



Encyclopedia
of the
Human Brain

A-Cog
VOLUME 1



CONTENTS

VOLUME I

Contributors	xv
About the Editor-in-Chief	xxxi
About the Advisory Board	xxxi
Preface	xxv
Guide to the Encyclopedia	xxvii

A

Action Potential	1
<i>John A. White</i>	
Adolescent Brain Maturation	13
<i>Jay N. Giedd, Elizabeth A. Molloy, and Jonathan Blumenthal</i>	
Aggression	21
<i>Jeffrey L. Saver</i>	
Aging Brain	43
<i>Lori L. Beason-Held and Barry Horwitz</i>	

Agnosia	59
<i>Jonathan J. Marotta and Marlene Behrmann</i>	

Agraphia	71
<i>Steven Z. Rapcsak and Pelagie M. Beeson</i>	

Alcohol Damage to the Brain	87
<i>John W. Olney</i>	

Alertness	99
<i>Verity J. Brown and Eric M. Bowman</i>	

Alexia	111
<i>Rhonda B. Friedman</i>	

Alzheimer's Disease, Neuropsychology of	119
<i>Robin G. Morris and Claire L. Worsley</i>	

Anger	131
<i>Christopher R. Long and James R. Averill</i>	

Anomia	137
<i>Lisa Tabor Connor and Loraine K. Obler</i>	

Anterior Cingulate Cortex	145	Axon	349
<i>B. J. Casey, Nick Yeung, and John Fossella</i>		<i>Kathleen S. Rockland</i>	
Anxiety	159		
<i>Eric Vermetten, Dennis S. Charney, and J. Douglas Bremner</i>			
Aphasia	181		
<i>Martha Taylor Sarno</i>			
Apraxia	193		
<i>Kenneth M. Heilman and Leslie J. Gonzalez-Rothi</i>			
Area V2	199		
<i>Daniel J. Felleman</i>			
Arousal	223		
<i>Richard T. Marrocco and Brent A. Field</i>			
Artificial Intelligence	237		
<i>Derek Partridge</i>			
Astrocytes	251		
<i>Nicole A. Baumann and Danielle Pham-Dinh</i>			
Attention	269		
<i>Shaun P. Vecera and Steven J. Luck</i>			
Auditory Agnosia	285		
<i>Henry A. Buchtel</i>			
Auditory Cortex	289		
<i>Robert J. Zatorre</i>			
Auditory Perception	303		
<i>William A. Yost</i>			
Autism	321		
<i>Eric Courchesne and Karen Pierce</i>			
Autoimmune Diseases	343		
<i>Felix Mor and Irun R. Cohen</i>			
		Basal Ganglia	367
		<i>Bruce Crosson, Leeza Maron, Anna B. Moore, and Laura Grande</i>	
		Behavioral Neurogenetics	381
		<i>Frans Sluyter, Eco de Geus, Gilles van Lijstelaar, and Wim E. Crusio</i>	
		Behavioral Neuroimmunology	393
		<i>Douglas L. Delahanty and Julie K. Cremeans-Smith</i>	
		Behavioral Pharmacology	405
		<i>Peter B. Dews</i>	
		Bilingualism	417
		<i>Jyotsna Vaid</i>	
		Biofeedback	435
		<i>Richard Gevirtz</i>	
		Body Perception Disorders	443
		<i>Georg Goldenberg</i>	
		Borna Disease Virus	459
		<i>W. Ian Lipkin, Thomas Brieze, and Mady Hornig</i>	
		Brain Anatomy and Networks	469
		<i>M.-Marsel Mesulam</i>	
		Brain Damage, Recovery from	481
		<i>Paul Bach-y-Rita</i>	
		Brain Development	493
		<i>Harun K. M. Yusuf and Khaleda Islam</i>	

Brain Disease, Organic*Kenneth Maiese***Brain Lesions***Matthias Keidel and Philipp Stude***Brain Stem***William W. Blessing***Broca's Area***Michelle Crank and Peter T. Fox***C****Cancer Patients, Cognitive Function** 587*Christina A. Meyers***Catecholamines** 595*Arnold J. Friedhoff and Raul Silva***Categorization** 603*Barbara J. Knowlton***Cerebellum** 611*Marco Molinari***Cerebral Circulation** 629*John A. Jane, Jr., Aaron S. Dumont, Daniel E. Couture, K. Michael Webb, Dilantha B. Ellegala, Hayan Dayoub, and Neal F. Kassell***Cerebral Cortex** 663*David F. Cechetto and Jane C. Topolovec***Cerebral Edema** 681*David S. Liebeskind***Cerebral Palsy** 703*Stephanie Watkins and Angela Rosenberg***509 Cerebral White Matter Disorders** 715*Christopher M. Filley***529 Cerebrovascular Disease** 733*John R. Absher***545 Chemical Neuroanatomy** 759*Yuri Koutcherov, Ken W. S. Ashwell, and George Paxinos***569 Cingulate Cortex** 775*Michael Gabriel, Lauren Burhans, Andrew Talk, and Paige Scalf***Circadian Rhythms** 793*Charles A. Fuller and Patrick M. Fuller***Classical Conditioning** 813*Robert E. Clark***Cognitive Aging** 829*Naftali Raz***Cognitive Psychology, Overview** 839*John F. Kihlstrom and Lillian Park***Cognitive Rehabilitation** 855*Stephanie A. Kolakowsky-Hayner and Jeffrey S. Kreutzer*

VOLUME 2**Color Processing and Color Processing Disorders** 1*Peter Gouras***Color Vision** 15*Gerald H. Jacobs*

Consciousness*Michael S. Gazzaniga***Conversion Disorders and
Somatoform Disorders***Richard J. Brown and Maria A. Ron***Corpus Callosum***Kathleen Baynes***Cranial Nerves***Ann B. Butler***Creativity***Mark A. Runco***D****Dementia***Alfred W. Kaszniak***Depression***Esteban V. Cardemil***Dopamine***Lisa A. Taylor and Ian Creese***Dreaming***Mario Bertini***Dyslexia***H. Branch Coslett***E****Electrical Potentials***Fernando H. Lopes da Silva***31 Electroencephalography (EEG) 169***Paul L. Nunez***37 Emotion 181***Ralph Adolphs and Andrea S. Heberlein***Endorphins and Their Receptors 193***Catherine Abbadie and Gavril W. Pasternak***51 Epilepsy 201***Bettina Schmitz***65 Event-Related Electromagnetic
Responses 221***John S. George***83 Evolution of the Brain 251***Harry J. Jerison***Eye Movements 269***Charles J. Bruce and Harriet R. Friedman***89****F****101 Forebrain 299***Luis Puelles and John Rubenstein***115 Frontal Lobe 317***Lada A. Kemenoff, Bruce L. Miller, and Joel H. Kramer***123 Functional Magnetic Resonance
Imaging (fMRI) 327***Robert L. Savoy***135****G****147 GABA 353***Sofie R. Kleppner and Allan J. Tobin*

Glial Cell Types**369**

*Conrad A. Messam, Jean Hou, Nazila Janabi,
Maria Chiara Monaco, Maneth Gravell, and Eugene O. Major*

H**Hallucinations****389**

Jane Epstein, Emily Stern, and David Silbersweig

Hand Movements**399**

J. Randall Flanagan and Roland S. Johansson

Headaches**415**

Seymour Diamond and George J. Urban

Hearing**429**

John F. Brugge and Matthew A. Howard

Heuristics**449**

Ralph Hertwig and Peter M. Todd

Hindbrain**461**

Joel C. Glover

HIV Infection, Neurocognitive Complications of**475**

Igor Grant

Homeostatic Mechanisms**491**

Pierre-Marie Lledo

Humor and Laughter**505**

Jyotsna Vaid

Hydrocephalus**517**

Chima Ohaegbulam and Peter Black

Hypothalamus**525**

J. Patrick Card and Linda Rinaman

Imaging: Brain Mapping Methods**537**

John C. Mazziotta and Richard S. J. Frackowiak

Information Processing**557**

*Joe L. Martinez, Jr., Stephen A. K. Harvey, Adria E. Martinez,
and Edwin J. Barea-Rodriguez*

Inhibition**571**

Avishai Henik and Thomas H. Carr

Intelligence**587**

Robert J. Sternberg and James C. Kaufman

Ion Channels**599**

B. Alexander Yi and Lily Y. Jan

L**Language Acquisition****617**

Helen Tager-Flusberg

Language and Lexical Processing**631**

Randi C. Martin, Mary R. Newsome, and Hoang Vu

Language Disorders**645**

David Caplan

Language, Neural Basis of**657**

David Caplan

Laterality**671**

Joseph B. Hellige

Left-Handedness**685**

Stanley Coren

Limbic System**695**

Joseph L. Price

Logic and Reasoning	703	Mental Workload	17
<i>Philip N. Johnson-Laird</i>		<i>Raja Parasuraman and Daniel Caggiano</i>	
Lyme Encephalopathy	717	Microglia	29
<i>Richard F. Kaplan</i>		<i>Guido Stoll, Sebastian Jander, and Michael Schroeter</i>	
		Midbrain	43
		<i>David M. Waitzman and Douglas L. Oliver</i>	
		Migraine	69
		<i>Margarita Sanchez del Rio and Stephen Silberstein</i>	
		Mild Head Injury	81
		<i>Jeffrey T. Barth, Jason R. Freeman, and Donna K. Broshek</i>	
		Modeling Brain Injury/Trauma	93
		<i>Helmut L. Laurer, David F. Meaney, Susan S. Margulies, and Tracy K. McIntosh</i>	
		Mood Disorders	103
		<i>Eran Chemerinski and Robert G. Robinson</i>	
		Motion Processing	117
		<i>Preeti Verghese and Brent R. Beutter</i>	
		Motor Control	137
		<i>Steven P. Wise and Reza Shadmehr</i>	
		Motor Cortex	159
		<i>Jon H. Kaas and Iwona Stepniewska</i>	
		Motor Neuron Disease	171
		<i>Philip C. Wong, Donald L. Price, and Jeffery Rothstein</i>	
		Motor Skill	183
		<i>Elliot Hazeltine and Richard Ivry</i>	
		Movement Regulation	201
		<i>John F. Soechting and Martha Flanders</i>	
		Multiple Sclerosis	211
		<i>Lorri J. Lobeck</i>	
		Multisensory Integration	227
		<i>Barry E. Stein, Paul Laurienti, Mark T. Wallace, and Terrence R. Stanford</i>	

M

Magnetic Resonance Imaging (MRI) 729

Jeffrey R. Alger

Manic-Depressive Illness 745

Edward H. Taylor

Memory Disorders, Organic 759

Andrew R. Mayes

Memory, Explicit and Implicit 773

Kathleen B. McDermott

Memory Neurobiology 783

Raymond P. Kesner

Memory, Neuroimaging 797

John Jonides, Tor D. Wager, and David T. Badre

Memory, Overview 817

John A. Lucas

VOLUME 3

Mental Retardation 1

Sandra Cluett Redden, Stephen R. Hooper, and Martha Pope

Music and the Brain*David W. Perry***N****Nausea and Vomiting***Robert J. Naylor***Neocortex***Jon H. Kaas***Nerve Cells and Memory***Peter S. Eriksson***Nervous System, Organization of***Jay B. Angevine, Jr.***Neural Networks***Paul Sajda***Neural Transplantation***Douglas Kondziolka, Elizabeth Tyler-Kabara, and Cristian Achim***Neuroanatomy***Christopher M. Filley***Neurobehavioral Toxicology***Marcia Hillary Ratner, Robert G. Feldman, and Roberta F. White***Neurodegenerative Disorders***Lee J. Martin***Neurofeedback***James R. Evans***Neuroglia, Overview***Angus M. Brown and Bruce R. Ransom***Neuroimaging***Giorgio Ganis and Stephen M. Kosslyn***243 Neuron***Maryann E. Martone and Mark H. Ellisman***Neuropeptides and Islet Function***Bo Åhrén***Neuropharmacology***Edward A. Workman***273 Neuroplasticity, Developmental***Daphne Bavelier and Helen Neville***291 Neuropsychological Assessment***Aaron P. Nelson and Meghan M. Searl***305 Neuropsychological Assessment, Pediatric***Lawrence C. Hartlage***313 Neurotransmitters***James H. Schwartz***373 Nociceptors***Lorne M. Mendell***385 Norepinephrine***Candice Drouin and Jean-Pol Tassin***Number Processing and Arithmetic***Karen Wynn***O****423****Object Perception***Pepper Williams***441****Occipital Lobe***Edgar A. DeYoe***465****479 Olfaction***Richard L. Doty***493****Opiates***Clifford M. Knapp***507****525****541****561****579****595****601****613****625****647****663****677****717****729**

Oxytocin*Hans H. Zingg***P****Pain***A. D. Craig***Pain and Psychopathology***David Fishbain***Parkinson's Disease***Melvin D. Yahr and Matthew A. Brodsky***Pattern Recognition***William R. Uttal***Peptides, Hormones, and the Brain and Spinal Cord***Lee J. Martin***Peripheral Nervous System***Andrei V. Krasslounkov***Phantom Limb Pain***Herta Flor***Phineas Gage***Malcolm Macmillan***VOLUME 4****Pick's Disease and Frontotemporal Dementia***Andrew Kertesz and David G. Munoz***741 Prefrontal Cortex 11***Robert J. Morecraft and Edward H. Yeterian***Priming 27***Anthony D. Wagner and Wilma Koutstaal***Prion Diseases 47***Hans A. Kretzschmar***Problem Solving 61***Richard E. Mayer***Prosopagnosia 67***Edward H. F. De Haan***Psychoactive Drugs 75***David E. Presti***Psychoneuroendocrinology 83***Serge Campeau***Psychoneuroimmunology 103***David L. Felten and Mary E. Maida***Psychophysiology 129***David Lykken***R****Reading Disorders, Developmental 141***Virginia A. Mann***Receptive Field 155***Rajesh P. N. Rao***Recovered Memories 169***Heidi Sivers, Jonathan Schooler, and Jennifer J. Freyd***Reinforcement, Reward, and Punishment 185***Daniel T. Cerutti*

Respiration*Homayoun Kazemi and Douglas C. Johnson***Retina***John E. Dowling***S****Sallience***Shih-Cheng Yen and Leif H. Finkel***Schizophrenia***Lisa T. Eyler Zorrilla and Dilip V. Jeste***Semantic Memory***Murray Grossman and Phyllis L. Koenig***Sensory Deprivation***Josef P. Rauschecker***Sex Differences in the Human Brain***Laura S. Allen and Roger A. Gorski***Sexual Behavior***John D. Baldwin and Janice I. Baldwin***Sexual Differentiation, Hormones and***Susan L. Zup and Nancy G. Forger***Sexual Dysfunction***Lisa Regev, Claudia Avina, and William O'Donohue***Sexual Function***Mark S. George and Jeffrey P. Lorberbaum***Short-Term Memory***Giuseppe Vallar***Sleep Disorders***Clete A. Kushida***209 Spatial Cognition***Barbara Landau***217 Spatial Vision***Russell L. De Valois and Karen K. De Valois***Speech***Keith R. Kluender***Stress***D. Jeffrey Newport and Charles B. Nemeroff***Stress: Hormonal and Neural Aspects***Bruce McEwen and Sonia Lupien***Stroke***Allyson R. Zazulla***Suicide***Beth S. Brodsky and J. John Mann***Superior Colliculus***Barry E. Stein, Mark T. Wallace, and Terrence R. Stanford***Synapses and Synaptic Transmission 521 and Integration***Michel Baudry***Synaptogenesis***Frederique Varoquaux and Nils Brose***T****367 Tactile Perception***Catherine L. Reed***383 Taste***Michael A. Barry and Marion E. Frank***395****419****433****449****463****475****493****503****521****531****545****557**

Temporal Lobes

Henry A. Buchtel

Thalamus and Thalamic Damage

Chihiro Ohye

Time Passage, Neural Substrates

Deborah L. Harrington and Stephen M. Rao

Tourette Syndrome and Obsessive-Compulsive Disorder

Valsamma Eapen and Mary M. Robertson

Transplantation

Timothy J. Collier and John R. Sladek, Jr.

U

Unconscious, The

John F. Kihlstrom

Unilateral Neglect

Eli Wertman and Kenneth M. Heilman

V

Ventricular System

David E. Scott

Vigilance

Martin Sarter and John P. Bruno

569 Violence and the Brain

Karen E. Anderson and Jonathan M. Silver

575 Vision: Brain Mechanisms

Robert Shapley and Nava Rubin

599 Visual and Auditory Integration

Jennifer M. Groh and Uri Werner-Reiss

615 Visual Cortex

Marcello G. P. Rosa

Visual Disorders

623 R. D. Jones and D. Tranel

Visual System Development and Neural Activity

A. E. Wiencken-Barger and V. A. Casagrande

635

647

W

Wernicke's Area

Eleanor M. Saffran

Working Memory

661 Sergio Della Sala and Robert H. Logie

687

Index