

Contents

1	Introduction	1
2	Materials and Techniques.	3
2.1	Cytoarchitectonic Analysis	3
2.2	Quantitative Analysis	3
2.3	Immunohistochemical Procedures	6
2.4	Neuropathological Procedures	7
3	Comparative and Developmental Notes	8
3.1	The SN and VTA in Lower Tetrapods	8
3.2	The Mammalian SN and VTA	10
3.2.1	Cytoarchitecture	10
3.2.2	Cytology	12
3.2.3	Chemoarchitecture.	13
3.2.4	Fiber Connections	15
3.2.4.1	Striomesencephalic Projections	15
3.2.4.2	Non-Striatal Afferents to the SN and VTA	18
3.2.4.3	Mesotelencephalic Projections.	19
3.2.4.4	Nigrothalamic, Nigrotectal and Nigrosegmental Projections.	24
3.2.5	A Summary of Nigral Organization	25
3.3	Development of the SN and VTA	26
4	The Human Substantia Nigra and Ventral Tegmental Area	32
4.1	Introduction	32
4.2	Cytological Features	34
4.3	Cytoarchitectonic Subdivision	37
4.3.1	Neuromelanin as a Marker for DAergic Neurons.	39
4.3.2	Pigmentoarchitecture.	39
4.3.3	Cytoarchitecture	41
4.4	Chemoarchitecture.	50
4.5	Fiber Connections of the Primate SN Complex	58
4.5.1	Striatonigral Projections	58
4.5.2	Mesotelencephalic Projections.	62

4.5.3	Nigrothalamic, Nigrotectal, and Nigrotegmental Projections	65
4.6	A Model of Human Nigral Organization	67
5	Neuropathological Aspects	70
5.1	Introduction	70
5.2	Involvement of the SN and VTA in Basal Ganglia Diseases	71
5.3	Involvement of the SN and VTA in AD	78
6	Quantitative Aspects	85
6.1	Introduction	85
6.2	Age-Related Neuronal Loss	85
6.3	Neuronal Loss in the SN and VTA in AD and PD	86
7	Functional and Pathophysiological Considerations	93
7.1	Lesion Studies on the SN	93
7.2	Some Functional and Pathophysiological Aspects of Mesencephalic DAergic Projections	94
7.2.1	Mesolimbocortical Circuitry and Cognition	95
7.2.2	Motor and Complex Cortico-Subcortical Loops	96
7.2.3	Imaging Studies	99
7.3	The Involvement of the SN and VTA in AD and PD	100
8	Summary	103
	Acknowledgements	106
	References	107
	Subject Index	131