Introduction to Five Neocortical Mapping Studies

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In the following five reports, results are presented of macro- and microelectrode mapping studies of somatic sensory (SI) cerebral neocortex in capybaras, guinea pigs, slow lorises, llamas, hyraxes and beavers. These five studies were carried out between 1959 and 1970 in the order presented. During this period more refined mapping techniques and strategies were gradually introduced to answer increasingly specific questions about the organization and functions of somatic sensory cortex. Micro-mapping strategies have become sufficiently complex and refined to be crucial tools for testing a variety of multidisciplinary neurobiological hypotheses concerned with localizing specific functions to specific structures. Comparative, neuroanatomical, neuroelectric, nonneural anatomical and behavioral methods were all employed, to different extents, in these studies. More specifically, these studies were addressed to the following problems and issues: (1) effects of increased brain size of closely related species on the organization of cortical sensory areas and on quantitative development of homologous neuroanatomical structures; (2) species differences in somatotopic organization and differential enlargement of particular peripheral projections; (3) physiological significance of cortical fissures and sulci; (4) nomenclature of fissures and sulci and their interspecies homologues; (5) intraspecies variation in cortical fissuration and its physiological significance; (6) correlation between physiologically defined cortical regions and underlying cytoarchitecture; (7) multiple sub-modality-specific somatic sensory projections to SI; (8) comparison of somatotopic specificity using micro- and macroelectrode recording methods; (9) importance of sampling density and sampling adequacy in mapping studies; (10) methods for successful study of small and large anesthetized

mammals, and (11) multidisciplinary content of behavioral, neurophysiological, quantitative neuroanatomical, and nonneural anatomical features. A more thorough treatment of mapping methodologies, their historical development, their increasingly multidisciplinary content, and their

role in the search for understanding of neurobiological mechanisms are reviewed elsewhere [WELKER, 1976].

References

WELKER, W. I.: Mapping the brain. Historical trends in functional localization. *Brain Behav. Evol.* 13: 32-43 (1976).