



NIMR Newsletter

Newsletter of the National Institute of Malaria Research (formerly Malaria Research Centre), Delhi

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Contents

- Malaria in News 2
- Guest Column 3
- Institute's News 4
 - Research Activities 4
 - Conference Organised 6
 - Meetings/Workshops Organised 7
 - International Conferences/Courses Organised 7
 - Scientific Publications 8
 - Hindi Week Celebrations 9
 - Documents/Monographs/Manuals/Periodicals Published 10
- Forthcoming Scientific Events 11

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From the Director's Desk

Dear readers,

It gives me immense pleasure in presenting the first issue of NIMR Newsletter. This Newsletter is intended to communicate the regular updates on the NIMR research activities and progress in the field of malaria research in general. It will be published biannually in January and July every year. I hope this Newsletter will be informative to persons working in the field of malaria as well as to students desirous to undertake malaria research as their career.

—AP Dash



About National Institute of Malaria Research (NIMR)

National Institute of Malaria Research (NIMR) was established in 1977 as 'Malaria Research Centre', which was renamed as 'National Institute of Malaria Research' in November 2005. NIMR is one of the permanent institutes of the Indian Council of Medical Research (an autonomous body under Ministry of Health & Family Welfare, Govt. of India). The primary task of the Institute is to find short-term as well as long-term solutions to the problems of malaria through basic, applied and operational field research. The Institute also plays a key role in man power development through trainings/workshops and transfer of technology.

The major areas of research carried out over the years are on mosquito faunistics, development of genetic and molecular markers for important malaria vectors and parasites, cytotaxonomic studies identifying major vectors as species complexes and laboratory and field studies to examine the biological variations among sibling species, development of molecular identification techniques for sibling species, monitoring of insecticide resistance in vectors and drug resistance in parasites through space and time, clinical trial of antimalarials, preparation of action plans, etc. Research on molecular evolutionary genetics and bio-informatics of the malaria parasites and vectors have recently been initiated. Field evaluation of new insecticides, biolarvicides, insecticide-impregnated bednets, drugs and parasite diagnostic kits have provided new armament to malaria control. Many of these have found place in national programme.

NIMR has a network of well developed laboratories at Delhi carrying out research on all aspects of malaria along with 10 field laboratories in different parts of India, which serve as testing ground for new technologies and help in the transfer of technologies.

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New malaria treatment announced

The New York Times, Tuesday, 13 December 2005

Two simpler, cheaper formulations of antimalaria drugs will be available next year, according to the Drugs for Neglected Diseases Initiative, a public-private partnership. The cost will be about half of what the current pills cost, said Dr. Bernard Pécoul, executive director of the partnership, which was founded by Médecins Sans Frontières, the Pasteur Institute of France, the World Health Organization and research institutes in Brazil, India, Malaysia and Kenya. The new pills will mix large doses of two drugs into one pill, so adults will take only six pills over three days instead of the current 24 to 32. They will also be made in low-dose pills that can be dissolved in water for infants. The new drugs will combine forms of artemisinin, a relatively new malaria drug developed in China from the sweet wormwood plant, with one of two established drugs, amodiaquine and mefloquine, which act more slowly but linger in the blood. For full story visit: <http://www.ihf.com/articles/2005/12/13/news/malaria.php>

How malaria dupes immune system

BBC News, Thursday, 29 December 2005

Scientists have discovered the genetic secret behind the ability of the malaria parasite to evade attack by the human immune system. They have shown how it can turn on and off genes that manufacture a series of 'cloaking' proteins used as camouflage. If one protein is recognised by the immune system, the parasite simply produces another type. The study, by Howard Hughes Medical Institute researchers based in Australia, is published in 28 December 2005 issue of the journal—

Nature. The key is a DNA sequence near the start of a cloaking gene, known as the gene's promoter. This not only turns up production of its protein, but also keeps all other cloaking genes under wraps. Malaria parasites enter human blood from infected mosquitoes. They decorate the surface of the blood cells they occupy with a protein called PfEMP1. But a small percentage of each generation of the parasite switches to a different version of this protein, which the immune system has never seen before, and so does not target for attack. This enables a new wave of infection to take place before the immune system catches on, and launches a counter offensive.

Malaria gene 'defends mosquitoes'

BBC News, Monday, 24 October 2005

A team of scientists at the Johns Hopkins University (Baltimore, USA) discovered that a gene called SPRN6 enables a mosquito to defend itself—a finding that could help fight human infection. These scientists hope to develop chemical sprays that would enhance the switching on of the SPRN6 gene in infected mosquitoes. These mosquitoes would no longer be a real threat to humans when biting them, because they would not transmit the malaria parasite *Plasmodium*, they believe. By looking at two types of mosquito, *Anopheles stephensi* and *Anopheles gambiae*, they found that the SPRN6 gene is normally switched off. However, when mosquitoes are infected with the malaria parasite the gene is switched on. To find out the function of SPRN6 they looked at what happened when they forced the gene to stay switched off. The number of malaria parasites that developed in the stephensi mosquitoes increased three-fold. Removing the SPRN6 gene completely delayed the natural process by which *An. gambiae* mosquitoes rid themselves of the malaria parasite.

Resistance is emerging to Artemisinin

Malaria parasites found in West Africa are showing signs of resistance to what is thought to be the most powerful antimalarial drug—Artemisinin, according to report published in Lancet (3 December, 2005). In an *in vitro* susceptibility studies of 530 *P. falciparum* isolates from three countries (Cambodia, French Guiana, and Senegal) Artemether IC₅₀ up to 117 and 45 nmol/L was seen in French Guiana and Senegal, respectively. DNA sequencing in a subsample of 60 isolates lends support to SERCA-PfATPase6 as the target for artemisinins. The S769N PfATPase6 mutation, noted exclusively in French Guiana, was associated with raised (> 30 nmol/L) artemether IC₅₀s (p < 0.0001, Mann-Whitney). All resistant isolates came from areas with uncontrolled use of artemisinin derivatives. This rise in resistance indicates the need for increased vigilance and a coordinated and rapid deployment of drug combinations.

Clue to how malaria infects cells

BBC News, Saturday, 24 December 2005

Scientists of International Centre for Genetic Engineering and Biotechnology in India and a unit of the European Molecular Biology Laboratory in France have analysed in close detail the structure of a key protein that helps the malaria parasite infect human cells. They found the protein has a unique atomic structure which, in theory, new drugs could target directly. The latest research focuses on one particular protein on the surface of *Plasmodium* which plays a particularly key role. The researchers obtained crystals of a part of this protein called the Duffy-Binding Like (DBL) domain—which directly interacts with a protein on red blood cells using a technique called X-ray crystallography.

Correlation of *PfCRT* and *PfMdr1* Mutations with Chloroquine Resistance in *P. falciparum* Malaria in the Field in India

G Padmanaban

Department of Biochemistry, Indian Institute of Science, Bangalore-560 012

The widespread occurrence of chloroquine resistance in *Plasmodium falciparum*, especially in Africa, has been a major concern that has called for the use of second and third line therapeutic options¹. While mechanisms involved in chloroquine resistance are a matter of debate, attempts are underway to identify molecular mutations in specific genes that will correlate with CQ resistance. These studies have led to candidate genes where specific mutations have been studied in relation to CQ-resistance. *PfMdr1* gene is a candidate where different haplotypes were identified from old and new world malarious regions. An allele with an Aspn to Tyr codon change (N86Y, K1 allele) has been shown to correlate with CQ-resistance in some regions. Subsequent studies have also led to the identification of alleles with codon changes at positions 184, 1034, 1042 and 1046 (7G8 allele). While some associations with these mutations have been shown in CQ-resistance *in vitro* and *in vivo*, there have been exceptions^{2,3}.

More recently, the locus for CQ resistance has been mapped to a 36 kb segment on chromosome 7 of *P. falciparum* and linked to the polymorphic gene *Pfcr*⁴. Eight different mutations on the gene have been identified and in particular a lysine to threonine mutation at amino acid 76 (K76T) has been shown to be present in all documented clinical CQ failures and laboratory adapted field isolates of CQ-resistant strains with different amino acid haplotypes (CVIET, CVMNT, CVMET and SVMNT) spanning amino acid residues 72–76⁵.

Two recent studies from India have shown that K76T mutation is rampant

in *P. falciparum* isolates from patients. In one case, amplification and refractory mutation-specific polymerase chain reaction (arms PCR) has been used to show the mutation in 96–100% of the infected blood samples analysed⁶. In another study, using specific restriction enzyme susceptibility of PCR product along with DNA sequencing, it has been shown that K76T mutation is around 98% in the *P. falciparum*-infected blood samples and that the predominant haplotype is surprisingly SVMNT, mostly seen in South America⁷.

While, there is a strong correlation between *Pfcr*-K76T mutation with CQ-resistance *in vitro*^{4,5}, the correlation *in vivo* has been variable depending on the geographical regions, endemicity and perhaps the level of chloroquine resistance. Thus, the correlation has been

excellent at Mali and some African states but studies in other African states and Laos have indicated that although this mutation would be necessary for CQ-resistance, it is not sufficient to predict CQ-response in the field^{8,9}. Preliminary studies have revealed that this may be the case in India as well⁶.

Nevertheless, a high preponderance of the CQ-resistant haplotypes, needs to be viewed seriously. This could mean that one of the essential genetic changes has already taken place in the parasite and additional genetic and environmental changes involving the parasite and the host could lead to rampant CQ-resistance in the field. Secondly, the consequence of this mutation to CQ efficacy in children and malaria-naïve individuals exposed to *P. falciparum* with the mutation for the first time needs to be

Prof G Padmanaban is a pioneer in ushering recombinant DNA technology as a tool in modern life science research in India. His scientific research for over 40 years has spanned a large spectrum, starting from elucidating the neurotoxic principle in Keshari dal (*Lathyrus sativus*) to the understanding of the transcriptional regulation of the genes involved in drug metabolism in mammalian liver and finally to unravel the vulnerable biochemical targets in the malaria parasite in order to develop new antimalarials. His research on the heme-biosynthetic pathway as a potential drug target in the malarial parasite has received wide international attention. He has also played an important role in the development of modern vaccines particularly recombinant hepatitis B vaccine and a DNA vaccine against rabies at the Indian Institute of Science. His research interests include the understanding of unique features of malaria parasite biology in general and finding new drug targets for malaria, in particular. The current research in his laboratory involves in analysing the Indian populations of malaria parasites for the presence of chloroquine resistance *Pfcr* mutation and its relevance to drug therapy and the use of antitubercular drugs to cure malaria.

Born on 20 March 1938, Prof. Padmanaban obtained his Ph.D degree from the Indian Institute of Science (IISc), Bangalore in 1966 and published over 120 scientific papers in the field of his research. He was INSA-CV Raman Research Professor (1991-1996). He was awarded visiting fellowship, Jawaharlal Nehru Birth centenary (1991), Padmabhushan 2004; Ambedkar award of ICMR, Distinguished Biotechnologist of the DBT at Indian Institute of Science, 2002. He is also a Fellow of all Academies of Science in India and also ThirD World Academy. He served as the Director of IISc from 1994 to 1998. Currently he is a Honorary Professor at Department of Biochemistry, Indian Institute of Science, Bangalore



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Research Activities

A Strain of *Plasmodium*-refractory *Anopheles culicifacies*

Anopheles culicifacies is the most important vector of malaria and is responsible for nearly 65%¹ of malaria cases reported annually from India. It transmits almost all rural malaria in India and also considered as an important vector in the countries west of India and Sri Lanka. *An. culicifacies* has developed resistance to all the commonly used insecticides and also to synthetic pyrethroids², making it difficult to control this vector.

Recent advancement in recombinant technology has developed consensus among global scientific community to design disease-resistant mosquito by genetic manipulation and to replace vector mosquitoes in wild mosquito populations with the genetically modified refractory mosquitoes. But for success of this strategy there is need to identify gene(s) that confers refractory

traits and the development of efficient and stable transformation system.

National Institute of Malaria Research has selected a strain of *An. culicifacies* B which is completely refractory to *P. vivax*. The oocysts of *P. vivax*, in this strain get melanized and encapsulated in similar fashion as has been described in *An. gambiae*³. But this strain differs from *An. gambiae* where some parasites escape from melanization/encapsulation process. Here in case of *An. culicifacies* strain, isolated by NIMR, the entire *P. vivax* parasites which invade the gut epithelium of mosquito, is killed (encapsulated) by mosquito immune system. Studies are ongoing in collaboration with scientists of the International Centre for Genetic Engineering and Biotechnology, New Delhi to find out molecular basis of refractoriness.

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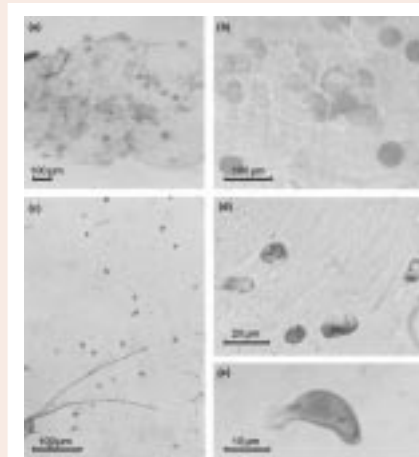


Fig. 1. Sporogonic development in susceptible (a & b) and refractory *An. culicifacies* (c-e). The parasite is encapsulated in refractory *An. culicifacies*

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— T Adak and OP Singh

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seriously evaluated. With respect to *PfMdr1* mutations, although this gene as such does not seem to contribute to CQ-resistance directly, it does seem to have some correlation, which is again variable depending on geographic regions. Thus, while the correlation between *Pfcrt*-K76T mutation and *PfMdr1*- N86Y mutation is very good in Papua New Guinea and Mali^{5,8} the correlation is only about 30% in India with the limited samples analysed⁷.

Therefore, it would be worthwhile to mount a field study on the correlation between *Pfcrt* and *PfMdr1* mutations with clinical CQ resistance. The study should address the following aspects:

- (i) Analysis of *Pfcrt* (K76T and 3 other loci) and *PfMdr1* (N86Y and 3

other Loci) mutations from *P. falciparum*-infected blood samples collected from different parts of India.

- (ii) Correlation of the mutation status with CQ-response in the field. This study on adequate number of cases in the field would help to redefine the policy of using chloroquine as a first line antimalarial for therapy in the country.

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Evaluation of Olyset® Net, a Long-lasting Insecticide-treated Net (LLIN)

Olyset net was evaluated for its bio-efficacy and operational feasibility in laboratory and field conditions. Olyset nets are highly effective in killing the anopheline mosquitoes within three minutes of exposure period as evidenced in the cone bio-assay tests. These nets also showed their efficacy on non-target species such as *Aedes aegypti* and *Culex quinquefasciatus* at higher exposure period. The efficacy remained same even after 20 washings at an interval of 24 hours.



The use of Olyset nets not only reduced the indoor resting density of *An. culicifacies* (>74%) but also reduced mosquito entry in Olyset net used structures. There was no landing on the Olyset net resulting complete protection of humans. The impact of Olyset nets was perceived on malaria transmission also. Social acceptability is very high as more than 99% usage was reported throughout the study period and no adverse effect such as itching, vomiting, nausea, headache etc. was reported by the users. Results of the present study revealed that Olyset nets are highly effective in reducing the indoor resting density of mosquitoes, man-vector contact and malaria incidence.

—MA Ansari, U Sreehari, RK Razdan and PK Mittal

Initiatives between NIMR and NOAA, USA

National Oceanic Atmospheric Administration (NOAA), NESDIS, Washington (USA) invited Dr. RC Dhiman and Dr. Neeru Singh for discussion on the project on “Early detection of malaria epidemics from satellite and climatic indicators”. It has been planned to find out the potential of vegetation health indices derived from NOAA satellite and meteorological parameters in early warning of malaria outbreaks in India. Milestones for short-term and long-term studies were decided. The short-term activities (6-8 months) would focus on research, which will show potential for the development of such system while the long-term plan (three years) will focus on the development of satellite/climate-based monitoring system. Retrospective monthly malaria incidence of Bikaner, Barmer from Rajasthan and Tumkur and Raichur from Karnataka are being analysed vis-à-vis vegetation health indices for finding potential of the approach.

— RC Dhiman

Evolutionary History of Human Malaria Parasite *Plasmodium falciparum* in India: Population Genomic Approach

In this project we are estimating genetic diversity of *Plasmodium falciparum* across Indian populations using the recently devised genomic and bio-informatic approaches. We will infer the population genetic structure and demographic history of the parasite populations in India and compare with the global parasite populations. We would also like to infer the detail evolutionary history of the *Pfcr* gene that is suggested to be involved in conferring drug resistance to the parasite. Since

earlier studies in this gene provided evidence for existence of different haplotypes that are of diverse origin in India, we would like to infer the detail evolutionary history of different haplotypes in Indian isolates and understand how these haplotypes move across continents. We are also constructing a webpage describing information on the Indian workers in this subject and the parasite genetic and biological diversity in India. This project has been funded by WHO-TDR, Geneva.

—Hema Joshi and Aparup Das

Community Randomised Trial for Malaria Control using a Native Larvivorous Fish—*Aphanius dispar*

District Kutch in north Gujarat lies in the semi-arid zone receiving scanty rainfall of about 370 mm per annum. Malaria has remained an everlasting health problem in District Kutch. Due to the vast geographical area and scattered population, the access to health facilities remains poor. Vacancies in various categories of health/malaria staff has resulted in poor surveillance and treatment of malaria. A low community acceptance of the house spraying of

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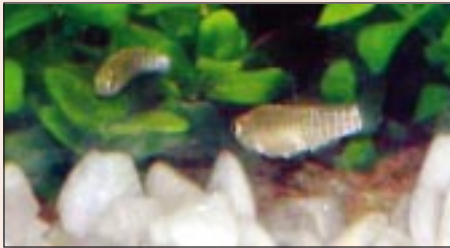
Dr C Usha Devi (1948–2005)

Dr. Usha Devi joined MRC in 1981 as Assistant Research Officer and served in different capacities for about 25 years. She was Assistant Director when she passed away on 5 October 2005. Her efforts in establishing the Malaria Parasite Bank and also screening of medicinal plants for their antimalarial activity are highly appreciated. She has published more than 35 research papers and her services to this institute shall always be remembered.



residual insecticides is resulting in poor vector control and has necessitated implementation of an integrated vector management strategy.

In a recent survey, an indigenous fish—*Aphanius dispar*, was found in Kutch. The fish tolerates salinity and has high potential for eating mosquito larvae. To evaluate antimalaria effectiveness of this fish on an operational scale, a



community randomised trial has been initiated in November 2005 in Rapar taluka. The project area covers four out of six Primary Health Centres of taluka Rapar in eastern part of Kutch, covering all farm-pond communities of 47 out of 90 villages.

A project-launch meeting of partners was organised in Rapar in November. Thereafter, a baseline mass blood survey has been completed in 47 villages and nearly 9,000 blood slides have been collected for microscopic confirmation of malaria. The study will monitor the impact of fish versus indoor residual spraying of malathion on the entomological parameters and overall incidence of malaria. It will assess

community acceptance and sustainability of the fish programme. If this large-scale experiment proves the hypothesis, it is expected that the use of fish in a situation like Kutch will be highly effective in controlling breeding of vector mosquitoes in farm ponds and other confined waters, and can replace the use of indoor residual spraying as a sole vector control strategy against malaria in this area. In view of the likely increase of the malariogenic potential by creation of thousands of water-harvesting ponds all over Gujarat as well as in other parts of India, the use of a native fish such as *Aphanius dispar* is likely to contribute in providing a lasting and alternative solution to control malaria.

— RS Yadav

Conference Organised

International Conference on Malaria

Malaria Research Centre (now, National Institute of Malaria Research) organised an International Conference on Malaria which was held in New Delhi from 4–6 November 2005. The conference was organised to mark the 125th anniversary of Laveran's discovery of malaria parasite in human blood on 8 November 1880. The theme of the conference was 'Laveran to Genomics'. The conference was inaugurated by Mrs Panabaka Lakshmi, Hon'ble Minister of State for Health and Family Welfare, Govt. of India. Dr Samlee Plianbangchang, Regional Director, WHO-SEARO, New Delhi, Prof NK Ganguly, Director General, ICMR, Dr RK Srivastava, Director General Health Services, Govt. of India, Dr Shiv Lal, Additional Director General Health Services, GOI and Dr. PL Joshi, Director NVBDCP, Delhi grace the inaugural function and

addressed the gathering. The conference was attended by over 500 national and international delegates and featured plenary lectures, invited lectures and free oral and poster presentations on various aspects of malaria.

The abstracts of scientific presentations made by delegates are available online on website www.mrcindia.org/conf/abstract.htm



Renaming of Malaria Research Centre

Malaria Research Centre, one of the permanent institutes of Indian Council of Medical Research has now been renamed as National Institute of Malaria Research. This was formally



announced by Mrs. Panabaka Lakshmi, Hon'ble Minister of State for Health and Family Welfare, Govt. of India, on 4 November 2005 during the inaugural function of the International Conference on Malaria held at New Delhi.

Meetings/Workshops Organised

1. A workshop on Drug Policy for Malaria was organised by NIMR at 22 Sham Nath Marg, Delhi from 26–29 October 2005.
2. Organised three training courses for entomologists/biologists under the World Bank supported Enhanced Malaria Control Project during 31 January to 18 March 2005 in collaboration with NVBDCP.
3. Malaria awareness-cum-health camp was organised on 6 January 2005 at village Kaliaposh, Bisra PHC, Sundargarh district in collaboration with CRPF, state health department and Rotary Club (Central) Rourkela.
4. Malaria awareness-cum-health camp was organised in "Vedvyas Gurukulashram" in collaboration with Youth Hostels Association of India and NACO, Rourkela.
5. Malaria and AIDS awareness-cum-health camp was organised on 4 February 2005 at CRPF camp at Rourkela.
6. Training workshop for participants of the workshop on treatment of severe and complicated malaria at Ispat General Hospital (IGH) was organised on 23 February 2005 at MRC, Rourkela.
7. Training workshop for participants of the workshop on treatment of severe and complicated malaria was organised from 21–23 March 2005 at RMRC, Bhubaneswar.
8. Malaria awareness camp was organised at mining area of Roxy under Koira PHC of Sundargarh district on 26 June 2005 in collaboration with CRPF Battalion.
9. Training workshop on monitoring of drug resistance in *P. falciparum* malaria cases was organised at District Training Unit, Keonjhar on 20 August 2005.
10. Organised a five-day malariology training workshop for Medical Officers of Mandla, Chhatarpur, Katni, Seoni, Damoh and Jabalpur districts from 4–8 July 2005 at IDVC field unit, Jabalpur. The workshop was organised jointly by the field unit and Directorate of Health Services Bhopal under EMCP.
11. A training of Block Health Officers of districts Kheda and Anand on indoor residual spraying was held at IDVC Field Unit, Nadiad on 15 July 2005.
12. Under intensive monitoring of antimalaria activities sponsored by the National Vector Borne Disease Control Programme, two capsule training courses in Malaria Microscopy for newly recruited laboratory technicians in Anand and Kheda districts were organised by IDVC field unit, Nadiad in collaboration with the District Malaria Office between 12–16 July and 18–22 July 2005.
13. Organised a malaria awareness camp at Gurundia on 27 October 2005 in collaboration with Jan Shiksha Sansthan (Min. of HRD, GOI) for the volunteers of Self Help Group (SEWAK) and students of High School.
14. Organised a malaria awareness camp in village Kanaveta under Bonai Block, Orissa on 3 October 2005 in collaboration with Jan Shiksha Sansthan (Min. of HRD, GOI) to improve the health awareness in the villagers and also benefits of using personal protection measures.

International Conferences/Courses Attended by NIMR Scientists

- All scientists and students of NIMR attended the 'International Conference on Malaria', New Delhi, India, 4-6 November 2005.
- AP Dash attended the conference on 'Vivax Malaria Research: 2005 and Beyond' Maryland, USA, 9–10 December 2005 and presented an invited lecture on 'Malaria in India: epidemiology, parasite and vector diversity'
- AP Dash attended the 'Annual Meeting of the American Society of Tropical Medicine and Hygiene', Washington DC, USA, 11–15 November 2005
- AP Dash attended the 'Fourth MIM Pan-African Malaria Conference', Yaound, Cameroon, 13–18 November 2005 and delivered a invited lecture on 'Malaria burden in India'.
- AP Dash attended the 'Indo-German Workshop on 'Recent Advances in Global Research in Infectious Diseases', Braunschweig, Germany, 16–18 June 2005 and delivered a lecture on 'Malaria in India'.
- C Dinesh attended 2nd Training course on 'Bioinformatics and Functional Genomics Applied to Insect Vector of Human Diseases' Bangkok, Thailand 19–30 September 2005.
- H Joshi attended the 'World Congress on Medicine and Health in the Tropics', Marseille (France), 11–15 September 2005 and presented a paper titled '*Plasmodium falciparum*: Genetic polymorphism and identification of recrudescence infection in field isolates in India'.
- H Joshi attended the conference on 'Vivax Malaria Research: 2005 and Beyond' Maryland, USA, 9–10 December 2005 and presented poster on '*Plasmodium vivax*: Genetic complexity among Indian field isolates'.
- K Raghavendra attended workshop on 'Perspectives on the global challenges to malaria research; India response. Potential synergies with south africa', organised by Malaria Initiative for Africa, Pretoria, South Africa, 4–7 September 2005.
- SK Sharma attended the 'International Vaccine Congress', Berlin, 8–10 September 2005 and presented a paper on 'Epidemiology of malaria transmission in forest and plain ecotype villages in Sundargarh district, Orissa, India: a po-

tential site for malaria vaccine trials'.

N Singh attended the conference on 'Vivax Malaria Research: 2005 and Beyond' Maryland, USA, 9–10 December 2005 and presented poster on 'The changing dynamics of *Plasmodium vivax* and *P. falciparum* in Central India'.

N Singh attended the 'Annual Meeting of the American Society of Tropical Medicine and Hygiene', Washington DC USA, 11–15 November 2005.

OP Singh participated in 'XVI Annual Biology of Diseases Vectors' Mahidol University, Bangkok, 12–25 June 2005.

A Verma attended the conference on 'Vivax Malaria Research: 2005 and Beyond' Maryland, USA, 9–10 December 2005 and presented poster on '*Plasmodium vivax*: MSP3 alpha highly polymorphic marker in Indian field isolates'.

N Valecha attended workshop on 'Perspectives on the global challenges to malaria research: India's response' from 4–7 September 2005. The Malaria Initiative for Africa Workshop in Pretoria, South Africa.

N Valecha attended the conference on Vivax Malaria Research: 2005 and Beyond', Maryland, USA, 9–10 December 2005.

Scientific Publications

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Hindi Week Celebrations

In recent years much emphasis has been laid in the promotion of Hindi as an official language. In order to implement the same the Institute also conducted different activities to create awareness and enthusiasm for the language. Hindi Week was celebrated in September in Delhi as well as IDVC field units located at Jabalpur and Shahjahanpur in 2005. In Delhi a workshop was organised for administrative staff to motivate them to adopt Hindi in their routine administrative activities. A seminar was also organised for scientific staff to promote Hindi in their regular activities. Apart from these, different competitions such as Noting and Drafting, Essay Writing and Debates were held separately for officers and employees to encourage them. To promote Hindi as an official language, a booklet entitled, “*Rajbhasha Karyanvayan sambandhi Sandharbh Pustika*” was printed and released by Prof RC Mahajan, Emeritus Medical Scientist, PGIMER, Chandigarh on the occasion of Hindi Week celebrations on 23 September 2005.



Documents/Monographs/Manuals/Periodicals Published

Protocols for Uniform Evaluation of Insecticides for use in Vector Control

This document was published in 2005 in collaboration with Vector Control Research Centre, Pondicherry. Detailed procedures for evaluation of insecticides in indoor residual spray, impregnation of bednets, fabrics and plastic sheetings, space sprays, larvicides, repellents, biolarvicides, mono molecular films and insect growth regulators, have been given in this document. The document is being circulated to all the Institutes involved in the evaluation of insecticides. Electronic version (PDF) of this document can be downloaded from www.mrcindia.org/com_pro/comm_prot.htm

Malaria Parasite Bank : A National Repository

A monograph was published in 2005 on different activities of Malaria Parasite Bank, established in 1992. The document highlights the objectives, activities, achievements, collection of malaria parasites, their preservation, characterisation, adaptation to *in vitro* culture, supply, etc. Details of parasite isolates collected from different parts of India are included in

the document. Electronic version (PDF) of this document can be downloaded from www.mrcindia.org/para_bank/parasite_bank.htm

Pictorial Identification Key for Indian Anophelins

A pictorial identification key for 58 species of Indian anophelins has been published in 2005 on the request of Defence Research Laboratory, Tejpur (Assam) and is meant for researchers, field workers and technicians. The pictorial key comprises an introduction, checklist of Indian anophelins, morphological characters (pictures only) used for identification and guidelines for using the key and pictorial identification. The breeding ecology of each species in brief is also given in the key.

Journal of Vector Borne Diseases

The Institute has been publishing an English quarterly the *Journal of Vector Borne Diseases*. The journal publishes original research articles, research communications, review articles on various aspects of different vector borne diseases. The journal is abstracted by major ab-

stracting agencies and is being uploaded in the web for easy access to the scientists working in the field of vector borne diseases. PDF version of all articles published in the journal can be downloaded from www.mrcindia.org/journal.

Malaria Patrika

Malaria Patrika, a quarterly periodical in Hindi language is published by the Institute to create awareness on malaria in the community. Various activities relating to the Institute, news and latest developments in the field of malaria research are being covered in this periodical apart from scientific articles. The *Patrika* is being applauded by the community.

Sandarbh Pustika

A reference booklet in Hindi titled "*Rajbasha karyanvayan sambandhi sandarbh pustika*" was published in 2005 to promote Hindi as an official language and to implement official language rules. This booklet contains highlights of official language rules, vocabulary related to administrative terms and selected notings that are regularly used in day-to-day office work.



Conferences

XI World Congress on Public Health

Rio de Janeiro, Brazil, 21–25 August 2006

World Federation for Public Health Associations (WFPHA) and Brazilian Association of Collective Health (ABRASCO) are organising the congress to discuss the theme “Public Health in a Globalized World: Breaking down Political, Social and Economic Barriers”. Website: www.saudecoletiva2006.com.br/
Deadline: 13 January 2006

Joint Annual Conference of the Indian Society for Malaria and other Communicable Diseases (ISMOCD) & Indian Association of Epidemiologist (IAE)

Agra, India, 11–13 February 2006

The Indian Society for Malaria and other Communicable Diseases and Indian Association of Epidemiologist are organising the Joint Annual Conference to be held at Central JALMA Institute for Leprosy & other Mycobacterial Diseases (ICMR), Dr. Miyazaki Marg, Taj Ganj, Agra-282 001 (U.P.), India. The theme of conference is ‘Road map to disease free India’. Website: www.jalma-icmr.org.in/ismocd/ISMOCD.htm
Contact: D. Anil Kumar, e-mail: kumara@icmr.org.in
Deadline: 15 January 2005

VIII International Symposium on Vectors & Vector-borne Diseases

Madurai, Tamil Nadu, India, 7–9 October 2006

The Centre for Research in Medical Entomology in collaboration with National Academy of Vector-borne Diseases is organising the symposium in Madurai, Tamil Nadu, India.

Contact: Dr. B.K. Tyagi, Officer-in-charge, Centre for Research in Medical Entomology (CRME) 4, Sarojini street, Chinnachokkikulam, Madurai-625 002, Tamil Nadu India. Telephones: +91-452-2520565, 2530746; Fax: +91-452-2530660; E-mail: crmeicmr@icmr.org.in; website: crmeindia.org.

JHMRI third International Malaria Research Conference

Baltimore, Maryland, USA, March 20–21 March 2006

The John Hopkins Malaria Research Institute, John Hopkins

Bloomerg School of Public Health, Baltimore, Maryland, USA is organising the conference.

Contact: E-mail: malaria@jhsph.edu; website: http://malaria.jhsph.edu/jhmri/conferences_workshops

Deadline: 9 March 2006.

Courses

Molecular Recognition: The Case of *Bacillus thuringiensis* Insecticidal Toxins

Morelos, Mexico, 1–4 February 2006

Organisers: Alejandra Bravo de la Parra and Mario Soberón Chavez (Instituto de Biotecnología, UNAM, Cuernavaca, Morelos, Mexico).

Contact: Dr. Alejandra Bravo de la Parra, Instituto de Biotecnología, UNAM, Av. Universidad No. 2001, Col. Chamilpa, Apdo. Postal 510-3, C.P. 62210, Cuernavaca, Morelos, Mexico, Tel.: +52-777-3291635; Fax: +52-777-3291624; E-mail: bravo@ibt.unam.mx

Bio-informatics : Computer Methods in Molecular Biology

Petrópolis, Brazil, 20–31 March 2006

Organiser: Sándor Pongor (ICGEB, Trieste, Italy)

Contact: ICGEB- Conferences and Meetings, Padriciano 99, I-34012 Trieste, Italy. Tel.: +39-040-3757333; Fax: +39-040-226555; E-mail: courses@icgeb.org

Experimental Approaches to Studying Host-Pathogen Interactions

New Delhi, India, 30 October–10 November 2006

Organiser: Kanury V.S. Rao (ICGEB, New Delhi, India)

Contact: Ms. H.S. Narayanan, Chief of Administration, ICGEB, New Delhi Component, Aruna Asaf Ali Marg, New Delhi 110 067 India. Tel.: +91-11-26167356; Fax: +91-11-26162316; E-mail: shubha@icgeb.res.in

Molecular Approaches in Malaria Research and Vaccine Development

New Delhi, India, 20 November–1 December 2006

Organisers: V.S. Chauhan, Chetan E. Chitnis and Pawan Malhotra (ICGEB, New Delhi, India)

Contact: Ms. H.S. Narayanan, Chief of Administration, ICGEB, Aruna Asaf Ali Marg, New Delhi 110 067, India. Tel.: +91-11-26167356; Fax: +91-11-26162316; E-mail: shubha@icgeb.res.in

Glimpses of NIMR Activities

