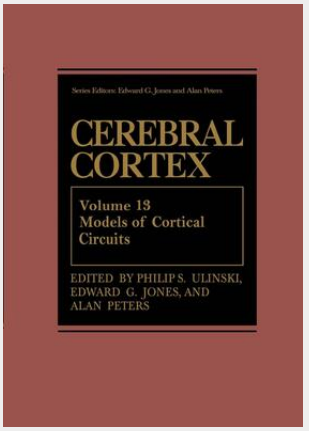
Ulinski

Cerebral Cortex

Models of Cortical Circuits

long-termplasticityandwithapproachestolearningandmemorybasedonmodificationofHebbiansynapsesarenotconsidered. Relativelyabstractattemptstounderstandhigherlevelandcognitiveprocessesbasedonneuralnetsrepresentasecond, majorareaofworkthatisnottreated. Modelsofcognitiveprocessesbasedon dynamicalsystemsmethodsinwhichnoattemptismadetoincludethebiophysical featuresofindividualneuronsarealsonotconsidered. vii viii Thetenmajorchaptersfallintothreegroups. Thefirstgroupdealswith compartmentalmodelsofindividualcorticalneurons. LyleBorg-Grahamprovides PREFACE anintroductiontothemethodsinvolvedinconstructingcompartmentalmodels andthenreviewstheexistingmodelsofhippocampalpyramidalcells. Becauseof theeffectivenessofhippocampalslicepreparations,theseneuronshavewell-characterizedbiophysicalproperties. Thischapterillustrateshowcompartmentalmodelscanbeusedtosynthesizeexperimentaldataandprovideanintegrativeviewof thepropertiesofindividualneurons. PaulRhodescontinuesthethemebyfocusing ontheroleofvoltage-gatedchannelslocatedonthedendritesofcorticalneurons. Thisisanareainwhichtechnologicaladvancesinthevisualizationofneuronsin slicepreparationsbasedoninfraredmicroscopyhavegreatlyexpandedtheinformationavailableondendriticfunctioninjustafewyears. Thechapterbothreviews theexperimentaldataonactivedendriticconductancesandemphasizestheirpotentialfunctionalroles. Thesecondgroupofchaptersdealwiththegenerationofreceptivefield propertiesofneuronswithinvisualcortex. Theyaddressissuesstemmingfromthe originalattempttounderstandhowthereceptivefieldpropertiesofneuronsincat andmonkeyprimaryvisualcortexaregeneratedbyinteractionsbetweengeniculateafferentsandcorticalneurons. ThechapterbyFlorentinWorgotterevaluates modelsthathavebeenusedtoanalyzethegenerationofreceptivefieldproperties. RodneyDouglasandhiscolleaguesaddressaspecificsetofissuesdealingwiththe roleofintracorticalexcitationmediatedbypyramidalcellcollaterals. Animportant featureofthischapterisitsrelationtoattempttoconstructfabricatedcircuitsthat duplicatethefunctionsofcorticalcircuits. ThechapterbyPhilipUlinskifocuseson thegenerationofmotion-selectivepropertiesincorticalneurons. Itseekstoidentitycellularmechanismsusedbyneuronsthatrespondpreferentiallytovisualstimuli movingwithparticularspeedsordirections. MatteoCarandiniandhiscolleagues discussthefeatureofcorticalneurons,knownasgaincontrol,thatallowsneurons torespondeffectivelytovisualstimulibypoolinginformationacrosspopulationsof corticalneurons. ThechapterbyHughWilsondealswiththereceptivefieldpropertiesofextrastriateareasandintroducesnewworkanalyzingface-selectiveneurons. Thefinalsetofchaptersconsidermodelsofensemblesofthalamicandcortical neurons. ThechapterbyWilliamLyttonandElizabethThomasusesthetheoryof dynamicalsystemstoanalyzethetemporalrelationshipsbetweenthalamicand corticalneurons. Animportantfeatureoftheinteractionbetweenthalamusand cortexisthepresenceofoscillationsthatdependinpartuponthevoltage-gated conductancespresentonindividualneuronsandinpartonthestructureofthe overallnetwork. PaulBushcontinuesthisemphasisonoscillationsbydiscussinga modelthatdealswiththegenerationofsynchronizedoscillationsinvisualcortex. Oscillationsofthiskindhaveattractedsubstantialattentioninrecentyearsbecause oftheirpotentialroleincognitiveprocesses. Thelastchapter,byMichaelHasselmo andChristianeLinster,reviewstheirworkonmodelingpiriformcortex,emphasizingtheroleofcholinergicmechanismsinmodulatingtheactivityofcorticalneu rons. Anattempthasbeenmadethroughouttomakethevolumeaccessibleto readerswithminimalmathematicalbackgrounds. Thevolumethusbeginswitha shorthistoryofmodelsofcorticalneuronsandcircuitrythatintroducestheprincipalmodelingstyles. ThechaptersbyWorgotterandUlinskicontainmoreextensive ix



213,99 €
199,99 € (zzgl. MwSt.)

Lieferfrist: bis zu 10 Tage

Artikelnummer: 9780306457272
Medium: Buch
ISBN: 978-0-306-45727-2
Verlag: Springer US
Erscheinungstermin: 28.02.1999
Sprache(n): Englisch
Auflage: 1999
Serie: Cerebral Cortex
Produktform: Gebunden
Gewicht: 1324 g
Seiten: 573
Format (B x H): 183 x 260 mm