

Subject Index

- A**
Acetylcholine, cortical content, 42
Acetylcholinesterase, somatosensory cortex content, 184
Afferent fibers
 basal telencephalic, 42–44
 class I, 153, 159
dopaminergic, 44–45, 69, 72
 extra-cellular channel ingrowth, 67
 internal capsules and, 18, 19
 of locus coeruleus, 44–45
 monoaminergic, 8, 69
 neurogenetic gradients, 42–45
 to raphe nuclei, 45
 serotonergic, 45, 69
 to subplate, 69, 70
 to substantia nigra, 44
 thalamic, 8, 70
 growth trajectory, 44
 input specificity, 208
 to ventral tegmental area, 44
Agenesis, corpus callosum, 149
Allocortex, 186
Anterior neuron, neurogenetic gradient, 33
Apical dendrite
 of cortical plate, 73–75
 of subplate, 112
Aplasia, olfactory, 149
Arhinencephaly, 149
Astrocyte, production, 57
Auditory cortex
 functional re-specification, 208
 neurogenetic gradients, 161–166, 222–223
 layer II, 161, 162, 163–165
 layer III, 161, 162, 163–165
 layer IV, 161, 162, 163–165
 layer V, 161–162, 163–164
 layer VI, 161–162, 163–165
 longitudinal, 164–165
 radial, 163
 thalamocortical connections, 165–166
 transverse, 163–164
- Autoradiographic labeling, of
 germinal matrix, 49–64
 heavily-labeled proliferating cells, 53–62
 heterogeneity/stratification patterns, 50–64
 lightly-labeled proliferating cells, 57–63
 methodology, 49
 mitotic figure cleavage planes, 50–53
Autoradiography, methodology, 226–228
- B**
Barrel subfield, of somatosensory cortex, 167–168, 172–174, 205, 211
Basal ganglia
 growth, 117, 221
 rudiment, 13, 15
Biocytin, 70
- C**
Cajal-Retzius cell, 6, 7, 8, 25
 autoradiographic labeling procedure, 65
 in cortical plate two-tier structure, 81
 differentiation, 50
 dorsomedial neocortical production, 76, 77
 extra-cellular channel localization, 65–67, 70
 of layer I, 147, 221–222
 neurogenesis peak, 140, 147
 neurogenetic gradients, 31–32, 33
 primordial plexiform accumulation, 222
 production, 63
 within pyramidal cell dendrite tuft, 73, 74
 synapses, 67
Callosal zone, 28
Cell migration, 8–10, 116–127. *See also* Interkinetic nuclear migration
 to dorsal cortical plate, 121, 123, 124
 to insular cortical plate, 120, 121
 to lateral cortical plate, 118–120, 121–125
 lateral cortical stream, 117–127, 144–146, 211, 221
 pyknotic cells, 145
 radial, 116, 124, 127, 139, 206
 vertical nuclear orientation and, 108
 radiosensitivity, 143–146
 to ventrolateral cortical plate, 120, 121, 123, 124
Cell orientation, determination, 233
Cell packing density, 108–109
 determination methods, 232
Cerebellum, radiosensitivity, 148
Cerebral cortex
 abnormalities, 148–149
 acetylcholine content, 42
 columnar organization, 139–140
 primordium, 13, 15–16
Cerebral palsy, 149
Chimera
 genotype radial distribution, 82
 ontogenetic columns, 206
Choline acetyltransferase, 43
Cholinergic neuron, basal telencephalic, 42–44
Chronoarchitectonic map
 of locus coeruleus, 45
 neurogenetic gradients, 30
Cingulate area, neurogenetic gradients, 193–195, 196
Colliculus, inferior, auditory cortical projections, 165
Colliculus, superior, thalamic nucleus projections, 153
Columnar organization, of cerebral cortex, 139–140
Congenital abnormalities, cortical, 148–149

- Corpus callosum
 abnormalities, 149
 agenesis, 149
 extra-cellular channels, 65
 neurogenetic gradients, 22, 36–38
- Cortical neuron. *See also* specific types of cortical neurons
 migration, 8–9, 10
 precursor cells, 203–204
- Cortical plate, 5–6, 16–19
 afferent system ingrowth, 69–70
 apical dendrites, 73–75
 cell migration, 8–10, 116–127
 to dorsal cortical plate, 121, 123, 124
 to insular cortical plate, 120, 121
 to lateral cortical plate, 118–120, 121–125
 radiosensitivity, 143–146
 to ventrolateral cortical plate, 120, 121, 123, 124
 cell packing density, 28, 109
 dopamine axon penetration, 44
 gray matter, 6
 heterogeneity, 205
 layer V neurons, differential distribution, 207–208
 neuroepithelium formation, 221
 neurogenesis, 65, 71–72, 221–222
 neuronal settling, 71
 nuclear area, 111
 nuclear orientation, 106, 107, 108, 109, 110, 111–112, 114–115, 222
 primordial plexiform layer
 relationship, 68, 71–72, 221–222
 proliferative cell differentiation, 55
 radial neurogenetic gradients, 73–82
 radiosensitivity, 129, 146, 147–148
 stratification changes, 218
 subplate blending, 72
 thickening, 25, 29
 three-dimensional reconstructions, 23–24, 25
 two-tier arrangement, 73, 80–82, 222
 ventricular zone relationship, 117
- Cortical plate morphogenetic foundation, 72
- Cortical wall
 dorsolateral, 36, 38
 ventrolateral, 36
- Corticospinal tract, layer V, 181–183
- Cranial nerve V. *See* Trigeminal nerve
- Cyclopia, 149
- Cytochrome oxidase, 168
- Cytomegalovirus, 149
- D**
- Dendrite, apical, of pyramidal cell, 73–75
- Dentate granule cell, radiosensitivity, 148
- Dentate gyrus, radiosensitivity, 148
- Dopaminergic afferent fibers cortical distribution, 72
 to subplate, 69
 of substantia nigra, 44, 45
 of ventral tegmental area, 44, 45
- Dorsomedial neuron, neurogenetic gradients, 33
- Dysplasia, cortical, 149
- E**
- Emotion, limbic cortex and, 186
- Ependyma, 64
- Ependymal cell
 precursors, 139, 147, 203, 204
 radiosensitivity, 139, 147, 220
- Ependymal layer/zone, 3, 5, 54, 56
- Ependymogial cell, 127
- Epithelium. *See also* Neuroepithelium
 olfactory, 13
 pseudostratified, 4
- Epithelzellen*, 3
- Extracellular channels, 25–26, 65–67
- F**
- Foramen of Monro, 13, 15–16
- Forebrain, embryonic. *See* Prosencephalon
- G**
- Gamma-aminobutyric acid, pyramidal cell content, 36
- Geniculate nucleus
 auditory cortex connections, 165–166
 visual cortex connections, 158–160
- Germinal cells, 3–5, 17–18, 203–205.
See also specific types of germinal cells
- Germinal matrix. *See also* Neuroepithelium;
 Subventricular zone
 autoradiographic labeling pattern analysis, 49–64
 heavily-labeled proliferating cells, 53–62
 heterogeneity/stratification patterns, 50–64
 lightly-labeled proliferating cells, 57–63
 methodology, 49
 cellular heterogeneity/stratification, 50–64
 mitotic figure cleavage planes, 50–53
- neuron/glia/ependymal cell generation and, 62–64
 proliferating cell positions, 53–54
- components, 49
 developmental stages, 216–220
- Glial cell**
 in cell migration, 116, 124–125, 127
 cortical neuronal interaction, 8, 9
 heterogeneity, 139
 of intermediate zone, 90
 precursors, 49, 64, 203, 204, 217
 differentiation from neuronal precursors, 219–220
 radiosensitivity, 139, 147
 production, 57
 radial, 49, 116, 127, 139, 206
 radiosensitivity, 139, 147, 220
 as stem cell, 205
 of third superior band, 220
 of transitional zone, 90, 95, 98
 as white matter precursor, 90, 98
- Glial fibrillary acidic protein, 57, 64
- Gray matter**
 cortical, 204
 of cortical plate, 6
 heterotopia, 149
- Gustatory cortex
 neurogenetic gradients, 188, 190
 thalamic connections, 187, 198–200
- H**
- Heterotopia, 149
- Hippocampus, radiosensitivity, 148
- Holoprosencephaly, 149
- I**
- Inferior bands**
 first, 79, 87, 89–91, 118, 220, 221
 fate, 95–98
 sequential arrangement, 93–95
 uniformity, 101–105
 second, 92–93, 95, 220
- Infralimbic area, neurogenetic gradients, 191–193, 196
- Interkinetic nuclear migration, 50, 203
 decrease, 218, 219
 duration, 217
 in neural tube, 4
 by neuronal precursor cells, 56
 synthetic zone/mitotic zone relationship and, 216
 termination, 54
- Intermediate zone, 5, 25
 cell migration, 117
 cell packing density, 109, 113–114
 components, 83
 expansion, 29
 glial cells, 90
 inferior bands

- first, 79, 87, 89–91, 93–98,
 101–105, 118, 220, 221
 second, 118–119
 layer V pyramidal cells, 83
 neuronal rotation, 8–10
 nuclear area, 114
 nuclear orientation, 106, 107–108,
 112, 113–115, 125–126, 221
 proliferative cell differentiation, 55
 pyknotic cells, 143, 145
 radiosensitivity, 143–144, 146, 147
 sojourn zones, 220
 superior bands
 second, 85–86, 87, 93–95,
 98–101, 220–221
 third, 87–92, 93, 95–98, 220
 Internal capsule, 18, 19
- K**
- Keimzellen*, 3
- L**
- Lamina
 intermediate, 5
 organization
 paleo/archicortex, 213
 specificity, 207, 208
- Lateral cortical stream, of cell
 migration, 117–127, 211, 221
 pyknotic cells, 145
 radiosensitivity, 144–146
- Layer I
 auditory cortex, 165
 Cajal-Retzius cells, 147, 221–222
 glial cells, 204
 limbic cortex, 191–192
 neurogenesis, 216
 neurogenetic gradients, 31–32, 33,
 159, 165
 pyramidal cell apical dendrite
 ingrowth, 73–75
 thalamocortical afferents, 153, 165
 visual cortex, 159
- Layer II
 auditory cortex, 161, 162
 longitudinal neurogenetic
 gradients, 165
 radial neurogenetic gradients, 163
 transverse neurogenetic
 gradients, 164
 in cortical plate two-tier structure,
 81, 82
 differentiation-related growth, 112
 glial cells, 204
 limbic cortex, 188, 190
 medial, 193
 neurogenetic gradients, 188
 motor cortex, 176
 longitudinal neurogenetic
 gradients, 181
- radial neurogenetic gradients,
 176, 177
 transverse neurogenetic
 gradients, 178–180
 neurogenesis, 41–42, 64, 218
 peak, 205
 neurogenetic gradients, 33–42, 222
 longitudinal, 165, 172, 181
 radial, 154–155, 163, 169–170
 transverse, 157–158, 164, 170,
 171, 178–180
 sojourn zone, 220, 221
 somatosensory cortex, 90–91, 205,
 210, 211–212
 cell migration, 210–211
 longitudinal neurogenetic
 gradients, 172
 radial neurogenetic gradients,
 168, 169–170
 transverse neurogenetic
 gradients, 170, 171
 subventricular zone, 205
 transitional zone
 first inferior band cells, 91, 94–95
 second inferior band cells, 93
 visual cortex, 153, 154, 205
 neurogenetic gradients, 154–155,
 157–158, 160
- Layer III
 auditory cortex, 161, 162
 longitudinal neurogenetic
 gradients, 165
 radial neurogenetic gradients, 163
 transverse neurogenetic
 gradients, 164
 in cortical plate two-tier structure,
 79, 81, 82
 differentiation-related growth, 112
 glial cells, 204
 motor cortex, 90–91, 176
 longitudinal neurogenetic
 gradients, 181
 radial neurogenetic gradients,
 176, 177
 transverse neurogenetic
 gradients, 178–180
 neurogenesis, 41–42, 64, 218
 peak, 79, 205
 neurogenetic gradients, 33–42, 222
 longitudinal, 165, 172, 181
 radial, 154–155, 163, 168,
 169–170, 176, 177
 transverse, 155–157, 163–164,
 170, 171, 178–189
 neuronal settling patterns, 79, 80,
 81, 82
 sojourn zone, 220, 221
 somatosensory cortex, 167, 205
 anterolateral distribution,
 211–212
 barrel subfields, 173
 longitudinal neurogenetic
 gradients, 172
 radial neurogenetic gradients,
 168, 169–170
 thalamic relay axon interactions,
 174
 transverse neurogenetic
 gradients, 170, 171
 subventricular zone, 205
 thalamocortical connections, 153,
 160, 165, 174, 211–212
- radial neurogenetic gradients,
 168, 169–170
 transverse neurogenetic
 gradients, 170, 171
 subventricular zone, 205
 transitional zone, first inferior band
 cells, 87, 91, 94–95
 visual cortex, 205
 neurogenetic gradients, 154–155,
 157, 160
- Layer IV
 auditory cortex, 161, 162
 longitudinal neurogenetic
 gradients, 165
 radial neurogenetic gradients, 163
 thalamocortical projections, 165
 transverse neurogenetic
 gradients, 163–164
 cell migration, 221
 in cortical plate two-tier structure,
 79, 80, 81, 82
 differentiation-related growth, 112
 glial cells, 204
 gustatory cortex, 187
 limbic cortex, 189, 190
 medial, 191–192, 194–195, 197
 motor cortex, 87–89, 104–105, 176
 longitudinal neurogenetic
 gradients, 181
 radial neurogenetic gradients,
 176, 177
 transverse neurogenetic
 gradients, 178–179
 neurogenesis, 41–42, 64, 218
 peak, 79, 80, 205
 neurogenetic gradients, 33–42, 222
 longitudinal, 165, 172, 181
 radial, 154–155, 163, 168,
 169–170, 176, 177
 transverse, 155–157, 163–164,
 170, 171, 178–189
 neuronal settling patterns, 79, 80,
 81, 82
 sojourn zone, 220, 221
 somatosensory cortex, 167, 205
 anterolateral distribution,
 211–212
 barrel subfields, 173
 longitudinal neurogenetic
 gradients, 172
 radial neurogenetic gradients,
 168, 169–170
 thalamic relay axon interactions,
 174
 transverse neurogenetic
 gradients, 170, 171
 subventricular zone, 205
 thalamocortical connections, 153,
 160, 165, 174, 211–212

- Layer IV (*contd.*)
 transitional zone, 83
 differential distribution, 101–105
 first inferior band cells, 87–89,
 94–95, 101–105
 visual cortex, 205
 neurogenetic gradients, 154–157,
 160
 thalamocortical connections, 159,
 160
- Layer V
 agranular insular cortex, 189
 auditory cortex, 161–162
 radial neurogenetic gradients, 163
 transverse neurogenetic
 gradients, 163–164
 corticospinal tract, 181–183
 differentiation-related growth, 112
 glial cells, 204
 heterotopia, 149
 laminar specificity, 207
 limbic cortex, 189–190
 medial, 193, 194–195, 197
 neurogenesis onset, 188
 motor cortex, 176
 longitudinal neurogenetic
 gradients, 180–181
 radial neurogenetic gradients,
 176, 177
 transverse neurogenetic
 gradients, 178–179
 neurogenesis, 41, 64, 217, 218
 completion, 80
 concurrent, 80, 82
 peak, 205
 neurogenetic gradients, 33–42, 222
 longitudinal, 154, 155, 171, 172,
 180–181
 radial, 163, 168, 169–170, 176,
 177
 transverse, 155–157, 163–164,
 170, 171, 178–179
 neuronal co-generation, 222
 neuronal settling patterns, 78–82
 occipital, 206
 regional specificity, 207–208
 sojourn zone, 220–221
 somatosensory cortex, 205
 longitudinal neurogenetic
 gradients, 171, 172
 radial neurogenetic gradients,
 168, 169–170
 transverse neurogenetic
 gradients, 170, 171
 subventricular zone, 205
 transitional zone, 83, 105
 differentiation, 98
 second superior band cells, 86,
 87, 93, 94, 98–101
 visual cortex, 153–154, 205
 neurogenetic gradients, 154–155,
 156
 thalamocortical connections, 159
- Layer VI, 28
 auditory cortex, 161–162
 longitudinal neurogenetic
 gradients, 165
 radial neurogenetic gradients, 163
 transverse neurogenetic
 gradients, 163–164
 in cortical plate two-tier structure,
 78, 79, 81, 82
 differentiation-related growth, 112
 dorsomedial neocortical production,
 78
 glial cells, 204
 limbic cortex, 72, 190
 motor cortex
 longitudinal neurogenetic
 gradients, 180–181
 radial neurogenetic gradients,
 176, 177
 transverse neurogenetic
 gradients, 178–179
 neurogenesis, 38–41, 64, 217
 concurrent, 80, 82
 dorsomedial, 78
 peak, 205
 neurogenetic gradients, 33–42, 222
 longitudinal, 165, 171–172
 radial, 163, 168, 169–170, 176,
 177
 transverse, 163–164, 170, 171,
 178–179
 neuronal accumulation patterns, 72
 neuronal co-generation, 222
 perirhinal cortex, 187–188
 sojourn zone, 220, 221
 somatosensory cortex, 205
 longitudinal neurogenetic
 gradients, 171–172
 radial neurogenetic gradients,
 168, 169–170
 transverse neurogenetic
 gradients, 170, 171
 thalamocortical afferents, 153
 transitional zone, 67, 83
 superior band cells, 86, 87, 93, 94
 visual cortex, 153–154, 205
 neurogenesis gradients, 154–155,
 156
 thalamocortical connections, 159
- Layer VII
 glial cells, 204
 neurogenesis, 216
 transitional field, 67
- Lectin, 57
- Limbic cortex
 behavioral function, 186
 definition, 186
 dopamine innervation, 44, 186
 mediodorsal thalamic nuclei
 projections, 186
 neurogenetic gradients, 33–36, 41,
 197–198
 ventrolateral-to-dorsomedial, 40
 paleo/archicortex ontogenetic link,
 213–215
 subplate/cortical plate blending, 72
- Limbic cortex, lateral
 agranular insular, dorsal location,
 187
 neurogenetic gradients, 188,
 189–190
 agranular insular, ventral
 location, 187
 neurogenetic gradients, 188
 components, 186
 neurogenetic gradients, 187–190,
 223
 longitudinal, 188–190
 radial, 188
 transverse, 188
 perirhinal cortex
 layer V cells, 41
 location, 187–188
 in rhinal sulcus, 189
- Limbic cortex, medial
 components, 186
 neocortical gradient reversal, 213
 neurogenetic gradients, 42, 45,
 191–197, 223
 cingulate area, 193–195, 196
 dorsal peduncular area, 191–192,
 196
 infralimbic area, 191–193, 196
 inter-area, 197
 longitudinal, 191
 radial, 191
 retrosplenial area, 195–197
 somatic neocortical relationship,
 191
 raphe nuclei projections, 45
 thalamic anterior nuclei connection,
 198–200
- Limbic system. *See also* specific
 areas of limbic system
 definition, 186
- Lissencephaly, 149
- Locus coeruleus, neocortical afferent
 inputs, 44–45
- M**
- Marginal zone, 6, 7
- Mental retardation, 149
- Mitotic cells/figures
 cellular stratification, 61
 cleavage planes, 50–53, 203, 204
 interkinetic nuclear migration, 4,
 50, 56, 203, 216, 217, 218, 219
 paraventricular, 50, 53, 57, 216, 217

- periventricular, 50, 53, 216, 217, 218
 during early neurogenesis, 63
 radiosensitivity, 134
 of subplate zone, 95
 subventricular, 50, 51, 52, 54, 63, 217
- Mitotic zone, 53–54, 55, 56
 synthetic zone relationship, 216, 218
- Monoaminergic fibers, neocortical, 8
 subplate content, 69
- Monoclonal antibody J1, 57
- Mosaicism, neuroepithelial, 206, 207, 208
- Motor cortex, 175–185
 neurogenetic gradients, 40, 41, 42, 176–184, 223
 corticospinal tract outgrowth
 correlation, 181–183
 layer II, 176–181
 layer III, 90–91, 163–165
 layer IV, 87–89, 104–105, 176–181
 layer V, 176–181
 layer VI, 86, 87, 104, 176–181
 longitudinal, 180–181
 radial, 176–178
 thalamocortical projection
 correlation, 183–184
 transverse, 178–180, 185
 somatosensory cortex overlap, 168
 ventrolateral thalamic nucleus
 projections, 175
- N**
- Neocortex. *See also* specific areas of neocortex
 cortical evolution and, 213–215
 cytoarchitectonic differentiation, 98–105
 deep layers, 80. *See also* Layer V; Layer VI
 dorsomedial, 25–29
 Cajal-Retzius neuron production, 76, 77
 neurogenetic gradients, 33–36
 peak neurogenesis, 67, 78
 stratification patterns, 61–62
 subplate neurogenesis peak, 67
 dual phylogenetic origin, 7–8, 33, 65, 213
 extra-cellular channels, 25–26, 65–67
 histogenesis, 5–10, 25–29
 monoaminergic fibers, 8
 morphogenesis, 17–25
 coronal sections, 17–23
 three-dimensional
 reconstructions, 23–25
- neurogenesis onset, 18
 neurogenetic gradients, 18, 30–45
 afferent fiber inputs, 42–45
 chronoarchitectonic map, 30
 subplate, 31–33
 primordium delineation, 129–135
 radiosensitivity, 128–149
 developmental change and, 135–142
 neuroepithelium collapse and, 129–143
 two-stage development, 7–8, 33, 65, 213
 volumetric increase, 17–23
- Nerve growth factor, 43–44
- Neural groove, stem cells, 3
- Neural plate, stem cells, 3
- Neural tube
 caudal, 5
 germinal cells, 4
 interkinetic nuclear migration, 4
 stem cells, 3
- Neuroectoderm, stem cells, 3
- Neuroepithelium
 cellular heterogeneity, 49, 138–139, 205–208, 216, 218–220
 epigenetic concept, 205–206
 preformationist concept, 206
 synthetic concept, 207–208
 collapse, 129–143
 autographic/radiosensitivity
 correlation, 135–142
 cellular basis, 142–143
 gradients, 133
 heterotopia and, 149
 migrating neuron sensitivity, 143–146
 pyknosis and, 129, 130, 132, 134, 135, 140, 142
 as columnar mosaic, 206
 of cortical plate, 221
 during early neurogenesis, 63
 of ependymal zone, 54, 56
 fast-cycling cells, 139
 germinal cells, 3, 17–18, 203–205
 laminar specificity, 207, 208
 during late-stage neurogenesis, 64
 as layer IV–II cell source, 95
 during middle-stage neurogenesis, 63
 mitotic cells/figures
 cellular stratification, 61
 cleavage planes, 50–53, 203, 204
 interkinetic nuclear migration, 4, 50, 56, 203, 216, 217, 218, 219
 paraventricular, 50, 53, 57, 216, 217
 periventricular, 50, 53, 63, 134, 216, 217, 218
 of subplate zone, 95
 subventricular, 50, 51, 52, 54, 63, 217
 mitotic zone, 53–54, 55, 56, 216, 218
 nuclear area, 110
 properties, 3–4
 of prosencephalic wall, 11, 15
 pseudostratification, 50
 shrinkage, 88
 slow-cycling cells, 139
 of sojourn zones, 220
 stratification changes, 218
 of subventricular zone, 5
 successive transformations, 81
 of synthetic zone, 53–54, 55, 56
 telencephalic, 4
 collapse, 129–130
 terminology, 3
 thalamic, 16, 52
 thinning, 25, 29
- Neurogenesis peak, 205
- Neurogenetic gradients, 30–45. *See also* under specific neocortical areas and layers
 afferent growth implications, 42–45
 chronoarchitectonic map, 30
 longitudinal, 222, 223
 noncortical, 32
 phylogenetic implications, 213–215
 radial, 73–82, 222
 transverse, 222, 223
- Neuroglia cell, 3
- Neuron precursor, glial cell
 differentiation, 219–220
- Noradrenalin, 45
- Noradrenergic neuron, of locus
 coeruleus, 44–45
- Nuclear area, 109–115
 determination method, 232–233
- Nuclear orientation, 106–115
 cortical plate, 106, 107, 108, 109, 110, 111–112, 114–115
 intermediate zone, 106, 107, 108, 112, 113–115
 subplate, 106, 107, 109, 110, 111, 112
 subventricular zone, 106, 107, 109, 112–113, 114–115
 ventricular zone, 106, 107, 108, 109, 110, 111, 114
- O**
- Occipital cortex, layer V neurons, 206
- Occipital pole, neuroepithelium
 collapse, 133
- Olfactory aplasia, 149
- Olfactory cortex, 213, 215
- Olfactory placode, 11, 12, 13, 15
- Ontogenetic column hypothesis, 206
- Opposum, global cortical gradients, 33

- Optic tectum
 extra-cellular channels, 65
 ontogenetic columns, 206
- Orbital cortex, neurogenetic gradients, 197–198
- P**
- Pachygyria, 149
- Papez circuit, 186
- Paraventricular mitotic cell, 50, 53, 57, 216, 217
- Parietal bone, somatosensory cortex coverage, 168–169, 170–174, 223
- Periarchicortex, 186, 213–215
- Peripaleocortex, 186, 213–215
- Perirhinal cortex
 layer V cells, 41
 location, 187–188
- Periventricular germinal matrix, disease of, 149
- Periventricular mitotic cells, 50, 53, 63, 216, 217, 218
 radiosensitivity, 134
- Pial membrane
 Cajal-Retzius neurons, 66, 67
 pyramidal cell plexus, 73, 75
- Piriform cortex, neuronal settling, 124
- Polymicrogyria, 149
- Polymorph neuron, 70, 71, 222
 extra-cellular channel localization, 65
- Posterior neuron, neurogenetic gradient, 33
- Primordial plexiform layer, 7–8, 25, 65–72. *See also* Layer I; Subplate
 Cajal-Retzius cell differentiation, 50
 cortical plate relationship, 68, 71–72, 221–222
 nerve growth factor fibers, 43–44
 neurogenesis, 221–222
 neurogenetic gradients, 33
 partitioning, 68–70, 71–72
 as reptilian cortex, 65
- Proisocortex, 186
- Prosencephalon
 development, 11–16
 neuroepithelium, 16
- Purkinje cell, radiosensitivity, 148
- Pyknosis
 in intermediate zone, 143, 145
 neuroepithelium collapse and, 129, 130, 132, 134, 135, 140, 142
 of subventricular zone, 143
 of synthetic zone, 139
- Pyramidal cell
 apical dendrites, 73–75
 differentiation, 6–7
 gamma-aminobutyric acid-containing, 36
 radial neurogenetic gradients, 73–82
 somatosensory, 169
- R**
- Radial glia hypothesis, of cell migration, 116, 124, 127, 139, 206
- Raphe nuclei, neocortical afferent inputs, 45
- Rathke's pouch, 12
- Retina, ontogenetic columns, 206
- Retinogeniculate projection, 158–160
- Retrosplinal area, limbic, 195–197
- Rhinal sulcus
 layer VI neurons, 38, 39–40
 neurogenetic gradients, 189
- S**
- Sensory cortex, general, 213
- Serotonin
 afferent fibers, 45, 69
 raphe nuclei production, 45
 subplate content, 69
- Sojourn zones, 93, 218, 220–221
- Somatosensory cortex, 167–174
 acetylcholinesterase content, 184
 barrel subfields, 167–168, 172–174, 205, 211
 cholinergic markers, 184
 motor cortex overlap, 168
 neurogenetic gradients, 222, 223
 layer II, 90–91, 168–172, 205, 210, 211–212
 layer III, 168–172, 205
 layer IV, 167–172, 205
 layer V, 168–172, 205
 layer VI, 169–172, 205
 longitudinal, 171–172
 radial, 169–170
 thalamocortical projection
 correlation, 173–174
 transverse, 170–171
 parietal bone coverage, 168
 PAR1, 168–169, 170–172, 173–174
 PAR2, 168, 169, 170–171, 223
 thalamic ventrobasal complex projection, 167
 ventrobasal complex connections, 184
- Somatostatin, 36
- Spinal cord, extra-cellular channels, 65
- Spongioblast, 3, 4
- Statistical analysis, methodology, 229
- Stem cell, 3, 17–18, 49, 203–205. *See also* specific types of stem cells
- Subplate, 7–8
 as afferent target, 70, 212
 apical dendrite plexus, 112
 autographic labeling procedure, 65
 as cortical plate morphogenetic foundation, 72
 cortical plate settling patterns, 77–78
 dopamine axons, 44
 dual nature of, 95
 first appearance, 19
 inferior band cells, 95
 layer IV, 83–84
 mitotic cells, 95
 neurogenesis peak, 67, 78
 neurogenetic gradients, 31–33, 40, 222
 ventrolateral/dorsomedial, 72
 neuronal settling, 67–70, 77–78
 nuclear area, 111
 nuclear orientation, 106, 107–108, 109, 110, 111, 112
 polymorph cells, 70, 71, 222
 as premigratory staging area, 95
 in primordial plexiform layer partitioning, 69, 71–72, 222
 proliferative cell differentiation, 56
 radiosensitivity, 148
 synaptic contacts, 70
 upper, 72
- Substantia nigra, dopaminergic afferent fibers, 44, 45
- Subventricular zone, 25, 216–217
 appearance, 54–55, 57
 cell migration, 117
 cell packing density, 109
 cell proliferation, 55, 56, 57, 63
 of early neocortex, 63
 expansion, 64
 inferior bands
 first, 79, 87, 89–91, 93–98, 101–105, 118, 220, 221
 second, 92–93, 95, 220
 of middle-stage neocortex, 63
 mitotic cells/figures, 50, 51, 52, 54, 63, 217
 neuroepithelium, 5
 neurogenetic gradients, 54, 55–56, 57
 nuclear orientation, 106, 107–108, 109, 112–113, 114–115
 pyknotic cells, 143
 radiosensitivity, 143–144, 146, 147
 as secondary germinal matrix, 63
 sojourn zones, 220
 thalamic, 52
 thickening, 28
 thinning, 27, 29
- Succinic dehydrogenase, 168
- Superior bands
 first, 220
 second, 85–86, 87, 220–221
 regional differences, 98–101
 sequential arrangement, 93–95

- third, 87–92, 93, 220
cell fates, 95–98
- Synapse
of Cajal-Retzius neurons, 67
first appearance, 67
- Synthetic zone, 4, 53–54, 55, 56
cell proliferation, 62
dissolution, 54
mitotic zone relationship, 216, 218
neuronal aggregation, 136, 216
pyknosis, 139
- T**
- Taste, primary afferents, 198–199
- Telencephalic vesicles, paired, 11–16
- Telencephalon
basal
afferent inputs, 42–44
dorsal expansion, 18
presumptive, 129–130
circumferential fiber band, 127
lateral, 130
neuroepithelium, 4
collapse, 129–130
neurogenesis onset, 18
- Tenia tecta, dorsal, 191
- Thalamocortical connections
auditory cortex, 165–166
input specificity, 208
limbic cortex, 198–200
motor cortex, 175, 183–184
neurogenetic gradient relationship, 208–213
somatosensory cortex, 167, 173–174, 184
visual cortex, 153, 158–160
- Thalamus
afferent fibers, 8
growth trajectory, 44
to subplate plexus, 70
arcuate subdivision, 173.
epigenetic influence of, 208
lateral posterior nucleus, visual
cortex projections, 153
neuroepithelium, 16, 52
neurogenesis, 35–36
synchronized, 212
retinogeniculate projection, 158–160
ventrobasal complex,
somatosensory cortex
connections, 167, 184
ventrolateral nucleus
function, 209
motor cortex connections, 175, 183–184
neurogenetic gradients, 209, 211
ventromedial nucleus
function, 209
neurogenetic gradients, 209, 211
- Transitional field, 18–19, 22
cell migration, 221
definition, 83
developmental events, 220–221
layer VI neurons, 67
layer VII neurons, 67
sojourn zones, 218, 220–221
somatic orientation, 221
stratification gradients, 83–105, 218
cortical cytoarchitectonic
differentiation and, 98–105
first inferior band, 79, 87, 89–91, 93–98, 101–105
first superior band, 85, 86, 87, 93–95, 98–101
second inferior band, 92–93, 95
second superior band, 85–86, 87, 93–95, 105
third superior band, 87–92, 95–98
transient gradient, 95
wave front, 93
three-dimensional reconstructions, 23, 24
- Trigeminal nerve, afferent pathway, 173
- V**
- Ventral tegmental area, dopamine
afferent fibers, 44, 45, 72
- Ventricle
lateral, 18
third, 15, 16
- “Ventricular choke” hypothesis, 52, 203
- Ventricular zone
cell packing density, 109, 110, 111
cortical plate relationship, 117
definition, 3
dorsomedial shrinkage, 67
nuclear area, 110–111
nuclear orientation, 106, 107–108, 109, 110, 111, 114
piriform cortex-settling cells, 124
radiosensitivity, 146, 146–147
three-dimensional reconstructions, 23–24, 25
- Ventriculitis, cytomegalovirus, 149
- Ventrolateral neuron, neurogenetic
gradients, 33
- Visual cortex, 153–160
dopamine innervation, 44
layer IV cells, 42
layer V cells, 41
neurogenetic gradients, 33, 159, 222, 223
ocular cortex 1B, 153, 154
neurogenetic gradients, 155, 156, 157–158
thalamocortical connections, 159
ocular cortex 2L, 154
neurogenetic gradients, 155, 156, 157
retinotopic map, 153
thalamocortical connections, 159
ocular cortex 1M, 153, 154
neurogenetic gradients, 155, 156, 157–158
thalamocortical connections, 159
ocular cortex 2M, 153, 154
neurogenetic gradients, 155, 156, 157, 160
retinotopic map, 153
sandwich neurogenetic gradients, 157–158
thalamocortical/neurogenetic
gradient connections, 158–160
- W**
- White matter, 22
glial cell precursors, 90, 98
heterotopia, 149
incipient, 19
third superior band coextension, 97–98
- X**
- x-irradiation studies, 128–149
acute paradigm, 128, 129
behavioral studies, 148–149
cortical primordium delineation, 129–135
differential radiosensitivity, 135–142
age factors, 143–146
ependymal cell sensitivity, 220
glial cell sensitivity, 220
hazardous long-term effects, 148–149
longitudinal paradigm, 128
neuroepithelium collapse, 129–143
radiosensitivity quantitative
analysis, 146–148