

Current thinking in basal ganglia research

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To coincide with the eighth triennial meeting of the International Basal Ganglia Society (IBAGS), to be held in Scotland in September, we publish here the first part of a *TINS* special feature on 'Current thinking in basal ganglia research'. It is nearly 14 years since publication of the special issue of *TINS* (volume 13, issue 7) devoted to basal ganglia research. That issue had a profound effect on the field, not least because it was the issue in which the 'direct and indirect pathways' model of basal ganglia organisation was first clearly elaborated [1,2]. Those articles, together with an earlier one in *TINS* [3], inspired a vast amount of basic research in basal ganglia and provided a basis for new therapies for the treatment of Parkinson's disease. Of course, there have been many developments in the field and indeed, in neuroscience in general, over the past 15 years. However, the central issues in basal ganglia research are arguably still the cortical innervation of the basal ganglia, the manner in which the cortical input is processed, and how dopamine modifies and influences the flow of cortical information through the basal ganglia (see cover illustration). The general aim of this special feature is to review contemporary concepts on the organisation of the basal ganglia, and we explore some of the ways in which modern physiological, molecular and genetic techniques, and different modelling approaches, are helping us to understand the basal ganglia in health and disease.

In this first issue, Mahon *et al.* discuss plasticity at the corticostriatal synapse and the changes in synaptic efficacy that occur in reinforcement learning. Vroon *et al.* re-address the issue of the differences between the dorsal and ventral striatum, and suggest a new way of looking at the functional divisions of the striatum. Liss and Roeper review gene-expression profiling techniques for single neurons, and how these will help us understand basal ganglia function and dysfunction. Finally, Gurney *et al.* critically review different strategies for modelling the basal ganglia, and how the different approaches give complementary insights into basal ganglia function.

The topics for inclusion in this special feature were chosen through extensive discussion with the scientific organising committee of the IBAGS meeting and the council of IBAGS, and have been carefully balanced against recent reviews on the basal ganglia published elsewhere.

References

- 1 Alexander, G.E. and Crutcher, M.E. (1990) Functional architecture of basal ganglia circuits: neural substrates of parallel processing. *Trends Neurosci.* 13, 266–271
- 2 DeLong, M.R. (1990) Primate models of movement disorders of basal ganglia origin. *Trends Neurosci.* 13, 281–285
- 3 Albin, R.L. *et al.* (1989) The functional anatomy of basal ganglia disorders. *Trends Neurosci.* 12, 366–375