



Council of Scientific & Industrial Research  
www.csir.res.in

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# CSIR - CDRI Newsletter



CSIR-Central Drug Research Institute  
www.cdriindia.org

## From the Director's Desk



**A**t the outset, let me take the privilege in extending my gratitude to each member of the CSIR-CDRI family for their contribution towards successful completion of Diamond Jubilee Celebrations commemorating sixty glorious and eventful years in the history of our institute. I am glad to present this Newsletter, incidentally, the first issue to be published after the said celebrations. Indeed the events, that were well organized and attended by several luminaries and stalwarts in science from various parts of the world during the year 2010-2011, have marked the beginning of a new era in building brand 'CSIR-CDRI' to an institution of excellence galloping towards global leadership in drug discovery and development.

I am glad to be the torch bearer of the scientific and technological marathon towards the luminous future of CSIR-CDRI, set by my able predecessors. The onset of the sixty first year puts an enormous sense of responsibility on us. It forms an added responsibility of each one of us to keep abreast with the phenomenal pace the scientific and technological pursuits across the globe are progressing. This can be achieved only by effective sense of sharing among us and bring ignited minds onto a common platform that results in impact oriented culminating endeavors.

The trend in achievements of CDRI during the last six months shows steady and satisfactory contribution of the institute towards national capacity building pursuits. We have been instrumental in adding up to the CSIR's flagship OSDD program, had been effective in putting ten more CSIR EMPOWER projects onto our stable. Three industry partners have expressed their confidence in initiating sponsored projects. I am glad to mention that my colleagues were effective in getting 20 grant-in-aid projects. Science communication has been enormous during this period from the institute.

We have initiated a centralized admission system to our Ph.D programme, through which twice a year open advertisement is made, to attract talented research fellows from all over the country to our institute. We have also initiated a centralized seminar series to be held every Wednesday with an aim to expose everyone, especially the research fellows to the diversity of research activities being carried out in the institute. It will be my constant endeavor to make us a force to reckon within Indian as well as international science. I do not hesitate to put on record that this would not be possible without the untiring efforts of each one of my colleagues, the elements of motivation imparted and sacrifice endured by their families and hope this would continue to bring sparkling future to CDRI.

With best wishes

*T. K. Chakraborty*

(Tushar Kanti Chakraborty)

## Highlights of Achievements\*

**Technologies Demonstrated (2010-11) : 02**

**Publications in SCI Journals (2010) : 244**

Average Impact Factor : 2.89

Number of Publications with IF >5 : 14

**Book Chapters (2010) : 03**

**Patents (2010)**

Filed Abroad : 10

Filed in India : 12

Granted Abroad : 06

Granted in India : 12

**Ph.D. Thesis Submitted (2010) : 37**

**New Projects Initiated (2010)**

Industry Sponsored Projects : 03

Grant-in-Aid Projects : 20

CSIR EMPOWER Projects : 10

**Total External Budgetary Resources (2010-11)**

External Cash Flow (ECF) (₹ in Lakh)

Govt. Deptt./PSU's : 1577.95

Private Agencies : 23.49

Foreign Govt./Agencies : 118.00

Total Lab Reserve Generated (LRF) : 255.58

**Total EBR (ECF + LRF) : 1975.02**

\*Provisional data as on 10.4.2011

## CONTRIBUTIONS TO ECONOMY

### Demonstration of know-how of Centchroman (Ormeloxifene) to HLL Lifecare Ltd.

In pursuance of the license agreement between CSIR-CDRI and HLL Lifecare Ltd., Thiruvanthapuram, executed on 02-12-2009 for the commercial exploitation of Centchroman (Ormeloxifene), the improved process know-how of its preparation was successfully demonstrated to the authorized representatives of HLL, at CDRI, Lucknow during 18-01-11 to 01-02-11. The Technology Transfer Document of the same was handed over to HLL on 01/02/2011.



### Major Agreements Signed

	Title	Industry	Signing Date
<b>Sponsored Project Agreements</b>			
1	Identification and quantification of bioactive marker(s) from <i>Cissus quadrangularis</i> extract	Suprem Pharmaceuticals, Mysore	29/10/2010
<b>Memorandum of Understanding</b>			
2	To create centre of excellence in flow cytometry at CSIR-CDRI by installing two new laser models of BD FACSCalibur	Becton Dickinson India Pvt, Ltd., New Delhi	24/11/2010
3	Comparative proteomic analysis of human receptive versus non-receptive and defective endometrium	CSM Medical University, Lucknow	03/12/2010
4	Study on promoter gene polymorphism of Interleukin-10, Interleukin-18 and assessment of GATA transcriptional factor expression in ovarian carcinoma in North Indian population	CSM Medical University, Lucknow	07/12/2010
5	Protective immunogenicity of Centrin KO live attenuated Leishmania parasite in the animal models and in the human cells	Institute of Pathology & Institute of Molecular Medicine, New Delhi	09/12/2010
6	Pharmacological evaluation of homoeopathic medicines under Drug Standardization Program of CCRH	Central Council for Research in Homeopathy, New Delhi	02/02/2011
7	Nanoreservoirs carrying <i>Brugia malayi</i> recombinant proteins as potential vaccine against experimental lymphatic filariasis	Integral University, Lucknow	10/02/2011
8	Synthesis of biologically potent bisphosphonates	Sri Venkateshwara University, Tirupati	23/03/2011
<b>Secrecy Agreements</b>			
9	Designing and developing a tandem mass spectrum based database of previously isolated flavonoids	MARG Software Solutions, Lucknow	30/11/2010
10	Preparation of formulation of pharmacological agents capable of synergizing with innate immune responses of the host macrophage in tuberculosis infection	Lifecare Innovations Pvt. Ltd., Gurgaon	16/12/2010

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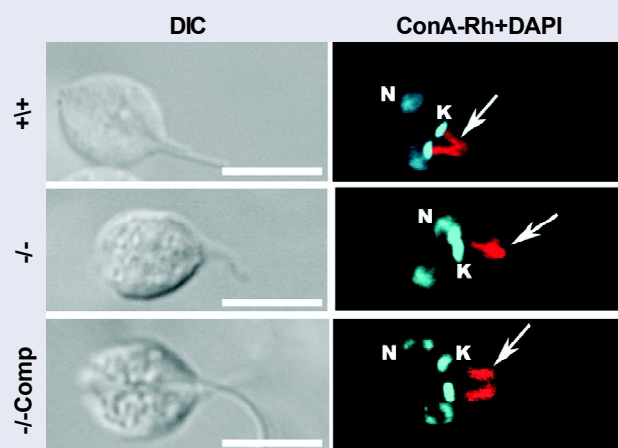
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## CONTRIBUTIONS TO SCIENCE & TECHNOLOGY

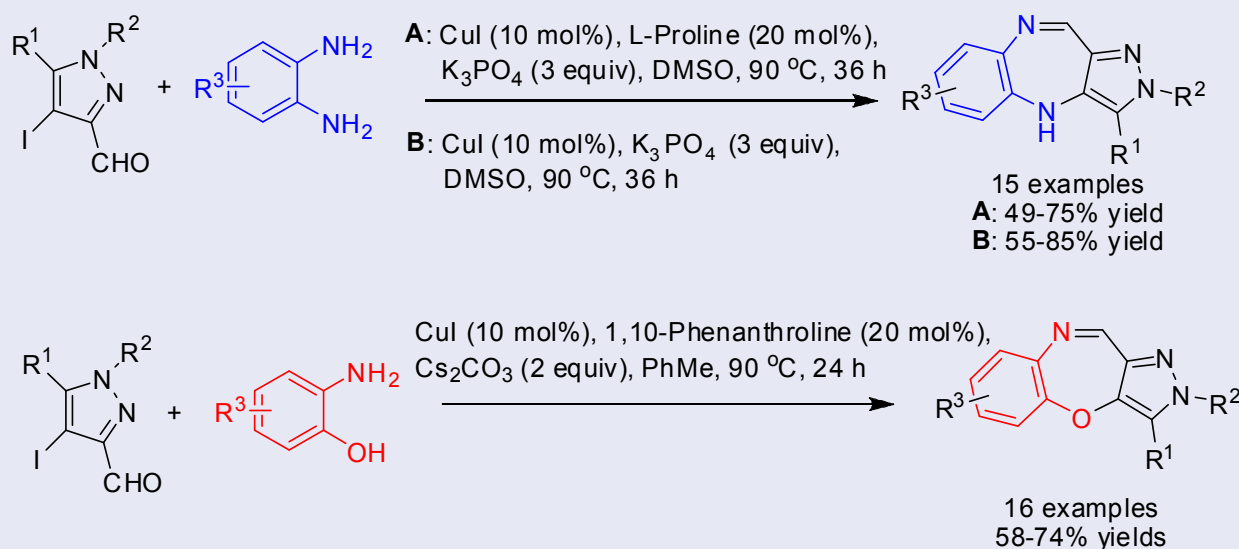
### 1. ADF/cofilin-driven actin dynamics in early events of *Leishmania* cell division (Tammana TVS, Sahasrabudhe AA, Bajpai VK and Gupta CM; *J Cell Sci.* 2010, 123(11):1894-1901; IF: 6.1)

ADF/cofilin is an actin-dynamics-regulating protein, which is essentially required for the flagellum assembly and cell motility in *Leishmania*. In the current study, it was shown that deletion of the gene encoding ADF/cofilin results in several aberrations in the process of cell division in these organisms. These aberrations include delay in basal body and kinetoplast separation, cleavage furrow progression and flagellar pocket division. In addition to these changes, the intracellular trafficking and actin dynamics are also adversely affected. Together, these results indicate that actin dynamics regulates early events of cell division in *Leishmania* parasites.



### 2. Copper-catalyzed cascade reactions of substituted 4-iodo-pyrazolecarbaldehydes with 1, 2-phenylenediamines and 2-aminophenols (Nayak M and Batra Sanjay; *Advanced Synthesis & Catalysis* 2010, 352, 3431-3437; IF: 5.18)

A novel method for the synthesis of hetero-annulated pyrazoles was formulated. The cascade protocol involved an intermolecular condensation between pyrazole-4-iodo-3-carboxaldehydes and 1,2-diamino or 1-amino-2-hydroxybenzenes followed by a copper-catalyzed C-N or C-O coupling to afford the heterofused benzazepines and benzoxazepines, respectively. For the C-N coupling, two sets of conditions, one using L-proline as ligand (**A**), and another, a ligand-free (**B**) process were identified. In all cases studied, method **B** provided 5-20% units higher than the method **A**. For C-O coupling, 1,10-phenanthroline as ligand and  $\text{Cs}_2\text{CO}_3$  as base were required. The yields range from average to good. The substrate scope was reasonably well studied in terms of pyrazole, less so with other counterpart as only commercially available materials were employed.

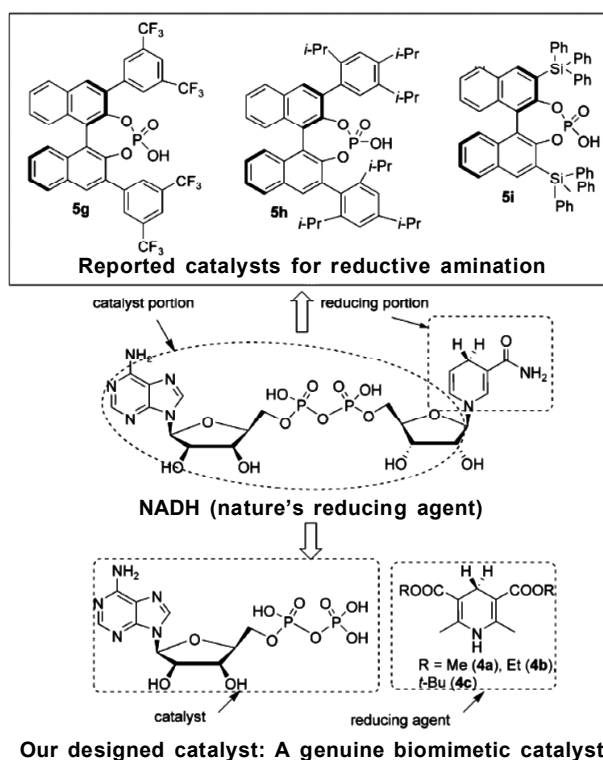


This paper was highlighted in *SYNFACTS* 2011, 252 for its synthetic significance



### 3. Single nucleotide-catalyzed biomimetic reductive amination (Kumar Atul, Sharma Siddharth and Maurya Ram Awatar; *Advanced Synthesis & Catalysis* 2010, 352(13), 2227-2232; IF: 5.1)

For the first time, it was demonstrated that a single nucleotide (adenosine 5'-diphosphate) is able to catalyze the direct asymmetric reductive amination of carbonyl compounds using a Hantzsch ester as transfer hydrogenating agent, resulting in structurally diverse amines. The process is a real mimic of NADH reduction in biological system in terms of selection of the hydrogen transfer agent as well as catalyst. Besides this, one major advantage of using nucleotides, as catalyst, is that they are commercially available. This fascinating single nucleotide catalysis has an immense impact in many fields of science such as chemistry, biochemistry and even in prebiotic studies, especially the RNA world and DNA world hypothesis for understanding the origin of life.



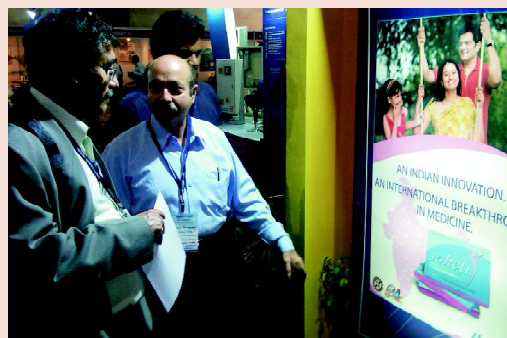
### CSIR Tableau at Republic Day

It was a red letter day for CSIR when the tableau of CSIR on the healthcare theme - From Generic Drugs to Genomics was presented before the nation at Republic Day parade 26.01.2011. The CDRI products viz. like Saheli, Memory Sure and E-Mal were shown highlighting the drugs available to the common man at affordable price.



### Chemtech/Pharma World Expo-2011

CSIR-CDRI participated in the Chemtech/Pharma World Expo-2011 organized as a Silver Jubilee event by the Chemtech Foundation during 23-26 February 2011 at Bombay Exhibition Centre, Goregaon, Mumbai. The theme was new drug discovery and availability of new drugs for masses at affordable price. CSIR-CDRI drugs like Saheli as Contraceptive, Novex- DS for the management of dysfunctional uterine bleeding to avoid hysterectomies, E-Mal for the treatment of cerebral and chloroquine resistant malaria and Memory Sure for the improvement of the memory were highlighted. CSIR-CDRI has also been projected in OSDD program of CSIR in the area of tuberculosis.



## NEW PROJECTS UNDERTAKEN

### Grant-in-Aid Projects (September 2010 - March 2011)

#### 1 Post translational modifications induced by nitroxidative stress biomarkers of vascular damage in diabetes

This is a collaborative project involving scientists from CSIR-CDRI, Lucknow, Goethe-University, Frankfurt, Germany and Centro de Biología Molecular "Severo Ochoa" Nicolás Cabrera, Spain. The project aims to deliver a set of post-translational modifications in neutrophils (Indian partner), macrophages (German partner) and endothelial cells (Spanish partner) to identify nitroxidative stress-related vascular and inflammatory damage in metabolic syndrome/diabetes.



**PI: Dr. Madhu Dikshit, Scientist, Pharmacology**  
**Funding Agency: DBT – New INDIGO Scheme**  
**Approved budget: ₹ 62.57 Lakhs**

#### 2 Synthesis of fracture and wound healing agents

Agents that would stimulate endogenous BMPs secretion selectively in skeletal and dermal tissues would promote increased collagen synthesis leading to rapid fracture and wound healing. The project specifically aims for discovery of an oral agent that will specifically stimulate collagen synthesis in bone and skin.



**PI: Dr. N. Chattopadhyay, Scientist, Endocrinology**  
**Funding Agency: DRDO**  
**Approved budget: ₹ 10.00 Lakhs**

#### 3 Protective immunogenicity of centrin KO live attenuated Leishmania parasite in the animal models and in the human cells

This collaborative project, involving scientists from CSIR-CDRI, Lucknow, IOP, New Delhi and IMM, Pune focuses primarily on the evaluation of immunogenicity of centrin KO live attenuated Leishmania parasite in the animal models viz hamsters and langur monkeys and secondly in the human cells.



**PI: Dr. Anuradha Dube, Scientist, Parasitology**  
**Funding Agency: DBT**  
**Total approved cost: ₹ 153.36 Lakhs (CDRI Component: ₹ 80.13 Lakhs)**

#### 4 Design and synthesis of flexible models based on pyrazolo[3,4-d]pyrimidine for better understanding of arene interactions at molecular and supramolecular level

Key question being addressed under this project is, which trimethylene linker compound having two *PP* core (or any other arene) residues at its termini will show conformational control due to intramolecular stacking/folding ( $\pi$ - $\pi$  or  $\text{CH}\cdots\pi$ )? Ethylene linker and other polymethylene linker compounds will also be studied for unusual conformational control due to arene interactions.



**PI: Dr. K. Awasthi, Scientist, Medicinal & Process Chemistry**  
**Funding Agency: DST**  
**Approved budget: ₹ 22.90 Lakhs**

#### 5 Pharmacological screening of homeopathic medicine under drug standardization programme of CCRH

The project has been designed to investigate the pharmacological properties of selected homeopathic medicines on various physiological system and animal models of human disease conditions.



**PI: Dr. Rakesh Shukla, Scientist, Pharmacology**  
**Funding Agency: Central Council for Research in Homoeopathy**  
**Approved budget: ₹ 31.90 Lakhs**

#### 6 Chiron approach synthesis of natural products like molecules from carbohydrate-based building blocks

In this project, focus will be given towards development of new methodology to access some "carbohydrate-based chiral building blocks" and use them for the synthesis of target natural products and biologically relevant molecules which will be screened for their various activities particularly in the area of tuberculosis and cancer.



**PI: Dr. A.K. Shaw, Scientist, Medicinal & Process Chemistry**  
**Funding Agency: DST**  
**Approved budget: ₹ 26.87 Lakhs**



### 7 Structural analysis of bacterial peptidyl-tRNA hydrolase enzymes and design of high affinity binders

Project proposes to determine the structure of the Pth proteins from several different bacterial sources using X-ray crystallography and NMR spectroscopy. NMR experiments are done on the protein that is in solution. Using the structure, new potential inhibitors will be designed to develop them as possible antimicrobial agents.



**PI: Dr. Ashish Arora, Scientist, Molecular & Structural Biology**

**Funding Agency: DBT**

**Approved budget: ₹ 44.75 Lakhs**

### 8 Generation and characterization of *Mycobacterium smegmatis* sigF mutant and studies on sigF-mediated gene expression by microarray analysis

The project aims to create a deletion mutant of *sigF* gene in *M. smegmatis* and study the growth profile of the mutant strain and its wild type counterpart. Survival abilities of mutant strain will be explored in comparison to wild type upon exposure to different



types of stress conditions. Transcriptome analysis of mutant vs. wild type strain will be performed in order to characterize the SigF regulon in *M. smegmatis*, which will help to understand the role of sigma factor in mycobacterial physiology.

**PI: Dr. B.N. Singh, Scientist, Microbiology**

**Funding Agency: DBT**

**Approved budget: ₹ 40.35 Lakhs**

### 9 Expression, intracellular localization and functional characterization of actin-related proteins in Leishmania

Actin-related proteins (ARPs) comprise a novel family of proteins that have been thought to perform evolutionarily related functions of actin, and for which the overall knowledge is poor. The functional analyses of Leishmania actin-related proteins will therefore be helpful in understanding fundamental processes that regulate cytoskeletal dynamics in the digenetic life cycle of Leishmania parasites, which can be exploited to identify novel drug targets and design newer strategies to combat this human pathogen.



**PI: Dr. Amogh Sahasrabuddhe, Scientist, Molecular & Structural Biology**

**Funding Agency: DST**

**Approved budget: ₹ 32.60 Lakhs**

## NEW FACILITIES ESTABLISHED



**Atmospheric pressure tandem quadrupole mass spectrometer TQD with UPLC**

Mass Range: up to 2000 daltons  
Applications: MS, LC/MS, MS/MS



**4000 Q Trap LCMS/MS (ABSciex)**

Mass Range: up to 3000 daltons  
Applications: MS, LC/MS, MS/MS/  
MS with UPLC



**4800 MALDI TOF/TOF**

Mass Range: up to 300K daltons  
Applications: MS, MS/MS Protein  
identification, De novo Sequencing



## SOME IMPORTANT PUBLICATIONS

(January-March 2011)

	Authors	Title	Journal	Vol. / page	IF
1	Pathak A, Sinha RA, Mohan V, Mitra K and Godbole MM	Maternal thyroid hormone before the onset of fetal thyroid function regulates reelin and downstream signalling cascade affecting neocortical neuronal migration	Cerebral Cortex	21 (1): 11-21	6.979
2	Kumar A, Tripathi VD and Kumar P	$\beta$ -Cyclodextrin catalysed synthesis of tryptanthrin in water	Green Chemistry	13 (1): 51-54	5.836
3	Siddiqui JA, Swarnkar G, Sharan K, Chakravarti B, Gautam AK, Rawat P, Kumar M, Gupta V, Manickavasagam L, Dwivedi AK, Maurya R and Chattopadhyay N	A naturally occurring rare analog of quercetin promotes peak bone mass achievement and exerts anabolic effect on osteoporotic bone	Osteoporosis International	2011 Jan 12	4.997
4	Sarswat A, Kumar R, Kumar L, Lal N, Sharma S, Prabhakar YS, Pandey SK, Lal J, Verma V, Jain A, Maikhuri JP, Dalela D, Kirti, Gupta G and Sharma VL	Arylpiperazines for management of benign prostatic hyperplasia design, synthesis, quantitative structure-activity relationships and pharmacokinetic studies	Journal of Medicinal Chemistry	54 (1): 302-311	4.802
5	Kaur J, Kumar P, Tyagi S, Pathak R, Batra S, Singh P and Singh N	<i>In silico</i> screening, structure-activity relationship and biological evaluation of selective pteridine reductase inhibitors targeting visceral leishmaniasis	Antimicrobial Agents and Chemotherapy	55 (2): 659-666	4.802
6	Pooja S, Francis A, Bid HK, Kumar S, Rajender S, Ramalingam K, Thangaraj K and Konwar R	Role of ethnic variations in TNF- $\alpha$ and TNF- $\beta$ polymorphisms and risk of breast cancer in India	Breast Cancer Research and Treatment	6(3): 739-47	4.696
7	Pal P, Kanaujia JK, Lochab S, Tripathi SB, Bhatt ML, Singh PK, Sanyal S and Trivedi AK	2-D Gel electrophoresis-based proteomic analysis reveals that ormeloxifen induces G0-G1 growth arrest and ERK-mediated apoptosis in chronic myeloid leukemia cells K562	Proteomics	2011: Feb 14	4.426
8	Samanta K and Panda G	Regioselective ring-opening of amino acid-derived chiral aziridines: An easy access to cis-2,5-disubstituted chiral piperazines	Chemistry - An Asian Journal	6 (1): 189-197	4.373
9	Dama MS, Negi MPS and Rajender S	High fat diet prevents over-crowding induced decrease of sex ratio in mice	PLOS ONE	6 (1): Art. No. e16296	4.351
10	Bhargavan B, Singh D, Gautam AK, Mishra JS, Kumar A, Goel A, Dixit M, Pandey R, Manickavasagam L, Dwivedi SD, Chakravarti B, Jain GK, Ramachandran R, Maurya R, Trivedi A, Chattopadhyay N and Sanyal S	Medicarpin, a legume phytoalexin, stimulates osteoblast differentiation and promotes peak bone mass achievement in rats: Evidence for estrogen receptor $\beta$ -mediated osteogenic action of medicarpin	Journal of Nutritional Biochemistry	2011 Feb 16	4.288



	Authors	Title	Journal	Vol. / page	IF
11	Gautam AK, Bhargavan B, Tyagi AM, Srivastava K, Yadav DK, Kumar M, Singh A, Mishra JS, Singh AB, Sanyal S, Maurya R, Manickavasagam L, Singh SP, Wahajuddin W, Jain GK, Chattopadhyay N and Singh D	Differential effects of formononetin and cladrin on osteoblast function, peak bone mass achievement and bioavailability in rats	Journal of Nutritional Biochemistry	22(4): 318-27	4.288
12	Singh PK, Srivastava A, Singh P, Singh D, Dalela D, Goel M, Gupta S, Negi MPS, Bhatt M and Rath S	Clinical utility of survivin gene expression in patients with transitional-cell carcinoma of the urinary bladder	European Journal of Cancer	Suppl. 9 (1) : 4-5	4.121
13	Singh PK, Srivastava A, Singh P, Singh D, Dalela D, Goel M, Gupta S, Negi MPS, Bhatt M and Rath S	Diagnostic and prognostic potential of ck20 gene expression in patients with transitional-cell carcinoma of the urinary bladder	European Journal of Cancer	Suppl. 9 (1) : 14-15	4.121
14	Kharkwal G, Fatima I, Kitchlu S, Singh B, Hajela K and Dwivedi A	Anti-implantation effect of 2-[piperidinoethoxyphenyl]-3-[4-hydroxyphenyl]-2H-benzo(b)pyran, a potent antiestrogenic agent in rats	Fertility and Sterility	95 (4): 1322-27	3.97
15	Babu S, Sinha RA, Mohan V, Rao G, Pal A, Pathak A, Singh M and Godbole MM	Effect of hypothyroxinemia on thyroid hormone responsiveness and action during rat postnatal neocortical development	Experimental Neurology	228 (1): 91-98	3.914
16	Verma R and Ghosh JK	Phospholipid membrane-interaction of a peptide from S4 segment of KvAP K(+) channel and the influence of the positive charges and an identified heptad repeat in its interaction with a S3 peptide	Biochimie	2011 Mar 3	3.897
17	Ahmad A, Azmi S and Ghosh JK	Studies on the assembly of a leucine zipper antibacterial peptide and its analogs onto mammalian cells and bacteria	Amino Acids	40 (2): 749-759	3.877
18	Biswas S, Lim EE, Gupta A, Saqib U, Mir SS, Siddiqi MI, Ralph SA and Habib S	Interaction of apicoplast-encoded elongation factor (EF) EF-Tu with nuclear-encoded EF-Ts mediates translation in the <i>Plasmodium falciparum</i> plastid	International Journal for Parasitology	41(3-4): 417-27	3.819
19	Singh N, Nigam M, Ranjan V, Zaidi D, Garg VK, Sharma S, Chaturvedi R, Shankar R, Kumar S, Sharma R, Mitra K, Balapure AK and Rath SK	Resveratrol as an adjunct therapy in cyclophosphamide-treated MCF-7 cells and breast tumor explants	Cancer Science	108 (5) : 1059-1067	3.771
20	Singh R and Panda G	Application of Nazarov type electrocyclization to access [6,5,6] and [6,5,5] core embedded new polycycles: An easy entry to tetrahydrofluorene scaffolds related to Taiwaniaquinoids and C-nor-D homosteroids	Organic & Biomolecular Chemistry	2011 Feb 24	3.762
21	Agrawal R, Tyagi E, Shukla R and Nath C	Insulin receptor signaling in rat hippocampus: A study in STZ (ICV) induced memory deficit model	European Neuropsychopharmacology	21 (3): 261-273	3.684
22	Pandey AK, Verma G, Vig S, Srivastava S, Srivastava AK and Datta M	miR-29a levels are elevated in the db/db mice liver and its overexpression leads to attenuation of insulin action on PEPCK gene expression in HepG2 cells	Molecular and Cellular Endocrinology	332 (1-2): 125-133	3.503



## PATENTS

(October 2010 - March 2011)

### Patents Granted Abroad

1	<b>US Patent No.</b>	<b>7807712</b>	Date of Grant	05-Oct-10
	Title	Oxy substituted chalcones as antihyperglycemic and antidyslipidemic agents		
	Inventors	Ram Pratap, Mavurapu Satyanarayan, Chandishwar Nath, Ram Raghubir, Anju Puri, Ramesh Chander, Preeti Tiwari, Brajendra Kumar Tripathi & Arvind Kumar Srivastava		

### Patents Granted in India

1	<b>Patent No.</b>	<b>245815</b>	Date of Grant	02-Feb-11
	Title	Novel spermicidal and antifungal agents		
	Inventors	Anil Kumar Dwivedi, Vishnula Sharma, Niharika Kumaria, Kiran Kumar, Gopal Gupta, Jagdamba Prasad Maikhuri, Janak Dulari Dhar, Pradeep Kumar, Abdul Haq Ansari, Praveen Kumar Shukla, Manish Kumar, Raja Roy, Kunnath Padmanabhan Madhusudhanan & Ram Chandra Gupta		
	Supporting Staff	Bhawani Shankar Joshi, Tara Rawat, Somendra Nath Roy & Seraj Alam Ansari		
2	<b>Patent No.</b>	<b>244289</b>	Date of Grant	29-Nov-10
	Title	<i>Mycobacterium tuberculosis</i> specific DNA fragments, a set of oligonucleotide primers and a kit thereof useful for rapid diagnosis of <i>Mycobacterium tuberculosis</i> infection in clinical samples		
	Inventors	Ranjana Srivastava, Deepak Kumar & Brahm Shanker Srivastava		
3	<b>Patent No.</b>	<b>243701</b>	Date of Grant	01-Nov-10
	Title	Synthesis of secondary amino alkoxy derivatives of substituted diaryl 5,6,7,8- tetrahydro naphthyl methane		
	Inventors	Neeta Srivastava, Man Mohan Singh & Suprabhat Ray		
4	<b>Patent No.</b>	<b>243559</b>	Date of Grant	26-Oct-10
	Title	A novel combinatorial library of 3-and 30-substituted Lup-20(29)-ene useful as antimalarial agents		
	Inventors	Misbah Alam Farooq Biabani, Thangathirupathi Srinivasan, Sunil Kumar Puri, Kanwal Raj & Bijoy Kundu		
	Supporting Staff	A K Srivastava		
5	<b>Patent No.</b>	<b>243415</b>	Date of Grant	15-Oct-10
	Title	2-alkyl/aryl sulphonyl-1,2,3,4-tetrahydro-9H-pyrido (3,4-b) indole-3-carboxylic acid esters /amides as antithrombotic agents		
	Inventors	Stuti Gaur, Zeeshan Fatima, Anshuman Dixit, Zahid Ali, William Rascan Surin, Kapil Kapoor, Kanta Bhutani, Mohd. Salim Ansari, Madhu Dikshit & Anil Kumar Saxena		
	Supporting Staff	Arimardan Singh Kushwaha & Dayanand Vishwakarma		

### Patents Filed Abroad

1	<b>Korean Patent</b>	<b>10-2010-7024460</b>	Filing Date	29-Oct-10
	Title	Novel donor-acceptor flurene scaffolds: A process and uses thereof		
	Inventors	Atul Goel, Sumit Chaurasia, Vijay Kumar, Sundar Manoharan & Raghubir Singh Anand		
2	<b>Chinese Patent</b>	<b>200980113792.0</b>	Filing Date	19-Oct-10
	Title	A bioactive extract/fraction from <i>Ulmus wallichiana</i> and its compounds for prevention for treatment of osteo-health disorders		
	Inventors	Rakesh Maurya, Preeti Rawat, Kunal Sharan, Jawed Akhtar Siddiqui, Gaurav Swarnkar, Geetanjali Mishra, Lakshmi Manickavasagam, Girish Kumar Jain, Kamal Ram Arya & Naibedya Chattopadhyay		
	Supporting Staff	Satish Chandra Tiwari, Abdul Malik Tyagi, Devi Dutt & Amruta Kendurkar		
3	<b>Australian Patent</b>	<b>2009233324</b>	Filing Date	01-Oct-10
	Title	Novel donor-acceptor flurene scaffolds: A process and uses thereof		
	Inventors	Atul Goel, Sumit Chaurasia, Vijay Kumar, Sundar Manoharan & Raghubir Singh Anand		



### Patents Filed in India

1	<b>Patent App. No.</b>	<b>0364DEL2011</b>	<b>Filing Date</b>	<b>14-Feb-11 (Prov.)</b>
	Title	Aryl aryl methyl thio arenes (aamtas) as antimalarial agents and a process for the preparation thereof		
	Inventors	Gautam Panda, Priyanka Singh, Sanjit Kumar Das, Subal Kumar Dinda, Manish Goyal & Uday Bandyopadhyay		
2	<b>Patent App. No.</b>	<b>0363DEL2011</b>	<b>Filing Date</b>	<b>14-Feb-11 (Prov.)</b>
	Title	Substituted 1,2,3,4-tetrahydroquinolin-7-yl carbamates, their preparation, and use thereof as acetylcholinesterase (Ache) inhibitors for the treatment oalzheimer's and other neurodegenerative disease		
	Inventors	Kuldeep Kumar Roy, Santoshkumar Tota, Chandishwar Nath, Rakesh Shukla & Anil Kumar Saxena		
3	<b>Patent App. No.</b>	<b>0265DEL2011</b>	<b>Filing Date</b>	<b>04-Feb-11 (Prov.)</b>
	Title	Novel 3, 3-spiroanellated 5,6-disubstituted -1,2,4-trioxanes as antimalarial agents and a process for the preparation thereof		
	Inventors	Prem Prakash Yadav, Sunil Kumar Puri, Ranjani Maurya & Awakash Soni		
4	<b>Patent App. No.</b>	<b>0317DEL2010</b>	<b>Filing Date</b>	<b>14-Feb-11</b>
	Title	A Process for the isolation of an antileishmanial fraction from a marine algae		
	Inventors	Vijai Lakshmi, Sunil Kumar Mishra, Shishir Srivastava, Mahendra Nath Srivastava, Prashant Khare, Pragya Mishra & Anuradha Dubey		
	Supporting Staff	Hriday Ram Mishra , Naveen Prakash Mishra, J.K.Joshi & Ram Chandra		
5	<b>Patent App. No.</b>	<b>208DEL2011</b>	<b>Filing Date</b>	<b>31-Jan-11(Prov.)</b>
	Title	Chiral 3-aminomethylpiperidine derivatives as inhibitors of collagen induced platelet activation and adhesion		
	Inventors	Dinesh Kumar Dikshit, Madhu Dikshit, Tanveer Irshad Siddiqi, Anil Kumar, Ravi Shankar Bhatta, Girish Kumar Jain, Manoj Kumar Barthwal, Ankita Mishra, Vivek Khanna, Prem Prakash, Manish Jain & Vishal Kumar		
	Supporting Staff	Surendra Singh, C P Pande, Kanta Bhutani & M S Ansari		
6	<b>Patent App. No.</b>	<b>0183DEL2010</b>	<b>Filing Date</b>	<b>25-Jan-11</b>
	Title	4-Alkoxy phenyl cyclopropyl methanes, process for preparation thereof and an antitubercular formulation therefrom		
	Inventors	Rama Pati Tripathi, Prabhat Ranjan Mishra, Girish Kumar Gupta, Surendra Sin Bisht, Jyoti Pandey,Vinita Chaturvedi, Sudhir Sinha, Varsha Gupta & Anil Kumar Dwivedi		
	Supporting Staff	Vinod Kumar Maurya , Hori Lal, A S Verma & Chandra Mool		
7	<b>Patent App. No.</b>	<b>0182DEL2010</b>	<b>Filing Date</b>	<b>17-Jan-11</b>
	Title	Novel dispiro cycloalkanones as inhibitors of NAD <sup>+</sup> - dependent DNA Ligase and antitubercular agents		
	Inventors	Rama Pati Tripathi, Jyoti Pandey, Nimisha Singh, Divya Dubey, Vandana Kukshal, Shalini Bhatnagar, Sudhir Sinha, Vinita Chaturvedi & Ravi Shankar Ramchandran		
8	<b>Patent App. No.</b>	<b>0685DEL2010</b>	<b>Filing Date</b>	<b>06-Dec-10</b>
	Title	Thiophene containing trisubstituted methanes(TRSMs) as antitubercular agents		
	Inventors	Gautam Panda, Maloy Kumar Parai, Priyanka Singh, Vinita Chaturvedi & Sudhir Sinha		
	Supporting Staff	Ajay S Verma , Shyam Singh & Hori Lal		