Synthesis

Great Innovations from High Quality Research!

ISSN. 0127-9394 http://www.rmc.upm.edu.my

Retrotext-E 2.0

Maximising Teachers' Professional Development

Word Loading And Distribution Patterns

Overall Checklist

Teacher Log

Halal Collagen from Freshwater Fish Skins

A Method for Purifying the Nucleocapsid Protein of *Nipah* Virus

Phagocytic Efficiency of Alveolar Macrophage of Calves against *Pasteurella multocida* B:2

Leaf-specific Promoter from Oil Palm for Driving Leaf-specific Expression in Transgenic Plants

Cancer Stem Cells Contribute to Cisplatin Resistance in *Brca1/p53*-Mediated Mouse Mammary Tumours

Expression of Notch-1 Receptor and Its Ligands Jagged-1 and Delta-1 in Amoeboid microglia

In this Issue

What's Next in the Coming Issue...

- The Shortcut and Rapid Protocol of Isolating and Developing DNA Microsatellite Markers for River Catfish
- Formulation of Tropical Lignocellulose *Kenaf* Fibre Compound for Malaysian Cars
- Great Literary Works of the Malay Language by Raja Ali Haji of Johor-Riau in the 19th Century

Are you reading your own copy of the UPM R&D Bulletin?

Synthesis is the only quarterly R&D&C bulletin of Universiti Putra Malaysia published in March, June, September and December. It focusses on award-winning innovations and high impact publications. It covers research happenings that emerged from the various faculties and institutes across the university and provides a brief summary of some of the important research findings by UPM. It features special topics that are of national interest in various fields and disciplines.

Scientists must be made aware of the impact of their work and its possible applications to the society and public. It is hoped that this bulletin will provide the opportunity to interact, particularly through feedback or direct mail, with the scientists from either the private sector or other government research institutions.

Readership

Synthesis is the official research bulletin of the University and is published by the Office of the Deputy Vice Chancellor (Research and Innovation), UPM. It is available free of charge to the academic community as well as techno-entrepreneurs, venture capitalists and laypeople. If you would like to receive a copy of Synthesis or would like to get further information regarding the Office of the Deputy Vice Chancellor (Research and Innovation), Research Management Centre (RMC) and Innovation and Commercialisation Centre (ICC), please contact the editors (address below) or send an e-mail message to fatimah@rmc.upm.edu.my.

Letters to the Editors

If you have any comments about the content of the publication or contributions for the forthcoming issues, please send them to: The Editors, Synthesis, Publication Division, Research Management Centre, Tower II, UPM-MTDC Technology Centre, 43400 UPM, Serdang, Selangor, Malaysia or e-mail to fatimah@rmc.upm.edu.my. The editors reserve the right to edit articles before publication.

The opinions and views expressed in this publication are not necessarily those of Synthesis or the Research Management Centre (RMC). Acceptance and publication of articles in this publication do not imply recommendations by the RMC.

The publisher of Synthesis neither endorses nor is responsible for the accuracy or reliability of any opinion, advice or statement published in this bulletin. Under any circumstances, the publisher of this bulletin will not be liable for any loss or damage caused by reliance on the advice, opinion or information obtained either explicitly or implied through the contents of this publication.

Pursuit of a New Indicator: *h*-index

There are several indicators used to assess research performance of researchers from various fields of study. With higher and greater expectations emphasised in producing quality research outputs, other indicators are constantly suggested to measure them.

As usual, whenever a new indicator to assess research performance is used, researchers will start to voice out their dissatisfaction, or at least they will question: why do we need another factor or index? In the past, we had made used of the total number of publications per year or the total number of citations as a bibliometric indicator. Perhaps we did not realise then that the total number of papers did not account to the quality of scientific publications, while the total number of citations can be disproportionately affected by the participation in a single publication of major influence. What about journal impact factor? As its name would suggest, it is meant to assess the quality of a particular journal, not the person. Soon after, these traditional bibliometric indicators are questioned by the authors themselves.

h-index was suggested by Jorge E. Hirsch, a physicist at the University of California, San Diego, as a tool for determining theoretical physicists' relative quality, in which it is sometimes called the Hirsch index or Hirsch number. According to Hirsch:

"A scientist has index *h* if *h* of [his/her] *Np* papers have at least *h* citations each, and the other (*Np-h*) papers have at most *h* citations each".

In other words, a scholar with an index of *h* has published *h* papers each of which has been cited by others at least *h* times. Thus, the *h*-index reflects both the number of publications and the number of citations per publication.

The *h*-index can be manually determined by using free Internet databases, such as Google Scholar or alternatively subscription-based databases such as Scopus and the Web of Knowledge which provide automated calculators. Due to different coverage in each database, the calculated *h*-index for the same scholar is likely to be different. Web of Knowledge is found to have strong coverage of journal publications, but poor coverage of high impact conferences. Scopus has better coverage of conferences, but poor coverage of publications prior to 1996. Google Scholar has the best coverage of conferences and most journals, but like Scopus, it has limited coverage of pre-1990's publications. Google Scholar has also been criticised for producing "phantom citations", which resulted in 53% more citations than the Web of Knowledge and Scopus combined.

In order to show how to calculate this index, I will use Scopus and I could not imagine a better candidate other than Prof. Dr. Yaakob Che Man, the Director of *Halal* Products Research Institute, whom when this article is being written, has an *h*-index of 20 **(refer Figure 1)**. The first step is to sort all the papers written by Prof. Dr. Yaakob in citations descending order. In other words, we would sort 189 papers (captured by Scopus) from the highest cited papers to the lowest cited papers from 1996 to current. As shown in the figure, the first article has been cited 65 times, and as we go from top to bottom, the number of citations decreases. As we reach articles ranked 20 and 21, both have been cited 21 and 20 times, respectively. As we can see, article ranked 21 needs another one citation in order to have the same number as its rank. Hence we could conclude that of the 189 documents considered for the *h*-index, Prof. Dr. Yaakob has 20 articles that have been cited at least 20 times or in Hirsch's original statement:

"Prof. Dr. Yaakob has index **20** if **20** of his **189** papers since 1996 have at least **20** citations each and the other **169** (189-20) papers have no more than **20** citations each.

As we can see, the *h*-index looks for a balance between Quantity (Productivity) and Quality (Influence). It also encourages consistency in citation numbers and favours continuous stream of papers with lasting and above-average impact. It allows us to characterise the scientific output of a researcher with objectivity, and therefore may play an important role when making decisions about promotion, fund allocation and awarding prizes. Above all, *h*-index can also be used to measure the performance of journals, institutions, faculties, departments, research groups, selection of papers, etc.

As with any new mode of assessments, *h*-index is not free from criticism and limitations. Since its introduction in 2005, Hirsch's original paper "An Index to Quantify an Individual's Scientific Research Output" has been cited 749 times, and out of these 749 documents, a total of 4484 citations have been recorded which make an *h*-index of 31!

Interestingly, the *h*-index of an 'invention' is greater than its 'founder', where believe it or not, Hirsch shares the same *h*-index as one of UPM's best researchers, as far as *h*-index is concerned.

Assoc. Prof. Dr. Mohammad Hamiruce Marhaban
Deputy Director (Knowledge Management Division)

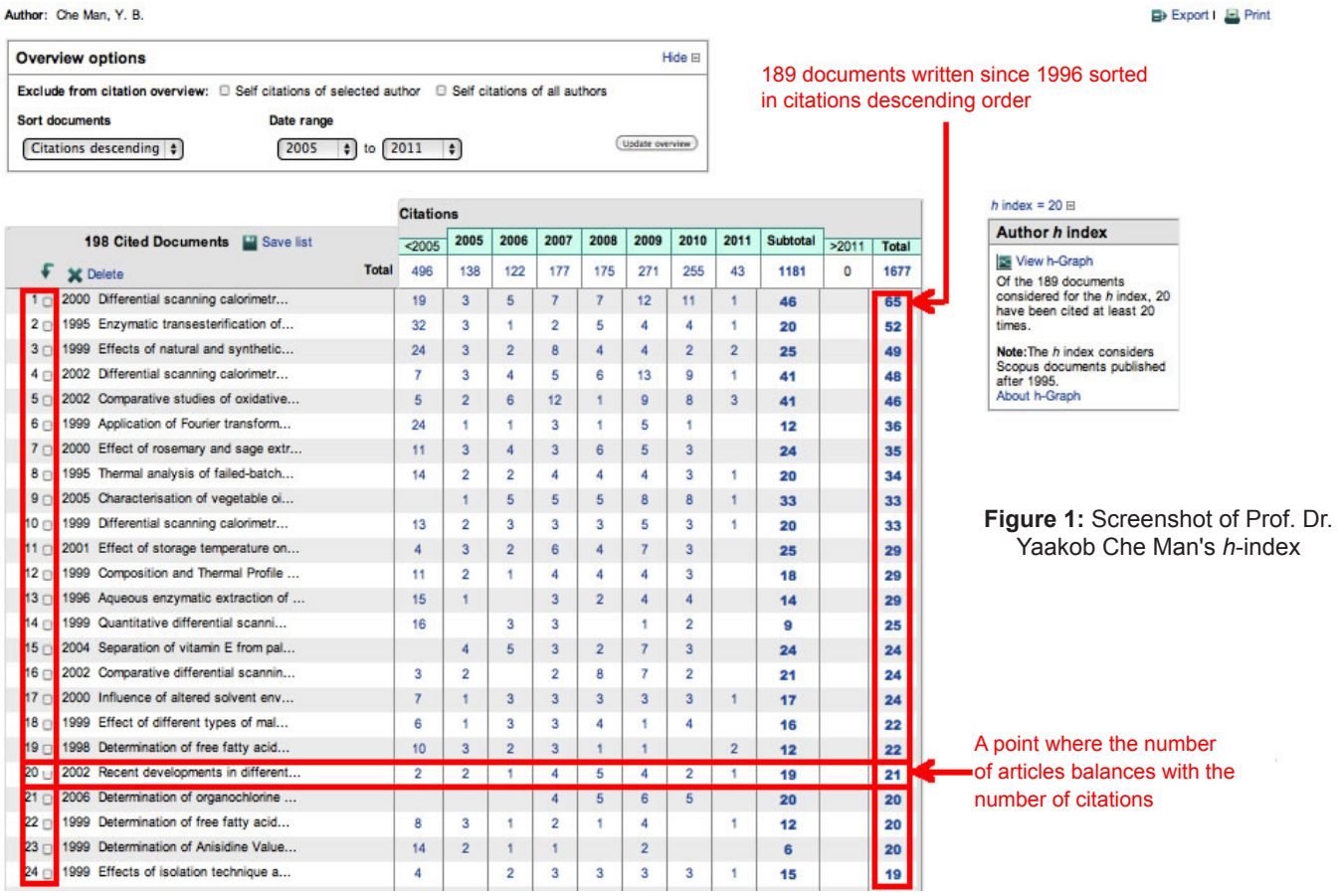


Figure 1: Screenshot of Prof. Dr. Yaakob Che Man's *h*-index

Maximising Teachers' Professional Development through RETROTEXT – E

RETROTEXT-E is a recent invention which attempts to benefit teachers as much as possible, perhaps to make their lives better. It is a tool for teachers to add more variety to their otherwise predictable life in schools. Most teachers teach and spend the rest of their day working on marking exercise books or doing administrative work. On-going evaluation of the materials that they use for teaching has probably never been a consideration. RETROTEXT-E is aimed to change all that.

Expert's Snapshots

Jayakaran Mukundan is an Associate Professor and is currently teaching at the Faculty of Educational Studies, UPM. Dr. Jayakaran's main research interests are in ELT Materials, Teaching of Writing and Teacher Professional Development. He is a Visiting Fellow at Leeds Metropolitan University, UK, and a Director on the Board of Directors of the Extensive Reading Foundation. He is also a core member of the Regional Creative Writing Group. He founded MICELT (The Malaysia International Centre for English Language Teaching) and has organised international conferences for more than 10 years. Apart from the many academic texts that he has written, he has also been a writer of story books and readers for young adults for many years.

At present there are two ways in which books, especially for English Language Teaching (ELT) are evaluated, the first way is to evaluate them impressionistically, while the second is by using an instrument, commonly known as a textbook evaluation checklist. While ELT textbooks can be evaluated efficiently through impression by experienced teachers, this may not be the case for novice teachers. Besides that, if more than one teacher is involved, impressionistic evaluation may not be feasible. Most teachers would then resort to the checklist. Although there are numerous checklists developed throughout the world, most of them have been tested for neither reliability nor validity. Another important point to be made is that checklists have been known to have very little capability of helping teachers evaluate important aspects of textbooks, especially with regard to the evaluation of vocabulary and structures, hence the need for some form of assistance from computers.

This software for evaluating textbooks was invented to help teachers to obtain an in-depth look into textbooks. It has a role that is similar to the role of a sophisticated microscope with computational powers. It provides teachers with a magnified view into the load and distribution patterns of words in textbooks.

Why place importance on words? Well, it is quite simple – words are the building blocks of language and a lot of research have shown that important factors like repetition and recycling of words are important considerations for teachers if words are to be remembered and learnt by their students. Words, researchers believe, should be repeated at least seven times if they are to be remembered. Another important factor to consider when developing curriculums and materials for beginner learners is that ad hoc writing of books, for instance, can lead to uncontrolled use of words, which may take into consideration the less important words (those not in the 2000 most frequent words used in the English Language) as opposed to the most frequently words used. The use of RETROTEXT-E is one way teachers will be aware of the loading and distribution of words in textbooks.

RETROTEXT-E has three main functions as it is conceptualised from the notion that triangulation of data provides strength to any inquiry. While conventional ways of evaluating textbooks usually feature a monoinstrument procedure (use of the checklist), RETROTEXT-E has the checklist working alongside two complementary instruments, the concordance software and the reflective journal. The potential of this three-instrument framework is further enhanced when all three are within a single software package.

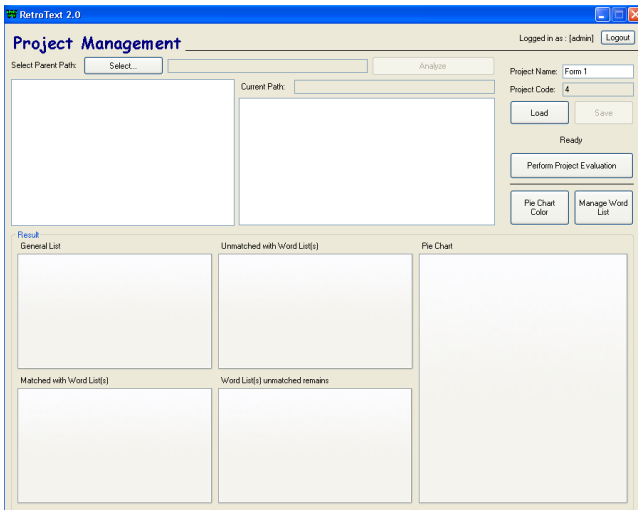


Figure 1: Worksheet page of word loading and distribution patterns in the programme

RETROTEXT-E enables teachers to constantly evaluate the book throughout the school year and beyond. The use of its concordance analysis capacity (Phase 1) can provide the teacher with the number of running words (tokens) and different words (types), unit by unit and across the whole book, provide teachers with a view on the various ways a single word is used in its context and more importantly provide comparisons of words used in textbooks with that of the 2000 most frequently used words in the English language. In addition to this, teachers will also be aware of how frequently words

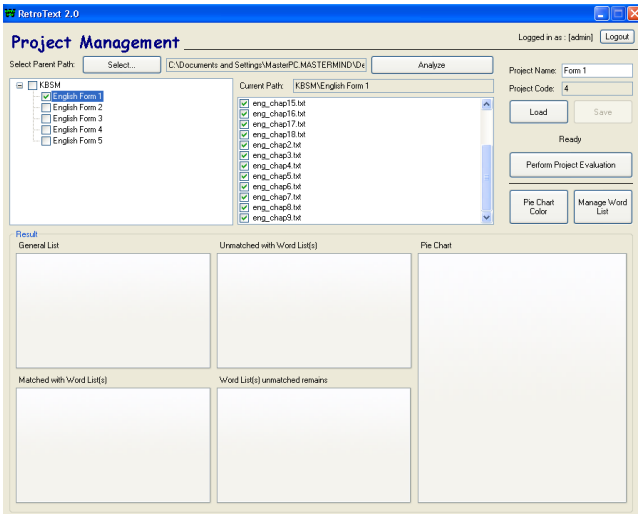


Figure 2: Sample of analysis: Books/chapters (in text file format) selected for evaluation

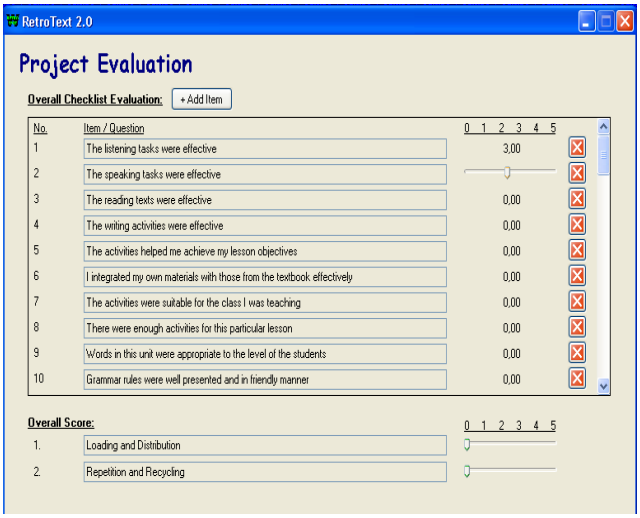


Figure 4: Sample of analysis: Evaluation of the target textbook(s) with overall checklist evaluation

are repeated and recycled so that attention can be focussed on the less frequently repeated words. The checklist (Phase 2) within the package is also user-friendly as unlike the paper and pen approach, it allows for quick computational analysis and systematic storage of data for the entire duration where the book is being evaluated. The use of the reflective journal (Phase 3) will help teachers to record qualitative observations after classroom teaching.

While the search for a more effective framework for evaluation of textbooks was a major consideration in the development of RETROTEXT-E, the potential of this software as an added incentive to professional development of teachers cannot be treated lightly. The software has the capability of individual as well as team evaluations, and this will support collaboration among teachers. Teachers can evaluate textbooks in teams throughout the year. They can also meet to discuss adaptation strategies for future teaching. As teachers evaluate the books throughout the year, they are also investigating aspects of the books, which of course lead to research. Teachers who are aware of this potential will then look at reporting aspects of this research at seminars and conferences thus enhancing their own professional development.

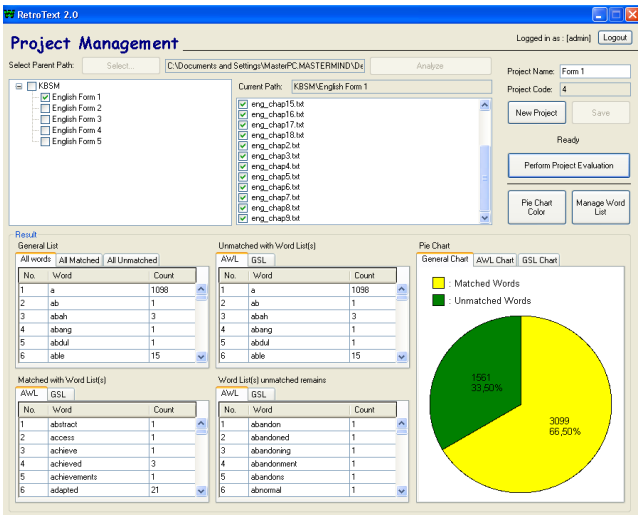


Figure 3: Sample of analysis: Results of evaluation

GOLD Malaysia Technology Exposition (MTE 2009)

GOLD The British Invention Show (BIS 2009)

GOLD UPM Invention, Research & Innovation Exhibition (PRPI 2005)

J. Mukundan, 2009. ESL Textbook Evaluation. A Composite Framework. Köln, Germany: Lambert Academic Publishing.

J. Mukundan and A. Aziz, 2009. Loading and Distribution of the 2000 High Frequency Words in Malaysian English Language Textbooks for Form 1 to Form 5. Pertanika Journal of Social Science and Humanities, 17, 92, 209-220.

J. Mukundan and N. Roslim, 2009. Textbook Representation of Prepositions. English Language Teaching, 2, 4, 13-24.

J. Mukundan and A. Aziz, 2007. A Forensic Study of Vocabulary Load and Distribution in Five Textbooks within an entire Malaysian Secondary School English Language Programme (Forms 1-5). Pertanika Journal of Social Sciences and Humanities, 15, 2, 183-198.

J. Mukundan, 2007. Evaluation of English Language Textbooks: Some Important Issues for Consideration. Journal of NELTA (Nepal English Language Teachers' Association), 12, 1 & 2, 80-84.

Reader Enquiry

Jayakaran Mukundan

Department of Language and Humanities Education, Faculty of Educational Studies, Universiti Putra Malaysia, 43400 UPM Serdang, Selangor, Malaysia.

Tel: +603-8946 8182 E-mail: jaya@educ.upm.edu.my

Title : Cancer Stem Cells Contribute to Cisplatin Resistance in *Brca1/p53*-Mediated Mouse Mammary Tumours
Author : **N. Shafee**, C. R. Smith, S. Wei, Y. Kim, G. B. Mills, G. N. Hortobagyi, E. J. Stanbridge and E. Y-H.P. Lee
Journal : Cancer Research
Volume : 68
Issue : 9
Page : 3243-3250
Impact Factor: 7.656

Cancer Stem Cells Contribute to Cisplatin Resistance in *Brca1/p53*-Mediated Mouse Mammary Tumours

Cisplatin is a platinum-based drug which is commonly used in the treatment of various types of cancer. This drug causes death of cancer cells by binding to and interfering with DNA molecules. Initial treatment of patients is effective in eliminating cancer cells. However, majority of the patients tend to relapse with cisplatin-resistant cancer. In this study, we used a mouse model of breast cancer which allowed for a longitudinal follow-up of cancer development and progression. These mice carried somatic mutations of *Brca1* and/or *p53* alleles in their mammary epithelial cells. The mutations developed using the Cre/loxP system resulted in mammary tumours with high penetrance.

Impact Factor: 7.656

We showed that exposure of the tumours to cisplatin led to the emergence of a subpopulation of cisplatin-resistant tumour cells. These cells displayed high levels of CD29 and intermediate levels of CD24 proteins ($CD29^{hi}CD24^{med}$). These two proteins are cell surface markers which are used in the identification of some adult stem cells. This subpopulation of cells showed common characteristics of stem cells with their ability to self-renew as well as to differentiate. When a small number of these cells were transplanted into the mice, they were able to regenerate tumours containing cells of various phenotypes. In addition to assaying the potential of cancer stem cells to regenerate tumours *in vivo*, we also carried out *in vitro* colony forming assay on the $CD29^{hi}CD24^{med}$ cells. Colony formation assay had previously been used for estimation of progenitor numbers in a cell population. This subpopulation of cancer stem cells showed a 6-fold higher colony-forming efficiency compared to the other cells.

Tumours regenerated following transplantation of this population of cells were continued to be treated with cisplatin. Further exposure of these tumours to cisplatin led to expansion of the resistant subpopulation of cancer stem cells. Their resistance also led to an increased proliferation rates relative to the total population of tumour cells during the treatment course. This population of cells was shown to be under the control of regulatory proteins involved in stem cells self-renewal and pluripotency. Findings from this study revealed a potential mechanism of clonal evolution and expansion of cancer stem-like cells as a potential cause of chemoresistance. We also identified a distinct cancer cell population which may serve as candidates for therapeutic targeting in breast cancer.

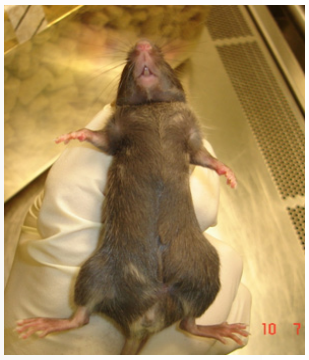


Figure 1: Transplantation of 1,000 cells of the $CD29^{hi}CD24^{med}$ subpopulation to the mouse resulted in tumour formation

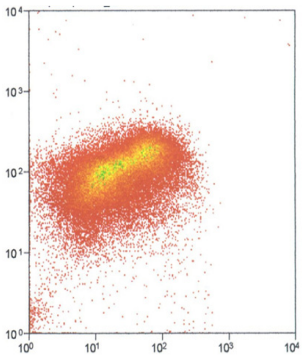


Figure 2: FACS analysis of dissociated tumour after secondary transplant

- *American Association for Cancer Research Special Conference Scholar-in-Training Award, San Diego, California, USA (2007)*
- *Avon Foundation-American Association for Cancer Research Travel Award: Annual Meeting, Los Angeles, California, USA (2006)*
- *Avon Foundation-American Association for Cancer Research International Scholar Award in Breast Cancer Research, University of California-Irvine, USA (2005)*

SILVER *UPM Invention, Research & Innovation Exhibition (PRPI 2008)*

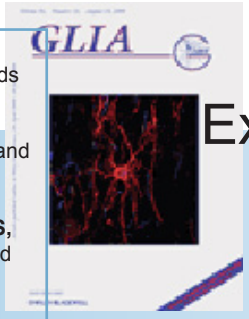
J-N. Cao, N. Shafee, L. Vickery. S. Kaluz, N. Ru and E. J. Stanbridge, 2010. MEK1act/Tubulin Interaction is an Important Determinant of Mitotic Stability in Cultured HT1080 Human Fibrosarcoma Cells. Can Res, 70, 14, 6004-6014.

N. Shafee, S. Kaluz, N. Ru and E. J. Stanbridge, 2009. PI3K/Akt Activity Has Variable Cell-specific Effects on Expression of HIF Target Genes, CAIX and VEGF, in Human Cancer Cell Lines. Can Lett, 282, 109-115.

N. Shafee, S. Y. Liao and E. J. Stanbridge, 2008. Upregulation of Stem Cell-related Genes in Hypoxic Mammosphere Cultures. J Immunother. 31, 9, 927-928.

Reader Enquiry
Norazizah Shafee
Department of Microbiology, Faculty of Biotechnology and Biomolecular Sciences, Universiti Putra Malaysia, 43400 UPM Serdang, Selangor, Malaysia.
Tel: +603-8946 6719 E-mail: nshafee@biotech.upm.edu.my

Title : Expression of Notch-1 Receptor and Its Ligands Jagged-1 and Delta-1 in *Amoeboid microglia* in Postnatal Rat Brain and Murine BV-2 Cells
Author : Q. Cao, J. Lu, C. Kaur, V. Sivakumar, F. Li, **P. S, Cheah**, S. T. Dheen and E-A, Ling
Journal : GLIA
Volume : 56
Issue : 11
Page : 1224-1237
Impact Factor: 5.013



Expression of Notch-1 Receptor and Its Ligands Jagged-1 and Delta-1 in Amoeboid microglia

The brain contains two major classes of cells, the neurone and glia (microglia, astrocytes and oligodendrocytes). Neurones are essential in conducting nerve impulse transmission whereas various glial types support, nourish and protect the neurones. Among the glial cells, the scavenger function of the microglia has attracted special interest due to their ability to maintain the immunological integrity of the healthy central nervous system (CNS). They exert neuroprotection from pathologic condition by secreting various inflammatory mediators and cytokines. The microglia exist in three forms at different stages of CNS development and immunological challenges. It is an interesting notion that the glial phenotypes are distinct from each other morphologically and functionally.

In response to brain injury and neuroinflammation, quiescent ramified microglia proliferate and transform into amoeboid-like reactive microglia. This glial type mediates phagocytosis at the injury site by secreting various pro-inflammatory cytokines such as interleukin-1 (IL-1), interleukine-6 (IL-6), TNF-alpha and inducible nitric oxide synthase (iNOS). The Notch signalling pathway is an evolutionarily conserved signalling mechanism that governs metazoan development, the neurodevelopment in particular. Signalling is initiated when the Notch ligand (such as Jagged or Delta) interacts with the Notch receptor, and the free intracellular fragment translocates to the nucleus to activate gene expression. During neurogenesis, Notch signalling has been shown to inhibit the neuronal differentiation. However, our knowledge about the role of Notch signalling during gliogenesis is not fully understood.

Impact Factor: 5.013

The present study is aimed to ascertain if microglia express Notch-1 receptor and its ligands, Jagged-1 and Delta 1, and, if so, to ascertain their roles in determining microglial type. For the first time, we provided evidence of the novel localisation of Notch-1 and its ligands in the immature amoeboid microglia in young rat brain. Later, in the mature brain, Notch activity was downregulated once the amoeboid microglia assumed a mature ramified form. These observations suggest that Notch-1 is necessitated for maintaining a pool of microglia population in their nascent form in the early brain development. When the murine microglial cell culture was challenged with the bacterial toxin, lipopolysaccharide (LPS), the Notch-1 alongside with its ligands expression and proinflammatory cytokines were upregulated in the reactive microglia. Following the pathologic condition, the Notch-1 and Jagged-1 expression was significantly suppressed by dexamethasone, the potent inhibitor for activated microglia. This data suggests that the Notch signalling may be linked to microglial phagocytic activity. It is an interesting notion that Notch-1 antiserum neutralisation suppresses the cytokines (IL-1) and iNOS but increases TNF-alpha. The *in vitro* studies strongly suggest that Notch-1 signalling differentially regulates the expression of various cytokines produced through the iNOS isoform in microglial activation.

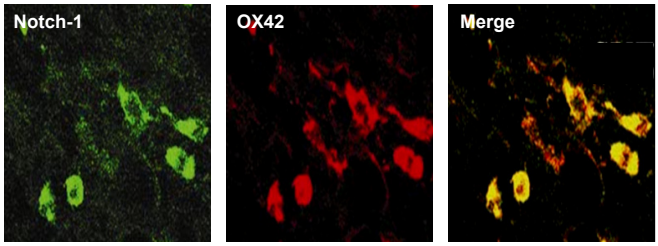


Figure 1: Double immunolabelling with anti-Notch-1 and OX42 (recognises the CR3 receptor on microglia surface) confirms their coexpression in the amoeboid microglia

K. H. Ling, C. Hewitt, T. Beissbarth, L. Hyde, P. S. Cheah, G. Smyth, S. S. Tan, C. Hahn, T. Thomas, P. Thomas and H. Scott, 2010. Spatio-temporal Regulation of Multiple Overlapping Sense and Novel Natural Antisense Transcripts at the Nrgn and Camk2n1 Gene Loci during Mouse Cerebral Corticogenesis. Cerebral Cortex, August 6, 2010.

E. Szarek, P. S. Cheah, J. Schwartz and P. Thomas, 2010. Molecular Genetics of the Developing Neuroendocrine Hypothalamus. Molecular and Cellular Endocrinology, 323, 115-123.

K. H. Ling, C. A. Hewitt, T. Beissbarth, L. Hyde, K. Banerjee, P. S. Cheah, P. Z. Cannon, C. N. Hahn, P. Q. Thomas, G. K. Smyth, S. S. Tan, T. Thomas and H. S. Scott, 2009. Molecular Networks Involved in Mouse Cerebral Corticogenesis and Spatio-temporal Regulation of Sox4 and Sox11 Sense and Antisense Transcripts Revealed by Transcriptome Profiling. Genome Biology, 10, 10, R104.

P. S. Cheah, N. Mohidin, B. Mohd-Ali, M. Myint and A. L. Azian, 2008. Histomorphometrical Study: Corneal Response to Short-term Reverse-geometry Orthokeratology Lens Wear in Primate Cornea, Cornea, 27, 461-470.

Reader Enquiry
Cheah Pike See
Department of Human Anatomy, Faculty of Medicine and Health Sciences, Universiti Putra Malaysia, 43400 UPM Serdang, Selangor, Malaysia.
Tel: +603-8947 2355 E-mail: pscheah@medic.upm.edu.my; cheahpikesee@yahoo.com

Phagocytic Efficiency of Alveolar Macrophage of Calves against *Pasteurella multocida* B:2

The respiratory tract is well protected from infection by numerous defense mechanisms, among which the cells known as macrophages and neutrophils. These cells function by engulfing all foreign bodies, a process known as phagocytosis, that enter the lungs. Since the respiratory tract is consistently exposed to various damaging materials inhaled into the system, these cells must be efficient in engulfing and removing foreign materials, which include microorganisms. On the other hand, microorganisms such as virus and bacteria need to overcome the defense mechanisms of the respiratory tract, including the phagocytosis by macrophages and neutrophils, before they can establish infection in the lungs and eventually cause disease. One of the most common bacteria found infecting the lungs of cattle in Asia is *Pasteurella multocida* B:2. The infection leads to severe disease and death within 12-24 hours. This infection is usually observed during stressful rainy seasons, in which the stress causes the phagocytic activity of macrophages and neutrophils in the lungs to be less efficient.

This study observed the phagocytic efficiency of macrophages and neutrophils cells following the introduction of *P. multocida* B:2 into the lungs of calves. Two types of *P. multocida* B:2 were used and compared, the unmodified, virulent wild-type and the modified, less-virulent gdhA derivative *P. multocida* B:2. Following the introduction of both types of *P. multocida* B:2, there was a significant ($p<0.05$) decrease in the phagocytic efficiency of macrophages and neutrophils of calves inoculated with the wild-type compared to those inoculated with gdhA derivative *P. multocida* B:2. It was found that only 45+4.1% of the macrophages and neutrophils of calves inoculated with the wild-type were involved in the phagocytosis compared to 57+3.4% of the macrophages and neutrophils of calves inoculated with the gdhA derivative. This means that more of the virulent wild-type *P. multocida* B:2 survived the elimination by the lung cells compared to the less-virulent gdhA derivative. With that, this resulted in the establishment of the disease following inoculation with the wild-type when few calves died showing signs like dullness, high fever, nasal discharge and salivation. Fluid was found accumulating under the skin at the lower jaw, neck and brisket, which appeared swollen. The respiratory tract was congested with accumulation of fluid while the lymph nodes were haemorrhagic. These changes were typical of infection by *P. multocida* B:2, which were not observed in calves inoculated with the less-virulent gdhA derivative of *P. multocida* B:2.

In conclusion, infection in the lungs of calves can be established by virulent bacteria that are able to suppress the phagocytic efficiency of macrophages and neutrophils. The less virulent bacteria are unable to suppress the phagocytic efficiency of macrophages and neutrophils, thus unable to establish infection in the lungs.

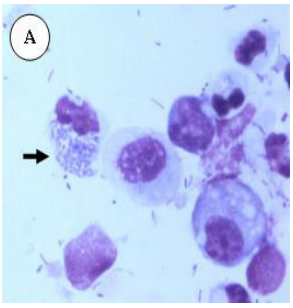


Figure 1: Lung washing fluid of a calf at 48 hours post-infection by *Pasteurella multocida* B:2 showing phagocytosed bacteria within the cytoplasm of neutrophils (*arrow*) Giemsa x1,000

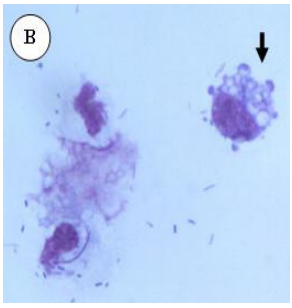


Figure 2: A neutrophil is in the process of engulfing a bacterium (*arrow*) Giemsa x1,000

GOLD *International Exposition of Research and Inventions of Institutions of Higher Learning (PECIPTA 2007)*

GOLD *UPM Invention, Research & Innovation Exhibition (PRPI 2006)*

SILVER *UPM Invention, Research & Innovation Exhibition (PRPI 2009)*

M. S. Shafarin, M. Zamri-Saad, B. Siti Khairani and A. A. Saharee, 2009. Pathological Changes in the Respiratory Tract of Goats Infected by *Pasteurella multocida* B:2. Journal of Comparative Pathology, 140, 194-197.

M. S. Shafarin, M. Zamri-Saad, B. Siti Khairani and A. A. Saharee, 2008. Transmission and Proliferation Pattern of *Pasteurella multocida* B:2 in Goats. Tropical Animal Health and Production, 40, 131-136.

M. Zamri-Saad and M. S. Shafarin, 2007. Response of Goats to Different Routes of Infection by *Pasteurella multocida* B:2. Journal of Animal and Veterinary Advances, 6, 340-343.

M. S. Shafarin, M. Zamri-Saad, S. M. Jamil, B. Siti Khairani and A. A. Saharee, 2007. Experimental Transmission of *Pasteurella multocida* 6:B in Goats. Journal of Veterinary Medicine A, 54, 136-139.

M. Zamri-Saad, A. Ernie and M. Y. Sabri, 2006. Protective Effect Following Intranasal Exposures of Goats to Live *Pasteurella multocida* B:2. Tropical Animal Health and Production, 38, 541-548.

Reader Enquiry
Mohd. Zamri Saad
Department of Veterinary Pathology and Microbiology, Faculty of Veterinary Medicine, Universiti Putra Malaysia, 43400 UPM Serdang, Selangor, Malaysia.
Tel: +603-8946 8312/8947 1626 E-mail: zamri@vet.upm.edu.my

Halal Collagen from Freshwater Fish Skins

Collagen is widely used in the food, pharmaceutical, cosmetic and medical industries. Its broad application is due to its multifunctional properties, thermal stability, solubility and its biological characteristics. Commercially available collagens are primarily from bovine and porcine skins and bones. These sources and the typical processing methods are not consistent with the Islamic *halal* requirements. The source of bovine collagen is also restricted by the outbreak of bovine spongiform encephalopathy (BSE) and the foot-and-mouth disease (FMD) while the issues of *halal* arise for the collagen derived from porcine. Collagen from aquatic sources has not been widely exploited and commercialised. At the same time, collagen extracted from freshwater fish has not been widely reported as well.

The processing of wastes from fisheries accounts for as much as 70-85% of the total weight of catch and the skins constitute to 30% of the total weight. These wastes have been generally dumped in-land or hauled into the ocean. Fish skin is known to contain collagen as part of its natural matrix. Aquatic and *halal* collagen will also benefit the Hindus, as well as, the Jews who refrain from consuming porcine-derived collagens. Collagens derived from fish skins have been proven to be more compatible to human system as compared to that of bovine and porcine.

More than 95% of the gelatin available in the industry are from non-*halal* sources and 75% of these are converted to edible gelatin. Since a direct data on the collagen production is not available, however, one could infer that the approximate percentage of collagen presently available in the market is of non-*halal* since gelatin is the hydrolysis product of collagen. In 2007, global collagen market was estimated to be at USD55 billion and collagen composed USD500 million in drinks and wellness product formulations while the rest went to pharmaceutical and cosmoceutical markets. The price of collagen varies depending on the market and the type. Temperate water fish collagens have been produced by countries like the United States of America. However, these collagens do not possess similar properties to the conventional collagens. Freshwater fish collagens exhibit properties very similar to the porcine and bovine collagens. Therefore, their application is not limited as compared to the temperate water fish collagens. Malaysia imports 100% of its needs for collagen. Hence, the ability of the country to produce freshwater fish collagen by tapping the strength of the aquaculture industry in the Asian region should be given a deep thought by policy makers and entrepreneurs.

Figure 1: Collagen from the red tilapia skin

Figure 2: Collagen from the barramundi

GOLD *IPTA Research and Development Exhibition and Conference 2003*

SILVER *37th International Exhibition of Inventions, New Techniques and Products of Geneva 2009*

SILVER *UPM Invention, Research & Innovation Exhibition (PRPI 2008)*

J. Bakar. *Kolagen dan Gelatin Halal*, 2010. *Dewan Kosmik*. 18, 5, 9-10. (Penerbitan Dewan Bahasa dan Pustaka), invited writer.

J. Bakar. *Kolagen dan Gelatin Ikan Air Tawar*, 2010. *Dewan Kosmik*. 18, 5, 6-8. (Penerbitan Dewan Bahasa dan Pustaka), invited writer.

J. Bakar, U. H. M. Razali, D. M. Hashim and A. Q. Sazili. Isolation and Characterisation of Collagen from Barramundi (*Lates calcarifer*) Skins (for submission to Journal of Bioprocess and Engineering).

J. Bakar, K. W. Tan, U. H. M. Razali and A. Azizah. Gelatins Characteristics Obtained by Liming Process from Three Cultured Freshwater Fish Skins. Food Hydrocolloids (final stage - with the editor) FOODHYD-D-09-00216.

J. Bakar and H. Kaur, 2002. Properties of Gelatins from Skins of Fish - Black Tilapia (*Oreochromis mossambicus*) and Red Tilapia (*Oreochromis nilotica*). Food Chemistry, 77, 81-84.

**Our research group at UPM managed to secure a patent pending for the processing of Halal collagen from aquatic sources (PI 20085247) and an international IP which was published on 01.07.2010 (WO/2010/074552). A pre-commercialisation for the collagen production has also been tentatively approved.*

Reader Enquiry

Jamilah Bakar

Department of Food Technology, Faculty of Food Science and Technology, Universiti Putra Malaysia, 43400 UPM Serdang, Selangor, Malaysia.

Tel: +603-8946 8396 E-mail: jamilah@putra.upm.edu.my

UPM's Latest Products and Innovations

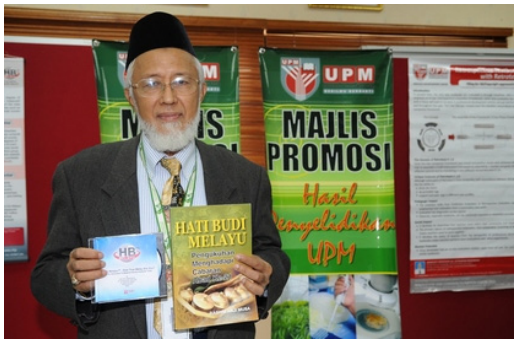
A Device to Trace Formaldehyde in Fish

Assoc. Prof. Dr. Fatimah Abu Bakar getting a helping hand from her assistant.

Assoc. Prof. Dr. Fatimah demonstrating ways of using the biosensor.

Assoc. Prof. Dr. Fatimah in her demonstration as the Deputy Vice Chancellor (Research and Innovation) of UPM, Prof. Dato' Dr. Abu Bakar Salleh looks on.

Two New Software by UPM Researchers – 'Adakah Anda Seorang Melayu?' and 'Retrotext-E'



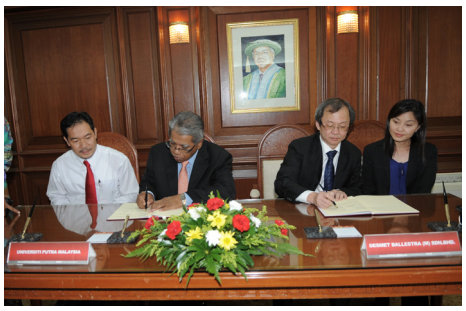
Prof. Dr. Hashim Musa and his software.

Assoc. Prof. Dr. Jayakaran Mukundan with his medal and software.

The Deputy Vice Chancellor (Research and Innovation), Prof. Dato' Dr. Abu Bakar Salleh (middle) sharing a light moment with Prof. Dr. Hashim Musa (left) and Assoc. Prof. Dr. Jayakaran (right) as well as the rest of the researchers.

R&D&C HAPPENINGS

Collaboration between UPM and Desmet for Palm-based Specialty Fats Research



The signing of MoU taking place between the Vice Chancellor of UPM and the Managing Director of Desmet Ballestra (M) Sdn. Bhd.

A firm handshake between the Vice Chancellor of UPM and the Managing Director of Desmet Ballestra (M) Sdn. Bhd.

The Vice Chancellor of UPM, Tan Sri Datuk Dr. Nik Mustapha R. Abdullah and the Managing Director of Desmet Ballestra (M) Sdn. Bhd, Mr. Khoon Kiak Kern (right) exchanging MoU documents. On the left is the Dean of the Faculty of Engineering, Prof. Ir. Dr. Mohd. Saleh Jaafar.

Awarding Young Scientist in Shanghai

Dr. Tan delivering his acceptance speech.

The finalists and the judges.

Digital System for the Modernisation of Agriculture

The Vice Chancellor of UPM cutting the ribbon to officiate his visit to the Agriculture Conservatory Park, IBS.

The Vice Chancellor of UPM trying to gain access to information of plants from his iPad.

UPM RETAINS ITS TITLE AS A MALAYSIAN RESEARCH UNIVERSITY

The Ministry of Higher Education has announced Universiti Putra Malaysia (UPM) as one of the top four public institutions of higher learning (IPTA) to retain its Research University (RU) title.

The other three universities who managed to retain the prestigious title are Universiti Malaya (UM), Universiti Kebangsaan Malaysia (UKM) and Universiti Sains Malaysia (USM), as declared officially on 20th July 2010. The accomplishment relies on four main aspects, which are the human capital, publication, patent and intellectual properties as well as the generation of revenue as reviewed during the reassessment conducted on 5th to 6th April 2010.

The Vice Chancellor of UPM, Prof. Tan Sri Datuk Dr. Nik Mustapha R. Abdullah said the University's key success in retaining the title is due to the commitment and contribution from everyone in improving the Quantity and Quality of Research as well as the Quantity of Postgraduates. "With this recognition, it is my great hope that UPM community will thrive in their services to ensure that the RU status will remain intact for the coming four years," he said.

One of the key factors for UPM's success in retaining the RU title is the fact that UPM produces employable graduates and the university is a point of reference for novel ideas and knowledge. UPM's recognition along with the other three varsities will elevate them as a role model to other IPTA(s) and IPTS(s) particularly in research and development (R&D) thus setting off the R&D activities and collaboration with commercial industries. The recognition also defines liberty for the university to carry out research activities to improve the quality of life and generate wealth in full throttle.

UPM has the potential to become the country's centre of excellence especially in key areas by producing high impact research publications, and to attract the greatest experts for learning and research, which in turn will produce quality graduates. With the RU status, UPM has a high potential to produce local and international postgraduates who are able to contribute significantly towards the nation's K-workforce. The involvement of international postgraduates will certainly heighten the country's image in the process of internationalisation, research and education as a whole.

No.	Summary and Total Marks	Marks Obtained	Total Marks
1.	Section B: Quantity and Quality of Researchers (25%)	22.5	25
2.	Section C: Quantity and Quality of Research (30%)	35.5	30
3.	Section D: Quantity of Postgraduates (10%)	15.1	10
4.	Section E: Quality of Postgraduates (5%)	4.4	5
5.	Section F: Innovation (10%)	6.5	10
6.	Section G: Professional Services and Gifts (7%)	7.0	7
7.	Section H: Networking and Linkages (8%)	7.2	8
8.	Section I: Support Facilities (5%)	2.8	5
	Total	**101.1**	**100**

* Source: MYRA (5th - 6th April 2010)

AWARDING YOUNG SCIENTIST IN SHANGHAI

Assoc. Prof. Dr. Tan Chin Ping, a lecturer from the Faculty of Food Science and Technology, Universiti Putra Malaysia (UPM), brought home a prestigious award at the Prosper.Net-Scopus Young Scientist Award in Sustainable Development held in Tongji University, Shanghai on 5th July 2010. He won the award for his work on the sustainability of palm oil and lipid products.

He was declared a winner based on the number of citations of his work as well as the number of his publications and patents in the category of agriculture and food security. He received USD 1,000 cash prize and was offered a fellowship from the International Bureau of the German Ministry of Education to fund his one-year research at any university of his choice in Germany.

Dr. Tan accepting his award from the chief adjudicator, Prof. Zhang Jianhua of Hong Kong Baptist University.

Dr. Tan has published a total number of 100 scientific articles in prominent international journals and 4 books as well as received 3 patents and presented more than 120 papers in international conferences. He is also a recipient of 30 international and local awards and has received 25 research funds from various agencies. His research is focussed on the expansion of green process technologies and the processing of palm oil as well as food manufacturing.

This year's awards are sponsored by Elsevier and awarded to young researchers and scientists of less than 40 years old who are constantly contributing to research activities in the Asia-Pacific region.

UPM RESEARCHERS RECEIVE 11 MEDALS IN THE UNITED STATES

Six researchers from Universiti Putra Malaysia (UPM) walked away with 11 medals at the Invention and New Product Exposition (INPEX) held recently at Pittsburgh, Pennsylvania, USA on 16th to 18th June 2010.

Dr. Helmi Zulhaidi Mohd. Shafri from the Faculty of Engineering bagged two medals, a gold medal in the agriculture category and a silver medal in the software category for his Hyperspectral-based Tree Assessment System, a product to identify and assess trees available in the forest and large orchards in Malaysia. The system does not only detect the number of trees in Malaysia's forests but it also evaluates the trees' condition and health level. It has great potential in the palm oil industry and forest management bodies.

(from left): Assoc. Prof. Dr. Loh Teck Chwen, Dr. Helmi Zulhaidi Mohd. Shafri, Farzad Hejazi (a PhD candidate), Assoc. Prof. Dr. Ratnasamy Muniandy, Assoc. Prof. Dr. Jamaloddin Noorzaei, Prof. Dr. Hashim Musa, Prof. Dr. Suhaila Mohamed, Assoc. Prof. Dr. Foo Hooi Ling and Assoc. Prof. Dr. Robiah Yunus.

The second gold medal (software category) was seized by Assoc. Prof. Dr. Jamaloddin Noorzaei from the Faculty of Engineering with his invention known as the Development of a 3-D Nonlinear Earthquake Resistance System for Framed Buildings. The system is able to secure the structure of a building during earthquakes and storms by using a viscous damper as a frame in concrete buildings. The key function of this invention is to provide shelter for 1 billion inhabitants from natural disasters such as earthquakes and tsunami. The system has also won a silver medal in the construction category.

Besides that, Assoc. Prof. Dr. Robiah Yunus from the Faculty of Engineering won 3 medals, a silver medal in the environmental category and two bronze medals in the science and alternative energy category for her invention, the Innovative Technology in Biodiesel Production from Jatropha Oil. The technology allows diesel fuel to be produced from Jatropha oil through soluble extraction and pre-treatment acid process which eliminate the need for purification process to produce diesel.

Prof. Dr. Hashim Musa from the Faculty of Modern Languages and Communication on the other hand, walked away with two silver medals with his invention of HB Melayu – Analysing How True Malay Are You? (education and software category). This interesting software is designed to trace the good values that are instilled among the Malays nowadays. The findings successfully listed 26 components of

fine demureness discovered by the software through *pantun*, *sajak*, *syair* and *puisi lama*. This software is potentially commercialised for nation and youth building such as the National Civics Bureau (BTN) and National Service (PLKN).

Prof. Dr. Suhaila Mohamed and Assoc. Prof. Dr. Loh Tech Chwen won a bronze medal each for their products, the Mental and Cardiovascular Health products from Oil Palm Leaf and the Novel Natural Feed Additive for Monogastric Animals.

Out of the 700 participations from around the world, Malaysia was represented by UPM, UiTM, Uniten and Beta Factor Sdn. Bhd.

UPM-ALNAIR TO ENHANCE RESEARCH COLLABORATION ON OPTIC COMMUNICATION

The Photonic Laboratory of the Wireless and Photonic Network (WiPNet) Research Centre of Excellence in the Faculty of Engineering, Universiti Putra Malaysia (UPM) joined hands with Alnair Labs Corporation (Alnair) to advance their alliance in optic communication research.

Dr. Ahmad Shukri Mohammad Noor , a senior lecturer in the Department of Computer and Communication System, Faculty of Engineering, said

The signing of the MoU.

the Memorandum of Understanding (MoU) will consist of fabrication, fibre bragg grating (FBG) which is used in the Photonic Laboratory. "The fabrication machine will be placed in the Photonic Laboratory of the Wireless and Photonic Network (WiPNet) under the supervision of 10 researchers where 6 of them are the main researchers in the photonic field," he said. The Deputy Vice Chancellor (Research and Innovation) of UPM, Prof. Dato' Dr. Abu Bakar Salleh together with the President and CEO of Alnair, Dr. Sze Y. Set signed the MoU.

Upon a complete tour at the Photonic Laboratory, Dr. Sze was absolutely satisfied with the facilities in the laboratory and had expressed his approval to open doors for staff and students of UPM to Alnair Laboratories in Japan for internship. The collaboration between UPM and Alnair began in 2004 with members from the corporation's Board of Directors, and Professor Dr. Kikuchi from the University of Tokyo as an external examiner at the Department of Computer and Communication System, Faculty of Engineering, UPM. His involvement has fairly prolonged the alliance between UPM and Alnair even though he is no longer attached as an external examiner at the faculty.

Alnair was established in 2001 in which it is a nano-technology based research supplier company intended for optic system development worth 413 mil yen (in 2008). Alnair is an international repute company where 20 of its optic communication related products are already in the market such as the 40Gb/s BERT tester and ultra compact femtosecond fibre laser, amongst the most cutting-edge devices of late. Alnair (Malaysia) Sdn. Bhd. is based in Pulau Pinang where it handles the operation of Alnair in the country. Alnair is constantly seeking for opportunities to expand its research collaboration on photonic outside of Japan whereby here in Malaysia, UPM has a photonic research laboratory that is completely equipped and modern led by Profesor Dr. Mohd. Adzir Mahdi.

The Deputy Vice Chancellor (Research and Innovation) of UPM, Prof. Dato' Dr. Abu Bakar Salleh (left) in a firm handshake with the President and the CEO of Alnair, Dr. Sze Y. Set (right).

DIGITAL SYSTEM FOR THE MODERNISATION OF AGRICULTURE

Universiti Putra Malaysia (UPM) has introduced a digital system for medicinal herbs available at its conservatory park as part of the university's initiatives to modernise high impact agriculture.

The Vice Chancellor of UPM, Prof. Tan Sri Datuk Dr. Nik Mustapha R. Abdullah said the system is developed to improve the access of information on the plants available at the Agricultural Conservatory Park and as a point of reference for the community and the industry as the university's effort in generating new technology to enhance agricultural innovation. "The system is a pilot project that involves botanical gardens as they are among the many interesting places in the country that attract local and foreign visitors all year round," he said during his visit at the Institute of Bioscience (IBS).

The Vice Chancellor listening to a briefing by a researcher from IBS.

He also stressed that the tagline of UPM – 'A World Leader in New Tropical Agriculture' requires constant dedication to sustain as it reflects the innovation efforts being applied in agriculture to a higher level. "This is in line with the government's aspiration to incorporate technology in agriculture and as a form of support in research planning and implementation," he added further.

In addition, the Director of IBS, Prof. Dr. Fatimah Md. Yusoff informed the media that IBS is soon to be equipped with Biohazard Safety Level (BSL-3) machineries in order to fulfill the requirements from the European Standard EN12128 and World Health Organisation (WHO) Guidelines (2004) commencing August 2010 once they are approved. "The laboratory construction is for research conducted on the handling of third class pathogen virus such as the *Nipah* virus, SARS Coronavirus, Yellow Fever Virus, Mycobacterium Tuberculosis and Bacillus Anthracis" she said.

The Vice Chancellor of UPM, Prof. Tan Sri Datuk Dr. Nik Mustapha R. Abdullah (second from right) and Deputy Vice Chancellor (Research and Innovation), Prof. Dato' Dr. Abu Bakar Salleh (second from left) trying out the system on their iPads.

The Agriculture Conservatory Park was established in 2006 with 500 species of herbal plants available for biological science research.

The Vice Chancellor of UPM (right) enquiring about the conservatory park to the Director of IBS, Prof. Dr. Fatimah Md. Yusoff (centre) as En. Tajuddin Abd. Manap looks on (left).

...continued from Synthesis Issue 29, June 2010 - Final

Guidelines for Pollution in Drinking Water

Mohammad Reza Mohammad Shafiee, Mohamad Pauzi Zakaria, Nayan Deep S. Kanwal, Mahyar Sakari, Pourya Shahpoury Bahry and Alireza Riyahi Bakhtiari

Water pollution is one of the major and serious problems to humans. There are several pollutants which pose as threats to drinking water.

They are categorised in six categories as follows:

- Microorganisms;
- Disinfectants;
- Disinfection Byproducts;
- Inorganic Chemicals;
- Organic Chemicals; and
- **Radionuclides**.

As mentioned above, these are potential pollutants to human drinking water worldwide. This guideline provides a short yet necessary information on these drinking water pollutants. In this final volume, you will receive information focussing on Radionuclides:

Radionuclides

Contaminant	[1]MCLG	[2]MCL	Potential Health Effects from Ingestion of Water	Sources of Contaminants in Drinking Water
Alpha particles	none ------- zero	15 picocuries per litre (pCi/L)	Increased risk of cancer	Erosion of natural deposits of certain minerals that are radioactive and may emit a form of radiation known as alpha radiation
Beta particles and photon emitters	none ------- zero	4 milligrammes per year	Increased risk of cancer	Decay of natural and man-made deposits of certain minerals that are radioactive and may emit forms of radiation known as photons and beta radiation
Radium 226 and Radium 228 (combined)	none ------- zero	5 picocuries per litre (pCi/L)	Increased risk of cancer	Erosion of natural deposits
Uranium	zero	30 ug/L as of 12/08/03	Increased risk of cancer, kidney toxicity	Erosion of natural deposits

Definitions:

1. Maximum Contaminant Level Goal (MCLG) - The level of a contaminant in drinking water below which there is no known or expected risk to health. MCLGs allow for a margin of safety and are non-enforceable public health goals. 2. Maximum Contaminant Level (MCL) - The highest level of a contaminant that is allowed in drinking water. MCLs are set as close to MCLGs as feasible using the best available treatment technology and taking cost into consideration. MCLs are enforceable standards.

*Units are in milligrammes per litre (mg/L) unless otherwise noted. Milligrammes per litre are equivalent to parts per million.

Leaf-specific Promoter from Oil Palm for Driving Leaf-specific Expression in Transgenic Plants

Genetic engineering is an important tool for crop improvement in plant biotechnological research. It involves transferring DNA segments containing genes by specifying the different traits from one organism to another. Expression of an introduced gene (transgene) produces protein with specific structural and biochemical properties enabling transgenic plants to possess new desired characteristics or to produce novel high value products. One of the key components for determining the success of any genetic engineering endeavours is the selection of correct regulatory or promoter sequences. Promoters control expression of the transgenes because promoter activities determine the location of tissues and the amount of products to be produced by the transgenic plants. Tissue-specific promoters such as the fruit-specific, flower-specific or leaf-specific promoters enable targeted and high level of expression of the transgenes in specific plant tissues. This is more desirable as non-selective expression of the transgenes at high level in all plant tissues will interfere with various developmental and physiological processes and will be deleterious to the plants.

Our previous work successfully identified a gene that was being expressed at high level in the leaf tissues of oil palm. This gene which was designated as *LS01* was controlled by a promoter sequence that ensured abundant and leaf-specific expression of *LS01*. Subsequent research efforts have resulted in the successful isolation of the promoter sequence referred to as pLS01 which is the first leaf-specific promoter isolated from oil palm. The isolated pLS01 is about 1.0 kb in size and is proven to be a valuable tool in driving leaf-specific expression in transgenic plants based on the various assays carried out on pLS01 promoter activities using reporter gene. Quantitative assay of pLS01 using reporter gene indicates that pLS01 is a strong leaf-specific promoter whose activity in oil palm leaves is three-folds higher than the well known constitutive cauliflower mosaic virus 35S (CaMV-35S) promoter. Further functional analysis of promoter activity showed that pLS01 can drive leaf-specific reporter gene activity in other monocotyledonous plants such as *Oryza sativa* (rice) and distantly related transgenic dicotyledonous model plant, *Arabidopsis thaliana*.

Our findings have thus demonstrated that pLS01 can have wide applications in research which involve analysing gene expression of the leaves of different transgenic plant species. It is also valuable for crop improvement and production of novel products via genetic engineering targeting leaf tissues for expression of introduced genes. It can be used in generating resistance in transgenic plants against pest infestation with high photosynthetic capacity and is capable of producing novel products such as bioplastic and vaccines. pLS01 is currently being used at the Malaysian Palm Oil Board (MPOB) in its genetic engineering programme. pLS01 and its applications in driving leaf-specific expression in transgenic plants have been granted patent in the United States.

Leaf-specific: GUS | Negative Control | CaMV 35S: GUS

Figure 1: Oil palm pLS01 can drive leaf-specific expression of transgene in dicotyledonous species

GOLD *Malaysia Technology Expo (MTE 2008)*

SILVER *UPM Invention, Research & Innovation Exhibition (PRPI 2006)*

BRONZE *International Exhibition of Inventions, New Techniques and Products of Geneva (2009)*

P. L. Chan and S. N. A. Abdullah, 2010. Leaf-specific Chlorophyll A/B Binding Protein Gene Promoter from Oil Palm. United States Patent 7629454.

M. Y. A. Masani, G. K. A. Parveez, A. M. D. Izawati, P. L. Chan and S. N. A. Abdullah, 2009. Construction of PHB and PHBV Multiple-gene Vectors Driven by an Oil Palm Leaf-specific Promoter. Plasmid, 62, 3, 191-200.

P. L. Chan, S. N. A. Abdullah and R. Othman, 2008. Light-Harvesting Chlorophyll A/B Binding Protein (LHCB) Promoter for Targeting Specific Expression in Oil Palm Leaves. Journal of Oil Palm Research. Malaysia-MIT Biotechnology Partnership Programme Special Issue, 21 – 29.

Reader Enquiry

Siti Nor Akmar Abdullah

Institute of Tropical Agriculture,
Universiti Putra Malaysia, 43400 UPM Serdang, Selangor, Malaysia.
Tel: +603-8946 4117 E-mail: sakmar@agri.upm.edu.my

A Method for Purifying the Nucleocapsid Protein of *Nipah* Virus

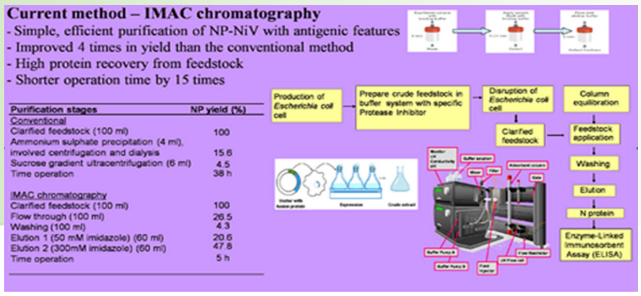


Figure 1: IMAC chromatography

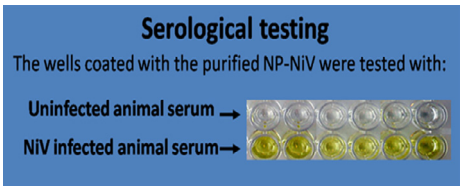


Figure 2: Serological testing

The present invention provides a purification protocol for the recovery of recombinant histidine-tagged nucleocapsid protein of *Nipah* virus (NP-NiV) from a microbial host by using the capture process based on the immobilised metal affinity chromatography (IMAC). *Nipah* virus was initially isolated upon the outbreak of encephalitis and respiratory illness among humans through close contact with infected swine in Malaysia in 1999. A mass culling of affected swine was executed, causing large economic loss to the swine industry of the affected country. Hence, there is a need for surveillance programme in preventing future NiV epidemics by developing rapid serological diagnostic reagent of the virus to determine the presence of anti-NiV in swine farms.

The NP-NiV has been successfully produced in a microbial system, and it is highly antigenic and immunogenic. Recombinant protein of the N gene has potential to be developed as a diagnosis tool for NiV infection and to replace the high risk crude formalin-inactivated NiV antigen. A major problem during the production and purification of the NP-NiV is the low recovery yield due to proteolytic degradation. The protein degradation can be reduced by shortening the purification time. The lab scale purification of the NP using sucrose gradient ultracentrifugation is time consuming, thus provides sufficient time for the protease to attack the NP. Therefore, the development of a rapid and simplified purification of NP is desired.

In this study, a rapid and efficient purification system, a packed bed column of immobilised nickel affinity medium is applied to purify recombinant histidine-tagged NP-NiV from clarified feedstock. The benefits of using IMAC as a ligand are its stability, high protein loading, mild elution conditions, simple regeneration and low in cost. These factors are important to be considered when large-scale purification procedures are involved. In this respect, we have now successfully established a scaled-up purification protocol using the nickel chelating with iminodiacetic acid (IDA) group at the agarose chromatographic medium. With that, the optimisations of binding and elution conditions are investigated in this study. The optimal binding was achieved at pH 7.5 and at superficial velocity of 1.25 cm/min. The bound N protein was successfully recovered by a stepwise elution with different concentrations of imidazole: 50, 150, 300 and 500 mM. The NP-NiV was captured and the effluent was collected which was free of the contaminant protein in a scaled-up IMAC packed bed column with the optimised condition obtained from the method scouting.

SILVER *UPM Invention, Research & Innovation Exhibition (PRPI 2008)*

BRONZE *BioMalaysia (BioInno Awards 2009)*

F. C. Chong, W. S. Tan, D. R. A. Biak, T. C. Ling and B. T. Tey, 2009. Purification of Histidine-tagged Nucleocapsid Protein of *Nipah* Virus Using Immobilised Metal Affinity Chromatography. Journal of Chromatography B, 877, 14-15, 1561-1567.

F. C. Chong, W. S. Tan, D. R. A. Biak, T. C. Ling and B. T. Tey, 2009. A Simplified Process for the Purification of Recombinant Nucleocapsid Protein of *Nipah* Virus. Journal of Bioscience and Bioengineering. 108 (Supplement 1): S70-S71.

F. C. Chong, W. S. Tan, D. R. A. Biak, T. C. Ling and B. T. Tey, 2008. Recovery of Recombinant Nucleocapsid Protein of *Nipah* Virus Using Immobilised Metal Ion Affinity Chromatography. 30th Symposium of Malaysian Society for Microbiology, pg: 22.

F. C. Chong, W. S. Tan, D. R. A. Biak, T. C. Ling and B. T. Tey, 2007. An Efficient Purification Method for the Direct Recovery of Recombinant Nucleocapsid Protein of *Nipah* Virus. 32nd Malaysian Society for Biochemistry and Molecular Biology Annual Conference, pg: 97.

Reader Enquiry
Tey Beng Ti
Department of Chemical and Environmental Engineering, Faculty of Engineering, Universiti Putra Malaysia, 43400 UPM Serdang, Selangor, Malaysia.
Tel: +603-8946 6289 E-mail: btey@eng.upm.edu.my

The 3rd MSC Malaysia R&D Series & IP Connect 2010

The 3rd MSC Malaysia R&D Series & IP Connect 2010, with its theme of "Computer System & Mobile Security", was held on 5th August 2010 in Monash University (Sunway Campus), Selangor. The event, which featured a line-up of distinguished speakers from various higher learning institutions with key industry players, aimed to provide a vast exposure and understanding of the ICT cyber security and establish potential areas for R&D with regard to the exploration of new innovation. Besides that, the event was also intended to discuss the limitations of current technologies and explore available alternatives.

The IP Connect programme is an intellectual property (IP) rights and business matching platform to bring together Research Institutions (RIs) and Institutions of Higher Learning (IHLs) with MSC Malaysia status companies to foster IP licensing or sale opportunities for RIs and IHLs, create new productisation and/or commercialisation opportunities for MSC Malaysia status companies and increase technology transfer among IHLs and RIs with MSC Malaysia status companies. Among the proposed scopes for the 3rd MSC Malaysia R&D Series & IP Connect included trustworthy cloud-based services, usable security and privacy, identity management and pseudonymity, next-generation browser technology, secure extensions and plug-ins, advertisement and affiliate fraud as well as security architectures.

Dr. Normahdiah Sheik Said from the Faculty of Modern Languages and Communication was selected to present her invention, namely the NEMD Model (NORMA™ Engagement Multimedia Design Model) in front of 60 representatives from various MSC Malaysia status companies. The NEMD model, a system which determines human engagement behaviour, was developed through observations and experimental studies of young teenagers in engaging situations as they interacted with computers. The model has become more relevant nowadays due to the fact that our lives revolve around computers. It has been tested in varying environments by taking into account the engagement factors.

An early attempt was the development of a package called "*3 Sahabat & Si Rama-Rama*" which incorporated a text design that engaged preschool children to learn how to tell stories. The interactive illustration, including a poetic rhyme had contributed to an engaging learning situation. As the children were engaged with the design features created, they would therefore remember what was initially aimed for them to remember. Another attempt was applying the engaging features in a student-centred learning environment for a university course. The features did not only manage to engage the students of the course but also enabled them to produce good learning outcomes. It is hoped that the engaging features of the model would contribute towards preparing our younger generation to face the New Educational Paradigm Shift in today's techno-savvy world.

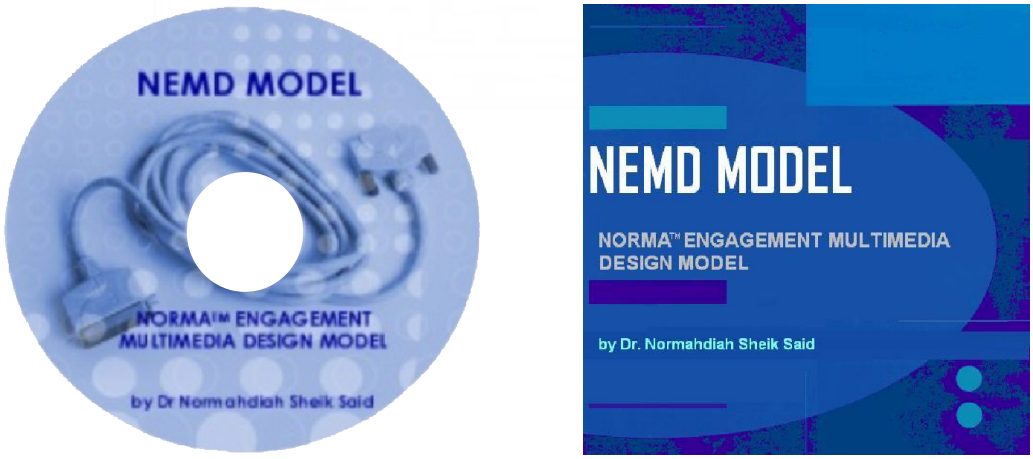


Figure 1: NEMD Model – NORMA™ Engagement Multimedia Design Model

Reader Enquiry
Asrizam Esam
Commercialisation Division, Innovation and Commercialisation Centre,
Deputy Vice Chancellor (Research and Innovation), Universiti Putra Malaysia, 43400 UPM Serdang, Selangor, Malaysia.
Tel: +603-8947 1294 E-mail: asrizam@icc.upm.edu.my

Pertanika

Pertanika is indexed in Scopus & EBSCO

Our goal is to bring high quality research to the widest possible audience

Pertanika is an international peer-reviewed leading journal in Malaysia which began its publication in 1978. The journal publishes in three different areas — Journal of Tropical Agricultural Science (JTAS); Journal of Science and Technology (JST); and Journal of Social Sciences and Humanities (JSSH).

JTAS is devoted to the publication of original papers and serves as a forum to discuss practical approches to improve quality in issues pertaining to tropical agricultural research or related fields of study. It is published twice a year in February and August.

JST caters for science and engineering research or related fields of study. It is published twice a year in January and July.

JSSH deals in research or theories in social sciences and humanities research with a focus on emerging issues pertaining to the social and behavioural sciences as well as the humanities, particularly in the Asia Pacific region. It is published twice a year in March and September.

Call for Papers

Pertanika invites you to explore frontiers from all fields of science and technology to social sciences and humanities. You may contribute your scientific work for publishing in UPM's hallmark journals either as a *regular article*, *short communication*, or a *review article* in our forthcoming issues. Papers submitted to this journal must contain original results and must not be submitted elsewhere while being evaluated for the Pertanika Journals.

Submissions in English should be accompanied by an abstract not exceeding 300 words. Your manuscript should be no more than 6,000 words or 10-12 printed pages, including notes and abstract. Submissions should conform to the Pertanika style, which is available at http://www.pertanika2.upm.edu.my/jpertanika/index.htm or by mail or email upon request.

Papers should be double-spaced 12 point type (Times New Roman fonts preferred). The first page should include the title of the article but no author information. Page 2 should repeat the title of the article together with the names and contact information of the corresponding author as well as all the other authors. Page 3 should contain the abstract only. Page 4 and subsequent pages should have the text - Acknowledgments - References - Tables - Legends to figures - Figures, etc.

Questions regarding submissions should be directed to the Executive Editor, Pertanika Journals.

Remember, ***Pertanika is the resource to support you in strengthening research and research management capacity.***

Why should you publish in Pertanika Journals?

Benefits to Authors

PROFILE: Our journals are circulated in large numbers all over Malaysia, and beyond, in Southeast Asia. Recently, we have widened our circulation to other overseas countries as well. We will ensure that your work reaches the widest possible audience in print and online, through our wide publicity campaigns held frequently, and through our constantly developing electronic initiatives through e-Pertanika and Pertanika Online.

QUALITY: Our double-blind peer refereeing procedures are fair and open, and we aim to help authors develop and improve their work. Pertanika JTAS is now over 30 years old; this accumulated knowledge has resulted in Pertanika JTAS being indexed by Scopus (Elsevier).

AUTHOR SERVICES: We provide a rapid response service to all our authors, with dedicated support staff for each journal, and a point of contact throughout the refereeing and production processes. Our aim is to ensure that the production process is as smooth as possible, is borne out by the high number of authors who publish with us again and again.

LAG TIME & REJECTION RATE: The elapsed time from submission to publication for the articles in Pertanika averages 6-8 months. A decision of acceptance of a manuscript is reached in 1 to 3 months (average 7 weeks). Our journals have a 30% rejection rate of submitted manuscripts. Many of the papers fail on account of their substandard presentation and language (frustrating the peer reviewers).

An Award Winning International–Malaysian Journal

FEB. 2008

Mail your submissions to:

The Executive Editor,
Pertanika Journals,
Publication Division,
Research Management Centre (RMC),
Deputy Vice Chancellor (Research & Innovation),
Tower II, UPM-MTDC Technology Centre,
Universiti Putra Malaysia,
43400 UPM, Serdang, Selangor, Malaysia.

Tel: +603-8947 1622
ndeeps@admin.upm.edu.my
www.rmc.upm.edu.my/pertanika

Synthesis BACK ISSUES

MARCH 2009 - Issue 24, 1st Quarter

Editorial: UPM - A World Leader in New Tropical Agriculture
Spotlight: What are Peer-reviewed or Refereed Journals?
Research Highlight: Career Success: Don't Take It for Granted!

Regulars
- The Effect of Magnesium Vacancies on the Intraband Scattering in MgB2 as Determined by Point Contact Andreev Reflection
- GIS for Paddy: Precision Farming
- RETECS MAPS: Real Time Electrical Conductivity of Soil Mapping System®
- Parallel 2PB Software for Solving Larger Non Stiff ODEs
- Development of Healthy Oil and Fat Products
- Wire Mesh Collimator for Gamma Camera

Research Happenings
- Pertanika goes International

Reportage
- NewsBriefs

JUNE 2009 - Issue 25, 2nd Quarter

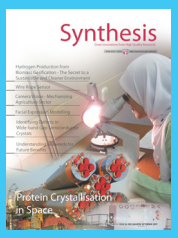
Editorial: Ethical Publications vs KPI...
Facts & Figures: Publication
Research Highlight: Composite - Its Endless Journey

Regulars
- PBDEs - An Environmental Pollutant of Increasing Concern
- SOAP Smart Home Systems
- *Kuih Bijan* - A Traditional Delicacy in the Modern World
- Mobile IPv6 - The Latest Network
- Understanding Microglia: The Immune Cells of the Central Nervous Systems

Research Happenings
- National Intellectual Property Day 2009
- Geneva 2009
- World *Halal* Research Summit 2009
- ITEX 2009

Reportage
- NewsBriefs

SEPTEMBER 2009 - Issue 26, 3rd Quarter



Editorial: A Proposal that Sells
Facts & Figures: Research Grant
Research Highlight: Protein Crystallisation in Space

Regulars
- Hydrogen Production from Biomass Gasification - The Secret to a Sustainable and Cleaner Environment
- Wire Rope Sensor
- Camera Vision - Mechanising the Agricultural Sector
- Facial Expression Modelling
- Identifying Defects in Wide-band Gap Semiconductor Crystals
- Understanding Seaweeds for Future Benefits

Research Happenings
- PRPI 2009

Reportage
- NewsBriefs

DECEMBER 2009 - Issue 27, 4th Quarter

Editorial: Quantity vs Quality in Academic Publication
Facts & Figures: Research Exhibitions and Awards Received
Research Highlight: A New VPO Catalyst for a Sustainable Environment

Regulars
- Tunable Range Enhancement of Multi-wavelength Brillouin-erbium Fibre Laser for WDM Systems
- Usage of CpG-free Plasmids for Gene Therapy - Reduced Inflammation and Sustained Pulmonary Gene Expression
- MgB2 - The Next Generation of High Field Magnetic Material
- Emerging Infectious Diseases - A Peril to the Livestock Industry
- A New UWB Filter for Higher Speed Communication
- *Bifidobacterium pseudocatenulatum* G4: A Potential Probiotic for Gut Health

Research Happenings
- PECIPTA 2009

Reportage
- NewsBriefs

MARCH 2010 - Issue 28, 1st Quarter

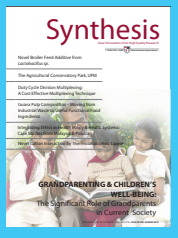
Editorial: Exhibitions and Promotional Schedule
Research Highlight: Applied Magnetics - Its Rapid Revolution

Regulars
- Optically Quenched Wide-gap Semiconductor Crystals Evaluation using Single- and Two-photon Excitation
- Andrographolide Derivatives - Suppress the Growth of Cancer Cells
- Quicker Peeled Fruits and Vegetables for Everyone!
- An Efficient Technology to Control Ammonia Pollution
- Nucleotide Probes - For Quicker and Faster Detection of *Candida* Infections
- Affinity Precipitation - The Latest Discovery

R&D&C Happenings
- MTE 2010
- A Working Visit by the Minister of Agriculture & Agro-based Industry
- MURoC 2010
- Cancer Awareness Carnival (3K)

Reportage
- NewsBriefs

JUNE 2010 - Issue 29, 2nd Quarter



Editorial: Facts & Figures 2010
Research Highlight: Grandparenting & Children's Well-being: The Significant Role of Grandparents in Current Society

Regulars
- Integrating Ethics in Health Policy & Health Systems: Case Studies from Malaysia & Pakistan
- Novel Cation Interaction by Thermoalkalophilic Lipase
- Duty Cycle Division Multiplexing: A Cost Effective Multiplexing Technique
- Novel Broiler Feed Additive from *Lactobacillus sp.*
- The Agricultural Conservatory Park, UPM
- Guava Pulp Composition – Moving from Industrial Waste to Useful Functional Food Ingredients

R&D&C Happenings
- Malaysia Green Forum
- Natural Gas Vehicle (NGV) Front Platform
- Agricultural Technology for Farmers
- World Engineering Congress 2010 (WEC 2010)

Reportage
- NewsBriefs

Office of the Deputy Vice Chancellor
(Research and Innovation)
UNIVERSITI PUTRA MALAYSIA