

Cerebral Lateralization in Nonhuman Species. Edited by S.D. Glick. 1985. Pp. 288. London: Academic Press. Price £49.50. .

The late Norman Geshwind ends this book, after a regrettably brief sketch of his hypothesis which links lateralization to diseases of the immune system, with the comment that cerebral asymmetry is of major importance in every branch of medicine. While the preceding chapters are an admirable guide to recent work on cerebral lateralization in laboratory animals, they suggest that a clinically useful understanding of the various findings to be found under this head is still some way off. Seven of the 11 chapters report investigations of the behaviour or anatomy of rats or mice, one covers birds, and one anatomical studies of of nonhuman primates, with a general historical introduction.

Birds provide some of the most unequivocal examples of functional lateralization. Canaries and related species have an asymmetrical sound-producing apparatus, the syrinx, which is much bigger on the left side, and, as neural control of this is ipsilateral, exhibit aphonia in response to left forebrain lesions. Day-old chicks, by contrast, appear to have their normal social imprinting processes more impaired by right hemisphere lesions. Arnold and Botjer review this work, but do not mention that an asymmetry between the left and right ears has important functions in sound localization in many owl species, or that the duck egg provides a valuable model for the embryology of asymmetry. (Male eggs develop a clear asymmetry of both the syrinx and the penis, but this can be suppressed by oestrogens.) It is unlikely that any of these avian phenomena bear a direct relationship to human cerebral dominance, and more data is available on the less clear cut physical asymmetries observable in the brains of rats.

Diamond, and Sherman and Galaburda, concur that the rat forebrain is typically asymmetrical, with the cerebral cortex, hippocampus, and basal ganglia larger on the right, and that there are substantial sex and strain differences, with females less asymmetrical. Denenberg and Yutzey report that right-sided forebrain lesions generally have a much greater effect than left on the behavioural tests which they employ (including spatial exploration and mouse-killing) but that these lateralized effects depend to some extent on the animals being stimulated (by handling) in infancy. Even without special rearing Robert Robinson finds that various means of insult, including experimental infarctions, suction lesions, knife cuts and 6-OHDA injections, all produce greater effects, in terms of spontaneous hyperactivity and neurotransmitter depletion, when delivered to the rat's right hemisphere. Glick and Shapiro report more detailed measurements of biochemical asymmetries in a variety of forebrain structures, and conclude that the rat and human brain 'exhibit remarkable similarities' in neurotransmitter asymmetries. Terry Robinson et al. review a range of behavioural and physiological work on non-human mammals with respect to sex differences, pointing out that although gender is an important variable for most asymmetries, not surprisingly in midbrain as well as forebrain areas, it is incorrect to suppose that one or other gender is more or less lateralized, as female rats have some asymmetries more strongly than males.

There is thus not yet a clear rat model for cerebral lateralization. Collins, in a thoughtful chapter on handedness in mice, suggests that since direction of side preferences is not subject to Mendelian inheritance, but degree of preference is, genetic control of asymmetries must take the form of sensitivity to pre-existing somatic asymmetry gradients. LeMay reviews the strong case that primate anatomical asymmetries preceded human psychological lateralization: fossil and CT evidence confirms that anatomical correlates of human cerebral dominance are present in its absence.

On close examination, left-right asymmetries of the brain appear to be as ubiquitous as those of the gut. This book will help to establish the biological foundations of cerebral dominance as an area where there are questions to be asked, but does not pretend to supply many of the answers.

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