

EDITORIAL

"The problem of neurology is to understand man himself"
Dr. Wilder Penfield

For most of the history of Western medicine, the fields of neurology and psychiatry have been intricately linked (1). Ironically, it was the pioneering psychoanalytical work of Freud, a neurologist, which helped to initiate what became a growing schism between neurology and psychiatry (2). Neurology, focused more on neurobiology, evolved along a parallel yet completely separate line from psychiatry, which took a more biopsychological approach to the understanding of the human brain. While there was much progress in both fields, they continued to grow apart through sub-specialization, in their organizational culture and in their understanding of the human brain. There were those who dared to go against the current and attempted to break down the wall between these two disciplines, but successes were few and far between and those well established in each discipline did not look well upon them. As Dr. Brenda Milner, a pioneer in the field of neuropsychology, recounts in the feature interview of this issue (3), Donald Hebb was among the first to advocate the merging of neurophysiology with neuropsychology despite disapproval from many of his prominent colleagues. Later, Dr. Milner herself had to fight against the prevailing disparaging attitude of the day toward a synthetic approach to the study of neuroscience in order to carry out her work.

Today there is far more agreement that it is not only possible, but necessary to unite the study of anatomy, physiology, and behaviour in neuroscience. More recently, many efforts have been made in the medical community to bring together the fields of psychiatry and neurology. One example is the creation and growth of combined neurology and psychiatry, i.e. neuropsychiatry residency programs in academic centres across North America since the 1980's. Currently, the Fellowship and Residency Electronic Interactive Database lists 10 such combined post-graduate training programs (4). It is reasonable to expect an increase in number of similar programs in North America in the upcoming years, as the programs mature and graduates establish themselves as physician and scientists in the medical field. Although it might still be too soon to judge the success of such initiatives, those hoping for more integration between neurology and psychiatry will certainly agree that a step in the right direction has been taken.

Although integration, or at least discussion, between

the disciplines and specialties is an important step, Dr. Milner points out quite rightly that a more difficult task ahead is to integrate our knowledge of the molecular aspects of neuroscience into our understanding of the human brain (3).

Research in the molecular neurosciences has been prolific over recent years. This is encouraging, and may provide a key role in removing the 'wall' that exists between physiologists and behaviourists, or psychiatrists and neurologists. In the past, molecular research was hampered by limitations in technology, making it difficult to either prove one's own hypothesis, or refute another's, thus creating further divisions within the field. Often, evidence for cerebral processes was indirect, or based on inferences found in principles from other fields. One example of this is the field of neuroimmunology. Only twenty years ago, many considered that the central nervous system was isolated and protected from most inflammatory responses, presumably due to the presence of the blood brain barrier (BBB). This theory was logical, but difficult to test at the time. However, as advances in molecular biology, cell culture, and medical imaging progressed, it is now clear that the immune system plays a major role in the pathophysiology of both acute and chronic neurological disorders such as stroke, brain trauma, Alzheimer's Disease, and multiple sclerosis. Research has demonstrated clear relationships between immunology and the CNS, bridging immunologists and neuroscientists, and forming this relatively young field.

Others are venturing further, with the emergence of psychoneuroimmunology (5). The field integrates researchers from several scientific and medical disciplines, including neurosciences, psychology, immunology, physiology, pharmacology, psychiatry, behavioural medicine, infectious diseases, and rheumatology, who are interested in interactions between the nervous and immune systems, and the relationship between behaviour and health. In fact, a recent review by Diamond et al. provides evidence for the role of serum antibodies to the N-methyl D-aspartate receptor, which occur frequently in patients with systemic lupus erythematosus, to alterations in cognition and behaviour, following a breach in the BBB. (6) Taken together, neuroimmunology is only one of the many fields of neuroscience whose progress has led to not only a greater understanding of disease, but an understanding shared amongst scientists and clinicians from multiple disciplines.

To summarise, the investigation of the human mind and brain, at once both the same and different, has taken a path thus far reminiscent of many other fields within science and medicine. First, one broad area of

study progresses and advances. It is then forced to sub-specialize and compartmentalise, allowing researchers and clinicians to create for themselves pockets of understanding. Later, further advances in understanding and technology finally allow scientists to begin reintegrating and synthesizing between seemingly disparate fields which actually originated from a common thread. We can look forward to great advances in the future of neuroscience as researchers and clinicians continue to expand upon their understanding of the brain and the mind, and its complex interactions with the body.

How should we prepare for what lies ahead? In his reflections published in this issue, Dr. Colman, the current director of the Montreal Neurological Institute, muses upon the role of serendipity in significant scientific advances, but also upon the importance of broadening horizons and being aware of what is around you as one may see something where another may not (7). Most importantly, perhaps, he also stresses the importance of good preparation as the soil in which serendipitous events may seed and grow. We should remember, as scientists and physicians in training, that good preparation include both a solid understanding of the field of neuroscience, as well as developing a broad set of skills.

As a parting thought, and a playful, yet sobering reminder of our humanity, it is interesting to question

how far our understanding of the mind has the potential to go. After all, are there not limitations in using the human mind to study the human mind? How can the brain objectively understand itself fully? These are, perhaps, questions best left to philosophers. At least for now...

REFERENCES

1. Baker MG, Kale R, Menken M. The wall between neurology and psychiatry. *BMJ* 324(7352):1468-9. Jun 22, 2002.
2. Stone J, Carson A, and Sharpe M. Wall between neurology and psychiatry, some parts of the wall are thicker than others. *BMJ* 324(7352):1468-9; Jun 22, 2002.
3. Milner B and Xia C. Understanding the human brain: A lifetime of dedicated pursuit. *McGill Journal of Medicine* 9(2):86-93; 2006.
4. Fellowship and Residency Electronic Interactive Database. <http://www.ama-assn.org/ama/pub/category/2997.html>. Last accessed July 29, 2006.
5. Prolo P, Chiappelli F, Fiorucci A, Dovio A, Sartori ML, Angeli A. Psychoneuroimmunology: new avenues of research for the twenty-first century. *Ann N Y Acad Sci.* 966:400-8; June, 2002.
6. Diamond B, Kowal C, Huerta PT, Aranow C, Mackay M, DeGiorgio LA, Lee J, Triantafyllopoulou A, Cohen-Solal J, Volpe BT. Immunity and acquired alterations in cognition and emotion: lessons from SLE. *Adv Immunol.* 89:289-320; 2006.
7. Colman D. The three princes of Serendip. Notes on a mysterious phenomenon *McGill Journal of Medicine* 9(2):82-84; 2006.



Sasha Carsen, B. Sc. (Hon.), M.D.C.M. (2008), MBA (2008) and **Chenjie Xia**, M.D.C.M. (2008) are the tenth Editors-in-Chief of the MJM. Sasha's research interests include health policy and management, and he has done research with the Canadian Health Services Research Foundation. Chenjie's current research focuses on cognitive neuroscience, more specifically the roles played by different neural substrates in the regulation of affect. **Christopher Fordyce** (M.D.C.M. 2008) is the Executive Senior Editor of the MJM. He received a B.Sc (Hons) in Life Sciences from Queen's University and an M.Sc. in Physiology and Neuroscience from the University of Toronto. His graduate work in neuroimmunology focused on the role of microglial K⁺ channels in immune-mediated neurotoxicity.