Science Academies Refresher Course Report
'Techniques in Neurosciences- From Behaviour to Molecules'
Department of Life Sciences, Sophia College, Mumbai
23rd November to 8th December 2011.

(Neuroscience is increasingly being included in undergraduate and post graduate syllabi and techniques specifically used in this area deserve focused consideration) Therefore, this refresher course was aimed at providing hands on training in model systems to study neurosciences at organismic, cellular and molecular level. The course was conducted by kind support of the Science Academies, The Indian Academy of Sciences, Bangalore; Indian National Science Academy, New Delhi; Indian National Academy of Sciences, Allahabad.

Eleven out station candidates from various parts of the country and nine local candidates (Appendix 1) were selected from a large number who responded to the announcement in Current Science, 25th August 2011. The outstation candidates were provided accommodation in ICMR guest house (nine participants) and in the Sophia College Campus (two participants). Suitable arrangements were made for boarding. All the candidates were provided, tea/coffee and lunch during the sessions on the venue.

The Local Managing Committee (Appendix 2) planned the programme which was divided into eight modules (Appendix 3-Programme at a Glance) which evolved systematically the theme of neurosciences from behavior to molecules. Each module was coordinated by a faculty incharge and comprised of lecture sessions, demonstrations and hands on training (Appendix 4 –Details of the program). Each participant was provided with a cotton bag and writing material; file (enclosed) which contained abstracts and protocols and was open ended as it developed as the course progressed. A DVD containing additional material references, videos and other material provided by the faculty and developed during the course (enclosed).

The inaugural session was with a brief welcome by Dr. Medha S. Rajadhyaksha (course coordinator). Dr. Tarala Nandedkar (Course Director) spoke about the Academies and Dr. Sr. Anila Verghese welcomed the delegates to Sophia College. This was followed by a short tour of the campus, including the Library and the Computer Center which were made accessible to the participants for use of literature and internet.

The faculty consisted of eminent scientists/ Professors (Appendix 5). The academic session started with a brilliant introduction to basic anatomy of the human brain and the imaging methodology (especially fMRI) used to understand its function by Dr. Meher Ursekar. The new and complex science of cognitive neurobiology was discussed by Dr. N. Srinivasan very lucidly and the questions that had to be answered using psychological protocols and EEG were clearly identified. Dr. H. Ramamchandran and Dr. A. Lobo took off from these discussions and demonstrated how these protocols were actually used. The participants seemed to enjoy these sessions as they themselves were subject of study.

Invertebrates as model systems to study behavior were introduced by two outstation faculty. A daylong session on overview on Drosophila and its use as models for neurodegenerative diseases followed by demonstration and hands on training to participants in some very elegant behavioral assays was conducted by Prof. Subash Lakhota. An equally exciting and long session was conducted by Dr. Sandhya Kaushika on maintenance and neurobiology of Ceanorhabditis elegans, a novel system for all the participants.
The third module, *in vitro* systems in neurobiology was introduced by a very interesting talk by Dr. Rajani Bhisey on tissue culture and cell lines. The module also included a very informative session on microscopy and microphotography conducted by Dr. Nishigandha Naik. A long laboratory session with hands on experience was provided by Dr. Yasmin Khan, Mr. Mustapha and Ms. Archana. A part of this aspect was continued in NIRRH as demonstration of confocal microscopy by Dr. Nafisa Balasinor and flow cytometry by Dr. Shraboni Mukherjee. All these sessions were greatly appreciated by the participants.

The session on molecular techniques used to elucidate differential gene function was conducted by Dr. Rita Mukhopadhyaya and Ms. J Italia. This involved each participant conducting experiments and analyzing the results which were found to be very useful by the participants. The extension of this module was demonstration of Real Time PCR by Dr. Gitanjali Sachdeva and microarray technology by Dr. Deepak Modi at NIRRH.

A very enlightening set of sessions using state of art technology were conducted at NIRRH which not only were continuation of techniques they had used during lab sessions but also added a new dimension. Techniques of molecular separations by Dr. Smita Mahale, si RNA by Dr. Deepak Modi and proteomics Dr. Vrinda Khole/ Dr. Kaushiki Kadam were discussed in details. The sessions at NIRRH were coordinated by Dr. S. Mukherjee.

Need based discussions on biostatistics was conducted by Ms. Sandra Mendes. As requested by the participants, a special session on primer designing was conducted where the participants designed a primer for gene of their choice.

The last module was a discussion on neuroscience education where Dr. M.C. Arunan stressed the need of developing indigenous model systems to address questions in neurosciences. Dr. Padma Shastry gave an overview on how to write a project proposal. The participants had been given the DBT form to write a project proposal in four groups. These proposals were presented by the participants on the last day, evaluated by a very senior scientist Dr. H.S. Juneja, Ex -Director, NIRRH, who gave insightful suggestions.

The refresher course included a visit to Tata Institute of Fundamental Research and interactions with the eminent scientist Dr. Shubha Tole. The participants also attended a talk organized on the campus by Dr. Medha Patkar. On one Saturday they had a brief encounter with shooting of film on the campus. All this added to the cultural richness of the course.

The valedictory address was given by Dr. S. D. Kholkote who reviewed in detail the developments in reproductive endocrinology, stressing on the concepts of neuronal role in hormonal control. The session ended with giving of the certificates to the participants. A vote of thanks was proposed by Dr. Medha Rajadhayaksha as a pictorial review of the events. A representative of the participants complemented and thanked the organizers and the faculty for the course. The function ended with the Principal, Dr. Sr. Anila Verghese, expressing her views on need to popularize basic sciences.

The participants were given forms to evaluate each module and for overall evaluation. The reactions of the participants have been compiled are attached.(Appendix 6). It appears that the refresher course was appreciated and served its purpose of updating teachers about neurosciences.
APPENDIX 4

FINAL PROGRAM

Inauguration- Wednesday, 23rd November 2011, Venue: Sophia College
9.00am – 9.45am  Introduction  Dr. Tarla Nandedkar
                       Welcome address  Dr. Anila Verghese

Module I – Neuroanatomy and Cognitive Sciences – Day 1
Wednesday, 23rd November 2011 Venue: Sophia College
10.30am -1.00pm  The Human Brain  Dr. Meher Ursekar
                       - a fMRI profile
2.00pm - 4.30pm  A guided walk through the vertebrate brain  Dr. Vidita Vaidya

Module I – Neuroanatomy and Cognitive Sciences – Day 2
Thursday, 24th November 2011 Venue: Sophia College
9.00am - 10.30am  Introduction to Cognitive Sciences  Dr. Srinivasan
11.00am –1.00pm  Cognitive Science Practical I
                       - Computer based techniques  Dr. Srinivasan
2.00pm – 3.00pm  Computational Neurobiology  Dr. Rohit Manchanda
3.00pm – 3.45pm  Cognitive Science Practical II
                       - activity of the human brain.  Dr. H. Ramachandran
4.00pm -5.00pm  Cognitive Science Practical III  Dr. A. Lobo
                       Questioners used in testing cognition.

Module II – Model Systems in Neurosciences- Day 1
Friday, 25th November 2011  Venue: Sophia College
9.00am – 11.00am  Invertebrate Model systems  Prof. S.C. Lakhotaia
11.30am – 1.00pm  Assays using invertebrates  Prof.S.C.Lakhotaia
2.00pm - 4.30pm  Assays using invertebrates  Prof.S.C.Lakhotaia
Module III: *In vitro* systems in Neurosciences – Day 1
Saturday, 26th November 2011  Venue: Sophia College

9.00am – 11.00am  Microscopy and photography  Dr. Nishigandha Naik
11.15am -12.15pm  Demonstration  -microphotography  Dr. Nishigandha Naik
1.30pm-5.00pm  Session at TIFR  Dr. Shubha Tole

Module III: *In vitro* systems in Neurosciences-Day 2
Monday, 28th November 2011  Venue: Sophia College

9.00am - 11.00am  Cancer and cell lines  Dr. Rajani Bhisey
11.30am – 1.00pm  Cells and their maintenance  Dr. Yasmin Khan
2.00pm - 4.30pm  Staining of cultured cells  Dr. Yasmin Khan

Module II – Model Systems in Neurosciences- Day 2
Tuesday, 29th November 2011  Venue: Sophia College

9.00am - 10.30am  *C. elegans* as a model system  Dr. Sandhya Kaushika
11.15am – 1.00pm  *C. elegans*- Practical I  Dr. Sandhya Kaushika -
Basic anatomy, Life cycle,
2.00pm - 4.30pm  *C. elegans* –Practical II  Dr. Sandhya Kaushika -
Behavioural Assays

Module IV: Advance Techniques in Cellular Neurosciences  Day 1
Wednesday, 30th Nov 2011 Venue: National Institute for Research in Reproductive Health

9.00am – 11.00am  Confocal microscopy  Dr. Nafisa Balasinor
11.30am – 1.00pm  Practical/ demonstration  Dr. Nafisa Balasinor
2.00pm- 4.30pm  Flow Cytometry  Dr. Srabani Mukherjee
Module IV: Advance Techniques in Cellular Neurosciences  Day -2
1st Dec 2011  Venue : National Institute for Research in Reproductive Health
19.00am – 11.00am  Proteomics  Dr.Vrinda Khole
11.30am – 1.00pm  2D electrophoresis  Dr. Deepak Modi
2.00pm - 4.30pm  Protein Purification  Dr.Smita Mahale

Module V : Gene Expression profiling of Neuronal cells  -Day 1
Friday, 2nd December 2011 , Venue: Sophia College
9.00am – 11.00a  Techniques in elucidating Gene expression  Dr. R. Mukhopadyaya
11.30am – 1.00pm  Molecular biology practical I RNA extraction and purification  Dr. R. Mukhopadyaya Ms. J.Italia
2.00pm - 4.30pm  Molecular biology practical I -RT reaction and PCR  Dr. R. Mukhopadyaya Ms. J.Italia

Module V : Gene Expression profiling of Neuronal cells  -Day 2
Saturday, 3rd December 2011  Venue : Sophia College
9.00am – 11.00am  PCR  Dr.R. Mukhopadyaya/Ms. J.Italia
11.30am – 1.00pm  Molecular biology practical III - Preparation and running the gel  Ms. J. Italia
2.00pm- 4.30pm  Molecular biology practical IV - Staining the gel.  Ms. J. Italia

Module VI Advanced Techniques in Gene Expression profiling
Monday, 5th Dec 2011 Venue : National Institute for Research in Reproductive Health
9.00am – 11.00am  Advanced Techniques in elucidating Gene expression- microarray  Dr.Deepak Modi
11.00am – 11.30am  Tea
11.30am –1.00pm  Molecular biology Demonstration  Dr. Deepak Modi
2.00pm - 4.30pm  Validating gene expression  Dr. Geetanjali Sachdeva
Module VII: Bioinformatics and Statistics
Tuesday, 6th December 2011  Venue: Sophia College
9.00am - 11.00am   Introduction to Biostatistics  Ms. Sandra Mendes
11.30am - 1.00pm   Need based hands on information  Ms. Fatima
2.00pm - 4.30pm    Project writing and more  Dr. Padma Shastry

Module VIII: Neuroscience Education
Wednesday, 7th December 2011  Venue: Sophia College
9.00am - 10.00 am  Innovations in Neuroscience Education  Dr. M.C. Arunan
10.00am - 11.00am  Talk on Sustainable Development  Dr. Medha Patkar
12.00am - 1.30pm   Feed back session by participants

Valedictory Function
2.30pm - 3.30pm    Valedictory address  Dr. S. D. Kholkute
3.30pm - 3.45 pm   Vote of Thanks  Dr. M.S. Rajadhyaksha
3.45pm - 4.00pm    Farewell speech  Dr. Sr. Anila Verghese

Thursday, 8th December 2011
9 am - 11.00 am      Project presentation by Participants
11.30 am - 12.30 pm  Suggestions by experts
1.30 onwards         Site seeing and departures.
APPENDIX 1

LIST OF PARTICIPANTS

1. R. Chitra
   Assistant Professor, Department of Animal Husbandry Statistics & Computer Applications,
   Veterinary College and Research Institute,
   Namakkal, Tamil Nadu -637002

2. Anand K. Tiwari,
   Assistant Professor, School of Biological Sciences and Biotechnology,
   Indian Institute of Advanced Research, Koba,
   Gandhinagar, 382 007, Gujarat.

3. Shubhangi Sanjay Puranik,
   Assistant Professor, Department of Biotechnology,
   Modern college, Shivaji Nagar, Pune 5.

4. Himanshu Saini,
   Assistant Professor, Department of Biotechnology and Bioinformatics
   Uttaranchal college of Science and Technology,
   Dehradun- 248001, Uttarakhand.

5. EGTV Kumar
   Assistant Professor, Department of Biotechnology,
   Sri Venkateswara Institute of Medical Sciences, Tirupati.

   Lecturer, Department of Biotechnology,
   Smt. Kasturbai Walchand College, Sangli, Maharashtra

7. Swati Avinash Koushik
   Assistant Professor, Department of Zoology,
   Institute of Science, Nagpur -440001

8. Sudha Garg
   Reader, Department of Zoology,
   Hindu College, Moradabad, U.P.

9. A. Radhika Rao
   Department of Genetics,
   Bangalore City College, Kalyana Nagar, Bangalore-560043.

10. Jyotna Prasad
    DIPAS, DRDO
    Lucknow Road, Timarpur, Delhi-110054.
11. Rajesh J. Sharma  
   VPASC College,  
   Vidynagari, MIDC,  
   Baramati, Pune, 413133.

12. Madhura Narkar  
   Zoology Department,  
   Sophia College, B. Deasi Road, Mumbai, 413133.

13. Jagdish Mehta  
   Assistant Professor, Department of Zoology,  
   Khalsa College,  
   Matunga, Mumbai.

14. Sree S. Kumar  
   Assistant Professor, Department of Life Sciences,  
   Sophia College,  
   B. Desai Road, Mumbai 400026.

15. Jagdish Nair  
   Department of Biotechnology,  
   D. Y. Patil Deemed University,  
   Belapur

16. Radhika Tendulkar  
   Assistant Professor  
   NMIMS School of Science, Vile Parle, Mumbai

17. Anita Jadhav  
   ICL, Vashi, Mumbai.

18. Girish Pai  
   Assistant Professor  
   Mahatma Gandhi Memorial College, Kamothe, Panvel.

19. Usha Karunakaran  
   D Y Patil University, Navi Mumbai.

20. Shalaka A. Masurkar  
   Department of Life Sciences, Sophia College,  
   B. Desai Road, Mumbai 400026.
APPENDIX 2

LOCAL MANAGING COMETTEE

HEAD OF THE INSTITUTION: Dr. (Sr.) Anila Verghese, Principal, Sophia College, Mumbai.

COURSE DIRECTOR: Dr. Tarala D. Nandedkar, Fellow, National Academy of Sciences.

COURSE COORDINATOR: Dr. Medha S. Rajadhyaksha, Head and Associate Professor, Department of Life Sciences, Sophia College, Mumbai

MEMBERS OF THE COMETTEE: (In charge of modules / laboratories/ computer center/ catering)

Dr. Hema Ramachandran
Associate Professor,
Department of Life Sciences,
Sophia College, Mumbai

Dr. Hema Subramaniun
Associate Professor,
Department of Life Sciences,
Sophia College, Mumbai

Dr. Yasmin Khan
Associate Professor,
Department of Life Sciences,
Sophia College, Mumbai

Dr. Chinmoyee Vatsyayan
Associate Professor,
Department of Biochemistry,
Sophia College, Mumbai
APPENDIX 5
LIST OF FACULTY

Outstation Speakers:

Dr. N. Srinivasan, CBCS, Allahabad

Dr. Sandhya Koushika, NCBS, Bangalore

Dr. S.C. Lakhotia (Fellow), BHU, Varanasi

Dr. Padma Shastry, NCCS, Pune.

Local Speakers (main):

Dr. Meher Ursekar, Bombay Hospital, Mumbai

Dr. Vidita Vaidya, DBS, TIFR, Mumbai

Dr. Nishigandha Naik (Fellow), Nicholas Piramal, Mumbai

Dr. Shubha Tole (Fellow) DBS, TIFR, Mumbai

Dr. Rajani Bhisey (Fellow)

Dr. S.D. Kholkute, NIRRH, Mumbai.
Speakers/ Demonstrators:

Dr. R. Mukhopadyaya, BARC, Mumbai
Dr. Deepak Modi (Fellow), NIRRH, Mumbai
Dr. Shaboni Munkerji, NIRRH, Mumbai
Dr. Nafisa Balsinor, NIRRH, Mumbai
Dr. Vrinda Khole/ Dr. Kaushiki Kadam, NIRRH, Mumbai
Dr. Geetanjali Sachdeva, NIRRH, Mumbai
Dr. Smita Mahale (Fellow), NIRRH, Mumbai
Dr. M. C. Arunan, Sophia College, Mumbai
Dr. A Lobo, Sophia College, Mumbai.
Dr. H. Ramachandran, Sophia College, Mumbai.
Dr. Yasmin Khan, Sophia College, Mumbai.
Ms. Sandra Mendes, Sophia College, Mumbai
Ms. J. Italia, Jai Hind College, Mumbai.
Ms. Fatima, Sophia College, Mumbai