From the library

Remembrance of things past

We do not know what the Viennese doctor told Mahler, for the telegram he sent Alma the next day is no longer to be found. According to her Erinnerungen, Kovacs diagnosed inborn contracted mitral valves on both sides, with compensatory movements. He ordered Mahler to give up sport altogether: no mountain climbing, no bicycle rides, no swimming, indeed with incredible short sightedness he recommended this man who had always practised the most strenuous sports to take a field course to accustom himself to walking, overlooking the inevitable psychological effect of all these prohibitions. For the next few days, Mahler obediently followed the doctor's instructions and taught himself how to walk. He practised walking slowly for the first time in his life. His diligence was touching. Looking at his watch, he walked for five minutes, for ten, and so on. (Henry-Louis de La Grange. *Gustav Mahler. Vienna: Triumph and Disillusion (1904–1907)*. Oxford: Oxford University Press, 1999:693.)

Muscles and ageing

For the past two decades, extensive research has documented the skeletal muscle composition of both normal non-athletic and world class athletic humans. In doing so, two classes of muscle fibres have been identified. One so called slow twitch fibre and the other the fast. The average healthy adult has roughly equal numbers of slow and fast twitch fibres. However, competitive athletes frequently show a disproportionate number of one or the other so that in the case of sprinters most fibres are fast and in the case of endurance athletes the fibres have a tendency to be slow. Now investigators have turned their attention to the process of ageing and muscle composition. It has been known for some time that marked muscle mass loss occurs with ageing, even beginning as early as 25 years of age and by the time a person reaches the age of 80, approximately 50% of muscle mass is gone. It now appears that, in addition to muscle loss, a change in composition of slow and fast fibres takes place; thus more fast fibres are lost than slow fibres leaving the elderly patient with slow twitch fibres. However, in addition, a hybrid fibre appears to emerge that is neither slow nor fast in its normal functioning. How this change in skeletal muscle composition translates into the change in physical activity of the elderly has yet to be defined. (*Scientific American* 2000;Sept:48–55.)

The chemistry of nicotine addiction

Recent experiments on the chemical changes that occur with nicotine addiction have challenged the old notion that with addiction repeated exposure to a chemical weakens its effect so that a person needs to take more of the drug to get the same psychological benefit. Investigators at the University of Chicago have shown that nicotine attaches to a specific subunit of a family of nicotinic receptors in neurons. These neurons as a result release glutamate. This stimulates other neurons to release dopamine. The psychological effects of nicotine seem to be related to this release of serotonin. Of interest is that with subsequent exposure the release of serotonin is increased. By identifying the specific nicotinic receptors that are crucial to this series of events that leads to serotonin release, investigators hope to develop drugs that may block these receptors and be useful in the treatment of nicotine addiction. (*Neuron* 2000;**27**:34.)

Depression and cellular change in the brain

Investigation of the mechanism by which antidepressants work may have relevance for other neurological diseases. These studies have demonstrated that many antidepressant medications seem to work by increasing circulating serotonin and by inhibiting it from being taken up by neurons that have released it. This elevated serotonin level stimulates a dramatic cellular proliferation especially in the hippocampus. As a result, the use of antidepressant medications results in a population of newly evolved neurons within the hippocampus. These studies may be important in the treatment of other neurological disorders. By understanding the process of neurogenesis in the brain, treatment of other neurological problems may result. Cells already present in the brain might be activated by a pharmacological or environmental stimulation that induces proliferation and migration to a damaged or diseased brain region where they could take up the lost function in this area. Further studies of these repair strategies are ongoing. (*American Scientist* 2000;**88**:340–5.)

Multimodal neurons and perception

Investigators at University College London and their colleagues at the Institute of Neurology have demonstrated with functional magnetic resonance studies that regions of the brain dedicated to a single perceptual task communicate with each other during many normal activities. These investigators demonstrated that while normal subjects looked at a flash of light either near their right or left hand, at the moment the light was flashed, some volunteers felt a vibration in their hand. When the hand was on the same side of the light stimulus, the lingual gyrus was more active. When the hand was on the opposite side, activity in this region fell. A growing body of evidence suggests that the brain's visual cortex may receive stimulation from neurons elsewhere in the brain that respond to touch and vision. These multimodal neurons can be stimulated by more than one perceptual activity. (*Science* 2000;**289**:1206.)

Brain plasticity in the adult

The ability of the brain to reorganise itself is referred to as plasticity. In general, this is usually felt to be primarily a capacity of the young brain. However, studies of the recovery pattern of adult stoke victims suggest that plasticity in the adult brain is more extensive that once thought. Investigators have demonstrated that adults who have language difficulties following a stroke in the left hemispheres are, over a period of time, able to recruit areas in the right hemisphere to perform language tasks. In other studies using a PET scan, investigators demonstrated that in patients who had severe paralysis of one hand, recovery occurred as the result of their use of a compensatory pathway from the supplemental motor area to the spinal cord. The use of this compensatory pathway was also accompanied by abnormally enhanced connections between the thalamus and the cerebellum. The anatomical and chemical correlates for the plasticity in the adult central nervous system are the subject of continuing investigations. (*American Scientist* 2000;**88**:426–31.)

Pharmacological treatment of myopia

Investigations over the past decade concerning the mechanisms underlying myopia have been provocative and thought provoking. A growing body of evidence suggests that prolonged near work in children is associated with the development and progression of myopia. A recent study from Taiwan suggests that the progression of myopia can be halted in at least some children by the topical treatment of each eye with atropine. The use of atropine has obvious limitations and investigators are now turning their attention to the drug pirenzepine. This drug has been used to block the production of gastric secretions and is a more selective cholingeric blocker. Investigators at the Scheie Institute in Philadelphia have shown that pirenzepine can prevent myopia in chickens. Currently the use of pirenzepine gel in children is under investigation in the United States. This programme will be later tested in Singapore, Hong Kong, Thailand, and Taiwan. Although the safety of pirenzepine seems certain since it has been used in humans for a long time, whether it is appropriate to use it chronically in children in order to prevent the onset and/or progression of myopia is a question that has yet to be answered. (*New Scientist* 2000;26 Aug:32–5.)

Nasotemporal asymmetry and infantile strabismus

Humans and experimental monkeys that have infantile strabismus demonstrate an asymmetry of OKN and smooth pursuit during monocular viewing. Thus, the eye movements are more vigorous for nasally directed targets than for temporally directed ones. Generally it has been considered that the movements are conjugate between the two eyes for any given subject with infantile esotropia. In this study, however, the investigators studied the two eyes of a normal monkey and the naturally strabismic monkey with early onset esotropia. The results suggest that OKN movements under monocular viewing conditions may be dysjunctive in monkeys with early onset esotropia. The authors suggest that this dysjunctive OKN might best be understood as reflecting a cerebral maldevelopment responsible for the nasally biased OKN that also contributes to the nasal bias in vergence pathways. (*Ophthalmic Research* 2000;**32**:172–80.)