Chapter 1
Brain, Behaviour and Evolution

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Standard atlases using identical nomenclature enable scientists to navigate seamlessly between the brain of humans and experimental animals to test hypotheses inspired by human considerations and relate data from experimental animals to humans. In current atlas construction we make use of genes that are responsible for the segmentation of the brain in development (hox genes). Using evidence from transgenic mice and birds we are proposing a new plan for the organization and function of certain brain regions of mammals. The brainstem, for instance, can no longer be considered as a container of haphazardly arranged nuclei (as potatoes in a sac), but instead as regions which co-vary (start and end) with their neighbours.

The human brain features many more homologies with the brain of monkey (e.g. virtually all areas of the cortex are homologous), of the rat and of the bird than previously thought. Areas which are shown to be homologous are likely to have similar function as for example are 9/46 of the prefrontal cortex which is homologous in human and monkey and is involved in executive processing in working memory in both species.

Using MR images in mice and non-human primates we are attempting to provide 3D volumes of canonical brains against which transgenic varieties with clinical significance can be compared.

Finally, on the issue of evolution and survival, the brain is wonderful, but it is not omniscient. Both the dazzling technological success of our species and the worrisome environmental degradation it has produced are reflections of the function of our brains. The author concludes: If the brain were smaller than what it is, it would not have been able to support language and the development of science and technology which today threatens existence; if the brain were larger than what it is, it might have been able to understand the problem and possibly even solve it. The brain is just not the right size.

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