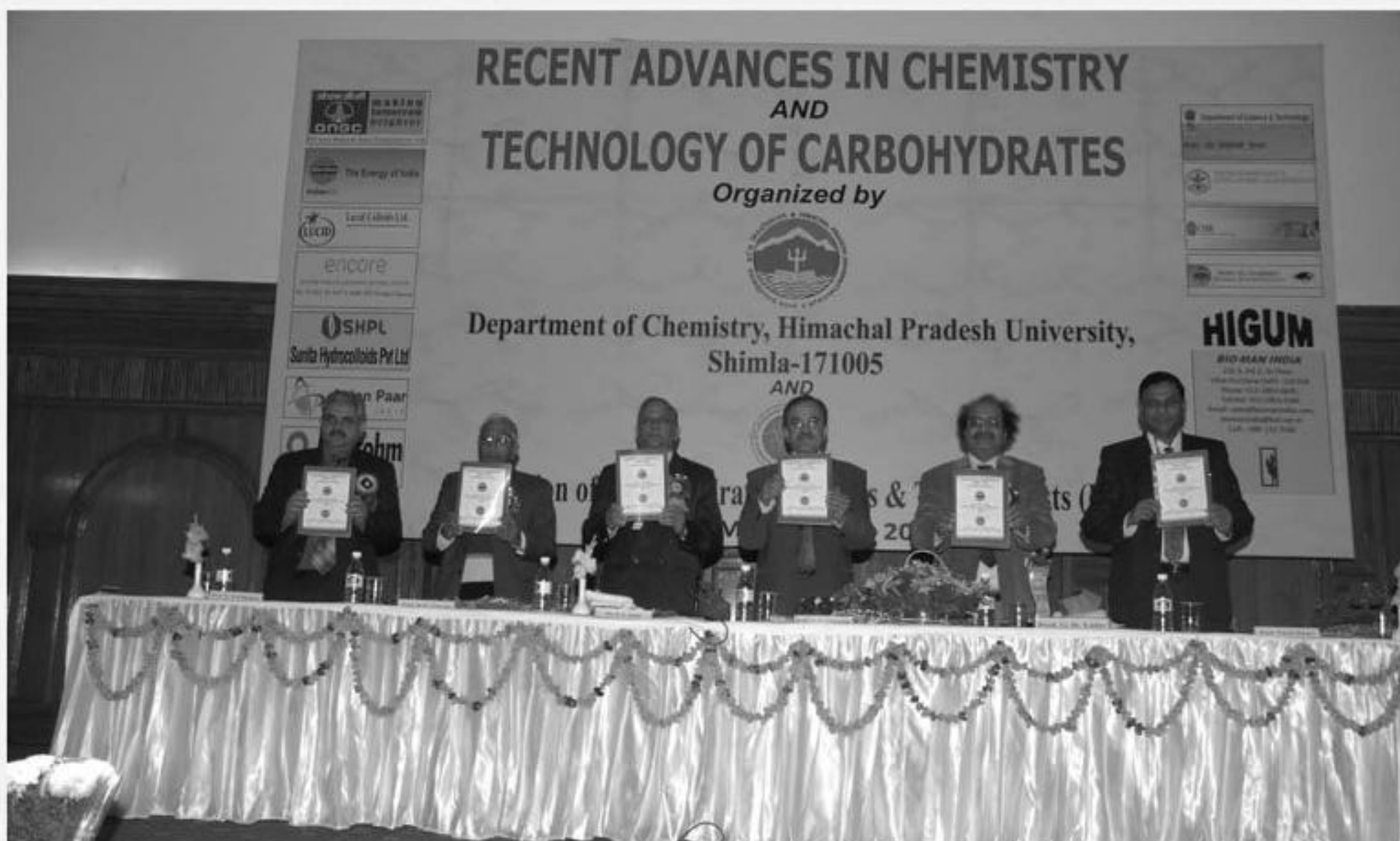
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Releasing of Souvenir at the opening ceremony of
Silver Jubilee Carbohydrate Conference at Shimla on Nov. 11, 2010



Trends in Carbohydrate Research (TCR) published by ACCTI, is completing three years of its launching and is a peer reviewed, quarterly, International, fast track, open access, e journal on Investigation, Application & Technology of Carbohydrates & their derivatives with a distinguished editorial and advisory board composed of leading carbohydrate researchers from around the world. The TCR is devoted for promotion and utilization of latest research and developments related to various scientific and technological aspects of carbohydrates. The publication of TCR will definitely affect the dynamics of Carbohydrate science & technology in this country and the world around.

We have also decided to select one best paper per volume which has very high standard, for award of Rs. 20,000.00 (US \$400) along with a certificate from the journal to this effect starting from the Silver Jubilee year of the ACCTI at the annual conference of Carbohydrate from CARBO XXV, Shimla, H.P. Dr. R.P. Tripathi, C.D.R.I., Lucknow is the first winner of the eTCRAward (2010).

TCR with ISSN 0975-0304 is being abstracted by Chemical Abstract Service (CAS) and in process of getting impact factor (Thomson Reuters) and to be listed in Scopus (Elsevier Bibliographic database Amsterdam) shortly. Our papers are being viewed, downloaded and uploaded by researchers all over the world. Now time has come when we wish libraries of Universities/Institutes and Individuals start prescribing this journal in order to make it more accessible. You can subscribe by going to our website and may contact us if you have any difficulty in doing so.

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The overall aim of the TCR is to advance and disseminate knowledge in all related areas of carbohydrates to benefit the whole carbohydrate's community. It offers an international forum for exchange of latest research and developments related to various scientific and technological aspects of carbohydrates and publish original research in form of normal length research papers, short reports, review articles in the following facets lie well within the scope of this journal.

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Looking at your expertise and experience in the area of carbohydrate research, we would like to invite you to contribute your valued manuscripts for publication in TCR. We trust that your esteemed association will definitely give new dimensions, magnitude and directions for continual promotion and growth of the TCR and in placing it in the forefront for the dissemination of novel, exciting and cutting edge research in all areas of carbohydrates.

Dr. P.L. Soni
Editor in Chief, TCR

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