

Curriculum Vitae
Ann Martin Graybiel

Education and Positions:

| | |
|--|-----------|
| Harvard University, A.B. <i>Magna cum Laude</i> , Phi Beta Kappa | 1964 |
| Tufts University, Department of Biology Woodrow Wilson Fellow | 1965-1966 |
| Massachusetts Institute of Technology, Ph.D. Department of Psychology and Brain Science | 1971 |
| Research Associate, M.I.T. | 1971-1973 |
| Assistant Professor in Psychology, M.I.T. | 1973-1976 |
| Associate Professor in Psychology, M.I.T. | 1976-1980 |
| Professor of Neuroanatomy, Dept. of Psychology, M.I.T. | 1980-1983 |
| Head, Course in Neuroscience and Professor, HST Division, Harvard Medical School | 1986-1988 |
| Professor of Neuroscience, Department of Brain and Cognitive Sciences, M.I.T. | 1983-1994 |
| Walter A. Rosenblith Professor of Neuroscience, M.I.T. | 1994-2008 |
| Investigator, McGovern Institute for Brain Research, M.I.T. | 2001- |
| Affiliate, Picower Center for Learning and Memory, M.I.T. | 2001-2012 |
| Institute Professor, M.I.T. | 2008- |

Awards and Honors:

| | |
|--|------------|
| Porter Fellowship Award, American Physiological Society | 1967 |
| Williams and Wilkins Award, American Association of Anatomists | 1970 |
| Associate, Neuroscience Research Program (first woman) | 1978 |
| Charles Judson Herrick Award, American Association of Anatomists | 1978 |
| McKnight Senior Investigator Award | 1985 |
| Member, National Academy of Sciences, USA | 1988 |
| Javits Neuroscience Investigator Award, National Institutes of Health | 1988, 1995 |
| Honorary Member, Royal Academy of Medicine, Seville, Spain | 1989 |
| Member, American Academy of Arts and Sciences | 1991 |
| Member, National Academy of Medicine, USA (formerly the Institute of Medicine) | 1994 |
| Fellow, American Academy of Neurology | 1997 |
| President, International Basal Ganglia Society | 1997-1998 |
| Teaching Prize for Excellence in Graduate Education, School of Science, MIT | 2000 |
| Outstanding Women in Neuroscience Award, Brown University, Providence, Rhode Island | 2001 |
| National Medal of Science, USA | 2001 |
| James Rhyne Killian Jr. Faculty Achievement Award, M.I.T. | 2002 |
| Robert S. Dow Neuroscience Award | 2002 |
| Honorary Doctor of Science, Mount Sinai School of Medicine, New York, New York | 2003 |
| 2004 Woman Leader of Parkinson's Science, Parkinson's Disease Foundation, New York, New York | 2004 |
| MERIT Award of the National Institutes of Health | 2004 |
| Radcliffe Alumnae Recognition Award | 2004 |
| Prix Plasticité Neuronale from the IPSEN Foundation | 2005 |
| Honorary Doctor of Science, Tufts University, Medford, Massachusetts | 2005 |
| Harold S. Diamond Honorary Professorship, National Parkinson Foundation | 2005 |
| NARSAD Distinguished Investigator Award | 2007 |
| Honorary Doctor of Philosophy, The Hebrew University, Jerusalem | 2007 |
| Honorary Doctor of Medical Science, Queens University, Belfast | 2007 |
| C. David Marsden Lectureship Award, Movement Disorder Society | 2008 |
| Vanderbilt Prize in Biomedical Science | 2008 |
| M.I.T. Institute Professor | 2008 |

| | |
|--|------|
| Honorary Member Award – Movement Disorders Society | 2010 |
| The Kavli Prize | 2012 |
| Diana Helis Henry and Adrienne Helis Malvin Medical Research Foundations | 2015 |
| Joint Award Lecture Series in Parkinson’s Disease Research | |
| Member, American Philosophical Society | 2016 |
| The Gruber Prize in Neuroscience | 2018 |
| Sanford L. Palay Award | 2020 |
| Citation Laureate | 2024 |

Honorary Memberships:

| | |
|--|------|
| Royal Academy of Medicine, Spain | 1989 |
| International Basal Ganglia Society | 2007 |
| The Movement Disorder Society | 2010 |
| Foreign Member, The Norwegian Academy of Science and Letters | 2012 |
| Swedish Basal Ganglia Society (SWEBAGS) | 2022 |
| Royal Irish Academy | 2024 |

Selected Named Lectures:

| | |
|--|------|
| First Special Lecture, Society for Neuroscience, Dallas, Texas | 1985 |
| Gordon H. Scott Memorial Lectureship, Detroit, Michigan | 1986 |
| John D. French Lectureship, UCLA, Los Angeles, California | 1994 |
| Olszewski Lectureship, Montreal Neurological Institute, Montreal, Canada | 1994 |
| Rushton Lecture, Florida State University, Tallahassee, Florida | 1995 |
| Servier Lecture, University of Montreal, Montreal, Canada | 1995 |
| Ragnar Granit Lecture, Karolinska Institute, Stockholm, Sweden | 1995 |
| Special Lecture, Society for Neuroscience, Washington, D.C. | 1996 |
| Grass Lecture, University of Indiana, Bloomington, Indiana | 1999 |
| George B. Murray Lecture, Massachusetts General Hospital, Boston, Massachusetts | 1999 |
| Melvin D. Yahr Lecture, Mt. Sinai School of Medicine, CUNY, New York, New York | 1999 |
| Distinguished Visiting Scientist Lecture, Albany Medical College, Albany, New York | 2000 |
| Plenary Lecture, French Movement Disorder and Basal Ganglia Societies, Paris, France | 2000 |
| NIH Tri-Institute Seminar, Bethesda, Maryland | 2001 |
| Robert S. Dow Neuroscience Award Lecture, Portland, Oregon | 2002 |
| NIH Director’s Lecture, Bethesda, Maryland | 2002 |
| Plenary Lecture, 6th IBRO World Congress of Neuroscience, Prague, Czech Republic | 2003 |
| John Flynn Memorial Lecture, Yale University, New Haven, Connecticut | 2004 |
| Norman Geschwind Memorial Lecture, Beth Israel-Deaconess Hospital, Boston, Massachusetts | 2004 |
| Distinguished Lecture and Rodolfo Rivas Memorial Lecture, University of Maryland, College Park, Maryland | 2005 |
| Plenary Lecture, Gordon Conference on Catecholamines, Andover, New Hampshire | 2005 |
| Plenary Lecture, Spanish Society on Neuroscience, Madrid, Spain | 2005 |
| Heller Lecture in Computational Neuroscience, Hebrew University, Jerusalem, Israel | 2006 |
| Millward Memorial Lecture, Brown University, Providence, Rhode Island | 2006 |
| Special Lecture, Society for Neuroscience, Atlanta, Georgia | 2006 |
| American Academy of Neurology Annual Meeting, Plenary Lecture, Chicago, Illinois | 2008 |
| C. David Marsden Lecture, Movement Disorder Society’s 12 th International Congress, Chicago, Illinois | 2008 |
| M.I.N.D. Institute Distinguished Lecture, Davis, California | 2008 |
| Lord Adrian Lecture, Cambridge, England | 2008 |
| Mildred Trotter Lecture, Washington University, St. Louis, Missouri | 2009 |
| David Smith Lecture, Oxford University, Oxford, England | 2010 |
| The Mellon Award Lecture, University of Pittsburgh, Pittsburgh, Pennsylvania | 2010 |
| Narabayashi Lecture, International Congress of Clinical Neurophysiology, Kobe, Japan | 2010 |
| Plenary Lecture, Turkish Neuroscience Meeting, Istanbul, Turkey | 2011 |
| Presidential Lecture, Society for Neuroscience, Washington, D.C. | 2011 |

| | |
|--|------|
| Segerfalk Lecture, Lund University, Lund, Sweden | 2012 |
| National Taiwan University Lecture, Taipei, Taiwan | 2012 |
| The Kavli Laureate Lecture, Oslo, Norway | 2012 |
| The Kavli Public Lecture, Bergen, Norway | 2012 |
| Carnegie Foundation Kavli Laureate Lecture, Washington, DC | 2012 |
| Druker Memorial Lecture, Beth Israel Deaconess Medical Center, Boston, Massachusetts | 2013 |
| Dean for Science Lecture in Neuroeconomics, New York University, New York, New York | 2014 |
| Jan and Dan Duncan Neurological Research Institute Distinguished Lecture, Houston, Texas | 2014 |
| Diana Helis Henry and Adrienne Helis Malvin Medical Research Foundations | 2015 |
| Joint Lecture Series in Parkinson's Disease Research | |
| McClintock Lecture, Cold Spring Harbor Laboratory, Cold Spring Harbor, New York | 2016 |
| Plenary Lecture, 10 th Annual Canadian Association for Neuroscience Meeting, Toronto, Canada | 2016 |
| Ruth K. Broad Foundation Seminar Series on Neurobiology and Disease, Duke University, Durham, North Carolina | 2017 |
| Plenary Lecture, Cosyne 2018, Denver, Colorado | 2018 |
| Plenary Lecture, International Meeting on Monitoring Molecules in Neuroscience, University of Oxford | 2018 |
| Plenary Lecture, International Conference on Learning and Memory, Huntington Beach, California | 2018 |
| Plenary Lecture, Society for the Neural Control of Movement, Santa Fe, New Mexico | 2018 |
| Plenary Lecture, Neuro2019 (joint meeting of the Japan Neuroscience Society and the Japanese Society for Neurochemistry), Niigata, Japan | 2019 |
| UCL Prize Lecture in Life and Medical Sciences | 2020 |
| Plenary Lecture, Chen Institute Symposium at Caltech | 2021 |
| ViDA Keynote Lecture | 2021 |
| Aird Professorship Lecture, University of California, San Francisco | 2021 |
| Honorary Lecture, Swedish Basal Ganglia Society | 2022 |
| NIH Seminar Series, Bethesda, MD | 2023 |
| 2023 Vivien Casagrande Lecture in Systems Neuroscience, Vanderbilt Brain Institute, Nashville | 2023 |
| Distinguished Lecture Series, University of Texas Health Science Center, Houston | 2023 |
| 2024 Joaquín Fuster Symposium (UCLA), Los Angeles, California | 2024 |
| Plenary Lecture, 37th European College of Neuropsychopharmacology (ECNP) Congress, Milan, Italy | 2024 |
| 2024 Lake Conference on Comparative and Evolutionary Biology, Seattle, Washington | 2024 |

Advisory Boards and Committees (National and International):

| | |
|--|-----------|
| National Science Foundation | |
| Panel for Neurobiology | 1976-1979 |
| Neuroscience Oversight Review Board | 1986 |
| Society for Neuroscience | |
| Council | 1976-1980 |
| Program Committee | 1976-1978 |
| Gerard Prize Selection Committee | 1989,1991 |
| Board of Scientific Counselors of the NINCDS (National Institutes of Health) | 1980-1984 |
| American Association of Anatomists | |
| Cajal Club, Program Committee | 1977 |
| President, Cajal Club | 1983-1984 |
| C. Judson Herrick Award Committee | 1985 |
| Max Planck Institute for Psychiatry, Munich, Germany | 1985-1989 |
| Institute of Basic Research Scientific Advisory Board | 1989-1998 |
| The McKnight Endowment Fund for Neuroscience | 1986-1996 |
| Vice President | 1986-1996 |
| Board of Directors | 1986-1996 |
| Research Project Awards Committee | 1986-1996 |
| Development Awards Committee | 1986-1996 |
| Member, Senior Review Committee | 1987-1996 |
| Tourette Syndrome Association | 1986-1992 |

| | |
|--|------------------|
| Scientific Advisory Board | |
| Dystonia Medical Research Foundation | |
| Scientific Advisory Board | 1989-1994 |
| United Parkinson's Disease Foundation | |
| Scientific Advisory Board | 1989- |
| International Brain Research Organization | |
| Executive Committee | 1991-1997 |
| Encyclopedia of Neuroscience | |
| Scientific Advisory Board | 1993- |
| National Academy of Sciences | |
| Neuroscience Award Selection Committee, Chair | 1993 |
| Class II Membership Committee | 1995-1998 |
| Chair, Section of Neurobiology | 1995-1998 |
| Class II Secretary | 2001- |
| Beckman Institute, University of Illinois at Urbana-Champaign | |
| External Advisory Committee | 1993-2007, 2013- |
| Institute of Medicine | |
| Board on Neuroscience and Behavioral Health | 1997-2001 |
| Chair, Board on Neuroscience and Behavioral Health | 2000-2001 |
| National Parkinson Foundation | |
| Scientific Advisory Board | 1997-2008 |
| National Institute of Mental Health | |
| National Advisory Mental Health Council | 1997-1999 |
| Hereditary Disease Foundation | |
| Scientific Advisory Board | 2000-2006 |
| Alzheimer Research Forum | |
| Scientific Advisory Board | 2000- |
| Max Planck Institute for Cybernetic Biology, Tübingen, Germany | |
| Scientific Advisory Board | 2000-2006 |
| American Association for the Advancement of Science | |
| Member-at-Large, Section Committee, Section on Neuroscience | 2001-2005 |
| Movement Disorder Society | |
| International Executive Committee | 2001 |
| Member, American College of Neuropsychopharmacology | 2003 |
| Society for Neuroscience International Affairs Committee – US National Committee (IAC-USNC) to the International Brain Research Organization (IBRO) | 2007 |
| Stockholm Brain Institute, Stockholm, Sweden | |
| Scientific Advisory Board | 2007- 2010 |
| Institut du Cerveau et de la moelle épinière (ICM) | |
| Scientific Advisory Board | 2008-2013 |
| Ernst Strüngmann Forum, Frankfurt, Germany | |
| Scientific Advisory Board | 2008- |
| Biomedical Science Advisory Board at Vanderbilt University | 2010- |
| Eidgenössische Technische Hochschule Zurich Scientific Advisory Board | 2010- |
| Dopamine International Advisory Board | 2011 |
| MIT Presidential Search Committee | 2012 |
| Foundation IPSEN | 2012-2016 |
| Neuronal Plasticity Prize Jury | |
| Max Planck Florida Institute | |
| Scientific Advisory Board | 2013-2018 |
| Bachmann-Strauss Dystonia & Parkinson Foundation, Inc. | |
| Scientific Advisory Board | 2013-2015 |
| Troland Research Award Selection Committee | 2013 |
| The Lurie Center for Autism | 2013- |
| Scientific Advisory Board | |

| | |
|---|-----------|
| Pradel Research Award Committee (NAS) | 2014 |
| NINDS Committee for Research Challenges and Opportunities for Parkinson's Disease | 2014 |
| American Philosophical Society, the Karl Spencer Lashley Award Selection Committee Member | 2017 |
| Collaborative Center for XDP Scientific Advisory Board | 2017-2024 |
| Neuropathology Advisory Board | 2024- |
| LikeMinds Scientific Advisory Board | 2018- |
| Centre for Brain Research, University of Auckland, New Zealand International Scientific Advisory Board | 2022- |
| Selection Committee for the Biswas Fellows Program, MIT Health and Life Sciences Collaborative | 2025- |

Editorial Boards:

| | |
|---|-----------|
| <i>Neuroscience Letters</i> | 1975-1984 |
| <i>Neuroscience</i> | 1976-1999 |
| <i>Journal of Comparative Neurology</i> | 1980-1984 |
| | 2008-2012 |
| <i>Neuroscience Research Communications</i> | 1986- |
| <i>Movement Disorders</i> | 1989-1993 |
| <i>Neurodegeneration</i> | 1991-1997 |
| <i>Journal of Neurophysiology</i> | 1992- |
| <i>Journal of Neuroscience</i> | 1980-1983 |
| | 1988-2004 |
| <i>Synapse</i> | 1992-2004 |
| <i>Biological Psychiatry</i> | 1993- |
| <i>Anales de Anatomía</i> | 1993 |
| <i>Parkinsonism and Related Disorders</i> | 1994-1999 |
| <i>Neuroscience Research</i> | 2000 |
| <i>Neuropsychopharmacology</i> | 2000- |
| <i>Frontiers in Neuroscience</i> | 2008- |
| <i>Journal of Parkinson's Disease</i> | 2010- |
| <i>The Neuroscientist</i> | 2019- |

Research: *Ann Graybiel discovered that the striatum, the largest subcortical structure of the mammalian forebrain, has a modular organization that is now recognized as shaping molecular signaling in the striatum and plasticity related to habit learning, repetitive behavior, motivational control, and human neurologic and neuropsychiatric disorders.*

When Graybiel began her work, the striatum was known by physicians as being important for extrapyramidal motor disorders but was largely ignored by basic scientists as it was thought to be a primitive, homogeneous structure. Graybiel nevertheless focused on the striatum, and in 1978, with student Ragsdale, discovered the neurochemical compartments of the human striatum, which she named as striosomes and the surrounding matrix. It is now known that this striosome-matrix architecture is altered in some human neurological and neuropsychiatric disorders and corresponding animal models, and that this architecture is critical to the cholinergic-dopaminergic balance required for normal motor/motivational function. In breakthrough discoveries, Graybiel and coworkers found potential clues to understanding this co-morbidity of motor and mood dysfunctions.

Early on, Graybiel and her students discovered that nearly all striatal neurotransmitter systems, including the critical dopaminergic-cholinergic systems, are differentially expressed according to this striosome-matrix architecture, including mood-related cortical inputs directed to anterior striosomes. They showed in species ranging from rodents to humans that this molecular modularity is present, is observed by striatal input-output circuits, is set up by striosomal lineage, and shapes the earliest dopaminergic innervation of the striatum during development. They then found selective striosome-matrix neuronal vulnerability patterns in non-human primate and rodent models of Parkinson's disease, in models of dopa-responsive dystonia and L-dopa-induced dyskinesias, and with colleagues discovered that striosomes are selectively vulnerable in Huntington's patients exhibiting pronounced mood problems. Striosomes, they showed, are also differentially sensitive to many dopaminergic drugs, including drugs of abuse. In parallel, they discovered novel CalDAG-GEF genes that link Ca^{2+} and DAG signaling to Ras signaling, have complementary expression in striosome and matrix compartments (CGFI & CDGII), are dysregulated in Parkinson's and Huntington's diseases, as examined in brain samples and also are dysregulated in mouse models of these disorders and drug-induced disorders.

With two crucial breakthrough studies, Graybiel and her group have opened up a new field of study of the control of dopamine. First, they discovered that striosomes project to dopamine-containing neurons in the midbrain substantia nigra to form dense input-output formations, 'striosome-dendron bouquets', by which the striosomal inputs can produce powerful inhibition of the dopamine-containing cells of the bouquets, with rebound excitation (2016). They especially target dopamine-containing neurons in the nigral region known to be selectively vulnerable in Parkinson's disease. Second, they have now discovered that, in parallel with the canonical direct and indirect (Go/No-Go) motor basal ganglia pathways that target motor circuits, striosomes give rise to pair of non-canonical, previously unappreciated direct and indirect pathways that uniquely target the dopamine system—both through the bouquets (S-D1 pathway) and indirectly (S-D2 pathway) via the pallidum (2024). Graybiel posits that this double non-canonical striosomal and canonical parallel pathway organization could provide for striosomal homeostatic control of the canonical action pathways, but vulnerable in neurologic and neuropsychiatric disorders.

In parallel, Graybiel with her students discovered that the large matrix compartment surrounding striosomes is itself modular, with 'matrisomes' organizing striatal input-output flow. Graybiel likened this physical architecture to learning architectures in computational models and suggested that this organization could underlie habit learning. She put this hypothesis to the test: her group made the first chronic recording from ensembles of neurons in the striatum and neocortex of animals as they learned new tasks and developed habits. They discovered wholesale plasticity in response properties of the striatal neurons as habits were formed, with activity eventually marking the beginning and end of the habitual behaviors as though chunking together positively reinforced behavioral repertoires. The task-bracketing patterns that they found in rodents and non-human primates suggest a potential biomarker of habitual behavior. They further demonstrated a relationship between striatal dopamine release and oscillatory field potentials, and discovered both ramping dopamine release related to reward proximity and plateau release during learning, novel forms of striatal dopamine signaling not predicted by standard models and under intense study.

Graybiel and her group manipulated corticostriatal circuits and discovered that they could block the formation of habits, block already formed habits and even toggle habits on and off; and that they could selectively block compulsive behavior and control levels of engagement, and in primates modulate pessimistic or optimistic choices by stimulating cortico-striosomal circuits, suggesting a stunning level of on-line control by striosomes of even apparently semi-automatic behaviors and behavioral state. In rodents, Graybiel and team then with optogenetics found causal evidence that cortico-striosomal circuits are critical for decisions requiring motivated cost-benefit integration, a function that is vulnerable in stress, in many disorders, and during aging.

Graybiel's work thus is pioneering new scientific understanding of the basal ganglia and behavior. Her work has ever-increasing importance for identifying circuits disrupted in neurological and neuropsychiatric disorders and vulnerable in aging, pointing to potential cellular and genetic basis and therapeutic strategies needed to relieve them.

Synopsis of Scientific Contributions of Graybiel and coworkers (please see list of publications for manuscripts):**Visuomotor Systems**

- Identified multiple-channel cortical connectivity of the pulvinar system of the thalamus. 1970-1983
- Delineated brainstem connections of oculomotor and visuomotor systems and discovered nearly every extrageniculate visual and visuo-oculomotor pathway in the brainstem. 1974-1980
- Identified mosaic organization of systems afferent to the superior colliculus. 1975-1978
- Delineated chemical compartments and mosaic organization of the superior colliculus. 1978-1984
- Identified sensory maps in the claustrum. 1980
- Identified chemical compartments of the visual thalamus and related these to the afferent-efferent subdivisions of these thalamic regions. 1980-1983

Basal Ganglia*Striosomes and Matrisomes*

- Identified histochemical compartments of the human striatum (striosomes and matrix). 1978
- Demonstrated that striatal inputs and outputs are organized in relation to striosomes. 1979-present
- Identified chemical compartments of embryonic and neonatal striatum and showed that these correspond to dopamine islands. 1980-1984
- Demonstrated that neuropeptides in striatum follow striosomal architecture and, subsequently, that most other neurotransmitter-related substances do so as well. 1981
- Demonstrated that striosomes are ontogenetic units of the striatum with defined developmental birthdates of striatal neurons. 1982
- Identified mosaic organization of the striatal matrix (matrisomes) using combined electrophysiology and anatomy. 1986
- Demonstrated that psychomotor stimulants induce immediate-early genes in striosome/matrix-specific patterns in the striatum. 1990-1993
- Identified convergent-divergent architecture of functionally-defined corticostriatal and striatopallidal circuits and likened this architecture to expert-systems learning architectures. 1991-1995
- Demonstrated that chronic psychomotor stimulant exposure induces network-level changes in gene expression in the striatum leading to striosome-enhanced induction patterns in rodents. 1996
- Demonstrated high correlation between striosome-predominant striatal gene expression patterns and stereotypic behavior induced by chronic exposure to psychomotor stimulants. 1999-2000
- Demonstrated that natural movement and sensorimotor inputs activate striatal matrix. 2002
- Demonstrated that after chronic psychomotor exposure, the stimulant induces striosome-predominant early-gene expression in the primate striatum. 2004
- Demonstrated that mood dysfunction in Huntington's disease patients is correlated with differential degeneration in striosomes of the striatum. 2006
- Demonstrated that differential degeneration of striosomes occurs in a mouse model of DOPA-responsive dystonia. 2008
- Demonstrated that DYT-3 dystonia-related protein N-TAF1 is enriched in the striosomal compartment of the striatum. 2011
- Demonstrated that microstimulation in striosome-projecting region of macaque anterior cingulate cortex induces negative value-based decision-making in non-human primates. 2012
- Identified a specific striosome-targeting corticostriatal circuit that selectively mediates decision-making under cost-benefit conflict conditions. 2015
- Demonstrated highly patterned prenatal development patterns of birth-dated striosomal and matrix neurons. 2015
- Demonstrated striosome-matrix developmental patterning of an autism spectrum disorder gene and its regulation. 2016
- Discovered 'striosome-dendron bouquets', elaborate input arbors of striosomal fibers intertwined with the bundled dendrites of dopamine-containing neurons of the substantia nigra. 2016
- Discovered that cholinergic interneurons in the striatum innervate differentially striosomes and matrix and can affect spike timing of their neurons by mechanisms blocked by 2017

- stereotypy-inducing levels of amphetamine.
- Discovered that the functional dynamics of cortico-striosomal circuits are disrupted by exposure to chronic stress, through stress-induced dysregulation of an intrastriatal local circuit mechanism. 2017
- Demonstrated that the major components of striatal architecture are set up by sharply contrasting neural progenitor programs at the inception of striatal development (in review). 2017
- Developed the first *in vivo* 2-photon imaging of striosomes by combining birthdate-labeling with imaging in mice performing reinforcement learning tasks. 2017
- Discovered with snRNA-seq a multiplexing of striosomal (S) sub-clusters within main D1 and D2 clusters, that striosomes are first hit in Huntington's disease, and that S-D2 cells are most affected. 2023
- Discovered that striosomes give rise to a pair of pathways that parallel the canonical direct D1-indirect D2 opposing control circuits of the basal ganglia, but instead of targeting basal ganglia motor outflow, they target dopamine-containing nigral neurons known to modulate mood, reinforcement learning and movement, systems vulnerable in neurologic and neuropsychiatric disorders. 2024

Physiology of Habit Learning and Cortico-Striatal Circuits, Neuroplasticity

- Demonstrated learning-related plasticity in spike activity of striatal tonically active neurons (TANs) during behavioral conditioning in primates, and showed that dopamine modulates expression of this neuroplasticity. 1994-1995
- Demonstrated that the activity of neurons in the striatum undergoes major reorganization as rats learn procedural tasks and form habits. 1999
- Demonstrated that thalamic inputs regulate expression of learning-related plasticity of striatal TANs. 2001
- Demonstrated that striatal TAN activity in macaque monkeys predicts behavioral response probability. 2002
- Identified neural activity in macaque monkeys prefrontal cortex representing boundaries of action sequences. 2003
- Demonstrated that striatal projection neurons exhibit multiple spiking changes during acquisition, extinction and reacquisition of a procedural "habit" task. 2005
- Demonstrated existence of highly contrasting learning-related neural dynamics in associative and sensorimotor striatum. 2010
- Demonstrated that optimal habits emerge without training in non-human primates. 2010
- Demonstrated that already acquired habits can be broken and reinstated in rats by on-line optogenetic inhibition of medial prefrontal cortex. 2012
- Demonstrated that dopamine depletion and L-DOPA treatment have selective effects on plasticity of learning-related ensemble spike activity in the sensorimotor striatum. 2013
- Demonstrated that dorsolateral striatum and medial prefrontal cortical habit-related regions exhibit strikingly different dynamics of neuroplasticity during habit learning, habit loss, and habit reinstatement. 2013
- Demonstrated that habit formation can be blocked by on-line optogenetic inhibition of medial prefrontal cortex. 2013
- Demonstrated that acquired compulsive behavior can be selectively blocked by on-line optogenetic excitation of orbitofrontal cortex and by excitation of orbitofrontal terminals within the striatum. 2013
- Discovered a novel, extended form of dopamine release signaling that occurs during approach to valued goals by use of fast-scan cyclic voltammetry in rats. 2013
- Demonstrated bivalent reinforcement signaling by cholinergic interneurons in ventral striatum during habit learning. 2014
- Demonstrated heightened stereotypy in mice genetically engineered to express exaggerated acetylcholine release. 2014
- Demonstrated that motivation and affective judgments elicit differential responses in cohorts of neurons in prefrontal cortex and cingulate cortex of macaque monkeys. 2015
- Demonstrated that natural habit learning in non-human primates leads to development of a 2015

- caudate signal representing the integrated cost and benefit of the acquired behavior.
- Demonstrated that acquisition of sequences of movements leads to bracketing of the first and last members of the sequence by spike activity of striatal neurons but not primary motor cortical neurons. 2017
 - Demonstrated that sequences of movements follow rules of rhythm and striatal neurons have rhythm fields. 2023
 - Discovered that striosomal direct pathway optogenetic stimulation induces decreased striatal dopamine release and striosomal indirect pathway stimulation increases dopamine release. 2024

Theoretical

- Proposed that the basal ganglia can act to affect cortical cognitive pattern generators, in addition to brainstem/spinal motor pattern generators. 1997
- Proposed that the basal ganglia act to enable chunking of action repertoires. 1998
- Proposed attractor state model of striatal processing. 2001
- Proposed the concept of ‘neural exploration’ and ‘neural exploitation’ to parallel behavioral exploration and exploitation in procedural learning. 2005
- Proposed hierarchical learning model suggesting that striosome-matrix architecture of the striatum provides template for context-specific learning whereby striosomes and associated cholinergic interneurons generate responsibility signals. 2011
- Proposed a model of the cortico-striosomal circuit in which the circuit performs cost-benefit integration that is elicited under conditions of motivational conflict. 2015
- Developed a non-linear multi-dimensional hidden state (NMHS) approach to complex neural circuit analysis. 2016

Striatal Oscillations

- Demonstrated that beta-band (10-25 Hz) oscillations are a prominent feature of striatal activity in normal, awake behaving macaques. 2003
- Demonstrated temporally coordinated LFP activity in simultaneous recordings from neocortex and striatum of awake, behaving macaques. 2005
- Demonstrated that theta rhythms in the striatum and hippocampus become coordinated during procedural learning. 2007-2008
- Demonstrated network-level shifts in frequencies of oscillatory rhythms and synchronized spike firing in ventromedial striatum during habit learning. 2011
- Discovered that multiple oscillatory frequency bands in local field potentials are selectively altered by dopamine depletion and L-DOPA treatment. 2012
- Demonstrated different co-occurring learning-related theta sub-band oscillation activity in sensorimotor and associative striatal regions during habit learning. 2014
- Demonstrated that brief bursts of beta oscillation mark the end of successfully completed task performance in non-human primates. 2015
- Demonstrated that beta-band oscillatory activity in macaque striatum can be used as a marker of compulsive behavior. 2018

Other work on basal ganglia

- Demonstrated that mouse weaver mutation depletes dopamine in patterns resembling those of Parkinson's disease. 1984
- Identified chemical compartments in substantia nigra pars compacta. 1989
- Demonstrated that intrastriatal grafts of fetal striatal cells develop striatal phenotype. 1989-1994
- Documented brain and behavioral consequences of dopamine D1 and D3 dopamine receptor deletion in transgenic mice. 1994-1996
- Introduced striatal organotypic slice cultures for studying regulation of gene expression in developing striatum. 1994
- Demonstrated that spatially selective phosphatase gates control cAMP-and Ca²⁺-mediated CREB phosphorylation in developing striatum using organotypic slice cultures. 1996
- Identified chemospecific compartments (“nigrosomes”) in human substantia nigra pars compacta and demonstrated that they are markers for neurodegeneration patterns in Parkinson’s disease. 1999

- Demonstrated existence of time-stamp encodings of time in cortico-basal ganglia circuits. 2009
- Demonstrated sharp increases in thyrotropin releasing hormone in striatum correlate with L-DOPA-induced dyskinesias. 2010
- Developed a chronic recording system for non-human primates with >100 independently movable electrodes. 2011
- Discovered that humanized Foxp2, engineered into mice, enhances learning to shift from place to habit strategies of performance. 2014
- Demonstrated, with colleagues, that Foxp2 is a critical controller of corticostriatal synapse formation during development. 2016
- Demonstrated with Fu-Chin Liu group that the specific FOXP2 mutation found in KE family with speech disorders produces deleterious actin-dynein molecular trafficking in striatal cells. 2023

Methodological Development

- Developed microiontophoretic method for *in vivo* tracer experimentation. 1974
- Developed a silver intensification method for immunohistochemistry. 1996
- Developed a multi-electrode recording technique and devise with independently movable electrodes for long-term, chronic neural recording in non-human primate. 2012
- Developed a non-invasive head-holding devise for chronic non-human primate neural recording to avoid use of invasive head immobilization. 2015
- Developed novel multi-stage algorithm for automated spike-sorting of high-dimensional neuronal data with high background noise. 2015
- Developed novel multi-channel recording probes for fast-scan cyclic voltammetry and recording. 2017
- Developed system for simultaneously recording neuronal activity and dopamine release in the substantia nigra of mice. 2024-2025

Novel Gene Families

- Cloned and characterized the cAMP-GEF family of brain-enriched genes. 1998
- Cloned and characterized the CalDAG-GEF family of brain-enriched genes and demonstrated that they are striatum-enriched and have differential striosome-enriched (CalDAG-GEFII) and matrix-enriched (CalDAG-GEFI) distributions in the striatum. 1998
- Demonstrated that CalDAG-GEFI is essential for platelet aggregation and thrombus formation. 2004
- Demonstrated that CalDAG-GEFI is essential to neutrophil adhesion and trafficking. 2006
- Demonstrated that CalDAG-GEFI is essential for specific forms of neuroplasticity in the striatum including the development of drug-induced sensitization of stereotypic behavior and long-term potentiation (abstract only, in progress). 2005-present
- Demonstrated, with collaborators, that the human LAD-III syndrome is associated with defective expression of CalDAG-GEFI in the hematopoietic system. 2007
- Demonstrated that the striatum-enriched genes CalDAG-GEFI and CalDAG-GEFII are strongly and inversely dysregulated in relation to severity of L-DOPA-induced dyskinesias (AIMs) in rat model of Parkinson's disease. 2009
- Demonstrated that CalDAG-GEFI down-regulation is protective in a model of Huntington's disease neurodegeneration and related to lowered expression of Htt nuclear aggregates. 2010
- Demonstrated that CalDAG-GEFI constitutive and conditional deletion in mice promotes behavioral repetitiveness and affects selectively a muscarinic cholinergic receptor-driven signaling pathway in the mouse striatum. 2014-present
- Demonstrated that CalDAG-GEFI controls the dendritic excitability of indirect pathway striatal projection neurons, contributing to motor control as demonstrate by defects after its knockout. 2023
- Demonstrated with D. J. Surmeier group that CalDAG-GEFI is essential for M1 mediated control of plasticity underlying levo-dopa induced dyskinesias in mouse models of Parkinson's disease. 2025

Publications of Ann Martin Graybiel:**Books:**

1. Kimura, M. and Graybiel, A. M., eds. (1995) *Functions of the Cortico-Basal Ganglia Loop*. Springer-Verlag: New York.
2. Graybiel, A.M., DeLong, M.R., and Kitai, S.T., Eds. (2003) *The Basal Ganglia VI*. New York: Kluwer Academic/Plenum.
3. Grillner, S. and Graybiel, A.M., Eds. (2006) *Microcircuits: The Interface between Neurons and Global Brain Function*. Cambridge, MA: MIT Press.

Papers:

1. Graybiel, A.M. and Held, R. (1970) Prismatic adaptation under scotopic and photopic conditions. *J. Exp. Psychol.*, 85:16-22.
2. Graybiel, A.M. (1970) Some thalamocortical projections of the pulvinar-posterior system of the thalamus in the cat. *Brain Res.*, 22:131-136.
3. Graybiel, A.M. (1971) Some fiber connections of the posterior thalamus in the cat. Doctoral dissertation, Massachusetts Institute of Technology.
4. Graybiel, A.M. (1972) Some extrageniculate visual pathways in the cat. *Invest. Ophthalmol.*, 11:322-332.
5. Graybiel, A.M. (1972) Some fiber pathways related to the posterior thalamic region in the cat. *Brain Behav. Evol.*, 6:363-393.
6. Graybiel, A.M. (1972) Some ascending connections of the pulvinar and nucleus lateralis posterior of the thalamus of the cat. *Brain Res.*, 44:99-125.
7. Graybiel, A.M. (1973) The thalamo-cortical projection of the so-called posterior nuclear group: a study with anterograde degeneration methods in the cat. *Brain Res.*, 49:229-244.
8. Graybiel, A.M., Nauta, H.J.W., Lasek, R.J., and Nauta, W.J.H. (1973) A cerebello-olivary pathway in the cat: an experimental study using autoradiographic tracing techniques. *Brain Res.*, 58:205-211.
9. Graybiel, A.M. (1974) Studies on the anatomical organization of posterior association cortex. In: *The Neurosciences: Third Study Program*, F.O. Schmitt and F.G. Worden, Eds. Cambridge: MIT, pp. 205-214.
10. Graybiel, A.M. and Devor, M. (1974) A microelectrophoretic delivery technique for use with horseradish peroxidase. *Brain Res.*, 68:167-173.
11. Graybiel, A.M. (1974) Visuo-cerebellar and cerebello-visual connections involving the ventral lateral geniculate nucleus. *Exp. Brain Res.*, 20:303-306.
12. Graybiel, A.M. and Hartweg, E.A. (1974) Some afferent connections of the oculomotor complex in the cat: an experimental study with tracer techniques. *Brain Res.*, 81:543-551.
13. Graybiel, A.M. (1975) Wallerian degeneration and anterograde tracer methods. In: *The Use of Axonal Transport for Studies of Neuronal Connectivity*, W.M. Cowan and M. Cuénod, Eds. Amsterdam: Elsevier, pp. 174-216.
14. Graybiel, A.M. (1975) Anatomical pathways in the brain stem oculomotor system. In: *Eye Movements and Movement Perception*, J. Lott Brown, Ed. Rochester, NY: Center for Visual Science, pp. 37-38.
15. Graybiel, A.M. (1975) Anatomical organization of retinotectal afferents in the cat: an autoradiographic study. *Brain Res.*, 96:1-23.
16. Gould, B.B. and Graybiel, A.M. (1976) Afferents to the cerebellar cortex in the cat: evidence for an intrinsic pathway leading from the deep nuclei to the cortex. *Brain Res.*, 110:601-611.
17. Graybiel, A.M. (1976) Evidence for banding of the cat's ipsilateral retinotectal connection. *Brain Res.*, 114:318-327.
18. Graybiel, A.M. (1977) Direct and indirect preoculomotor pathways of the brainstem: an autoradiographic study of the pontine reticular formation in the cat. *J. Comp. Neurol.*, 175:37-78.
19. Graybiel, A.M. (1977) Organization of oculomotor pathways in the cat and rhesus monkey. In: *Control of Gaze by Brain Stem Neurons*, R.G. Baker and A. Berthoz, Eds. Amsterdam: Elsevier, pp. 79-88.

20. Graybiel, A.M. (1977) Basal ganglia in health and disease. In: *Society for Neuroscience, 6th Annual Meeting, Summaries of Symposia* (BIS Conference Report No. 45). Los Angeles: Brain Information Service, pp. 41-45.
21. Graybiel, A.M. (1978) Organization of the nigrotectal connection: an experimental tracer study in the cat. *Brain Res.*, 143:339-348.
22. Graybiel, A.M. (1978) A stereometric pattern of distribution of acetylthiocholinesterase in the deep layers of the superior colliculus. *Nature*, 272:539-541.
23. Graybiel, A.M. (1978) A satellite system of the superior colliculus: the parabigeminal nucleus and its projections to the superficial collicular layers. *Brain Res.*, 145:365-374.
24. Berson, D.M. and Graybiel, A.M. (1978) Parallel thalamic zones in the LP-pulvinar complex of the cat identified by their afferent and efferent connections. *Brain Res.*, 147:139-148.
25. Graybiel, A.M. and Ragsdale, Jr., C.W. (1978) Histochemically distinct compartments in the striatum of human, monkey, and cat demonstrated by acetylthiocholinesterase staining. *Proc. Natl. Acad. Sci. U S A*, 75:5723-5726.
26. Graybiel, A.M. (1979) Periodic-compartmental distribution of acetylcholinesterase in the superior colliculus of the human brain. *Neuroscience*, 4:643-650.
27. Graybiel, A.M., Ragsdale, Jr., C.W., and Moon Edley, S. (1979) Compartments in the striatum of the cat observed by retrograde cell labeling. *Exp. Brain Res.*, 34:189-195.
28. Graybiel, A.M. (1979) Some patterns of connectivity in the central nervous system: a tribute to Rafael Lorente de Nó. In: *Integration in the Nervous System*, D.P.C. Lloyd, R. Lorente de Nó, V.J. Wilson and H. Asanuma, Eds. Tokyo: Igaku-Shoin, pp. 69-96.
29. Graybiel, A.M. and Ragsdale, Jr., C.W. (1979) Fiber connections of the basal ganglia. In: *Development and Chemical Specificity of Neurons*. M. Cuénod, G.W. Kreutzberg, and F.E. Bloom, Eds. Amsterdam: Elsevier, pp. 239-283.
30. Kaiserman-Abramof, I.R., Graybiel, A.M., and Nauta, W.J.H. (1980) The thalamic projection to cortical area 17 in a congenitally anophthalmic mouse strain. *Neuroscience*, 5:41-52.
31. Graybiel, A.M. and Berson, D.M. (1980) Histochemical identification and afferent connections of subdivisions in the lateralis posterior-pulvinar complex and related thalamic nuclei in the cat. *Neuroscience*, 5:1175-1238.
32. Graybiel, A.M. and Ragsdale, Jr., C.W. (1980) Clumping of acetylcholinesterase activity in the developing striatum of the human fetus and young infant. *Proc. Natl. Acad. Sci. U S A*, 77:1214-1218.
33. Graybiel, A.M. and Berson, D.M. (1980) Autoradiographic evidence for a projection from the pretectal nucleus of the optic tract to the dorsal lateral geniculate complex in the cat. *Brain Res.*, 195:1-12.
34. Berson, D.M. and Graybiel, A.M. (1980) Some cortical and subcortical fiber projections to the accessory optic nuclei in the cat. *Neuroscience*, 5:2203-2217.
35. Olson, C.R. and Graybiel, A.M. (1980) Sensory maps in the claustrum of the cat. *Nature*, 288:479-481.
36. Ragsdale, C.W., Jr. and Graybiel, A.M. (1981) The fronto-striatal projection in the cat and monkey and its relationship to inhomogeneities established by acetylcholinesterase histochemistry. *Brain Res.*, 208:259-266.
37. Graybiel, A.M., Ragsdale, C.W., Jr., Yoneoka, E.S., and Elde, R.P. (1981) An immunohistochemical study of enkephalins and other neuropeptides in the striatum of the cat with evidence that the opiate peptides are arranged to form mosaic patterns in register with the striosomal compartments visible by acetylcholinesterase staining. *Neuroscience*, 6:377-397.
38. Graybiel, A.M. and Berson, D.M. (1981) On the relation between transthalamic and transcortical pathways in the visual system. In: *The Organization of the Cerebral Cortex*. F.O. Schmitt, F.G. Worden and F. Dennis, Eds. Cambridge: MIT, pp. 285-319.
39. Graybiel, A.M. and Berson, D.M. (1981) Families of related cortical areas in the extrastriate visual system: summary of a hypothesis. In: *Cortical Sensory Organization. Vol. 2: Multiple Visual Areas*, C.N. Woolsey, Ed. Clifton, NJ: Humana, pp. 103-120.
40. Graybiel, A.M., Pickel, V.M., Joh, T.J., Reis, D.J., and Ragsdale, Jr., C.W. (1981) Direct demonstration of a correspondence between the dopamine islands and acetylcholinesterase patches in the developing striatum. *Proc. Natl. Acad. Sci. U S A*, 78:5871-5875.

41. Graybiel, A.M. and Hickey, T.L. (1982) Chemospecificity of ontogenetic units in the striatum: demonstration by combining [³H]thymidine neuronography and histochemical staining. *Proc. Natl. Acad. Sci. U S A*, 79:198-202.
42. Graybiel, A.M. (1982) Correlative studies of histochemistry and fiber connections in the central nervous system. In: *Cytochemical Methods in Neuroanatomy*, V. Chan-Palay and S.L. Palay, Eds. New York: A.R. Liss, pp. 45-67.
43. Graybiel, A.M. and Ragsdale, Jr., C.W. (1982) Pseudocholinesterase staining in the primary visual pathway of the macaque monkey. *Nature*, 299:439-442.
44. Berson, D.M. and Graybiel, A.M. (1983) Subsystems within the visual association cortex as delineated by their thalamic and transcortical affiliations. In: *Molecular and Cellular Interactions Underlying Higher Brain Function*, J.-P. Changeux, J. Glowinski, M. Imbert, and F.E. Bloom, Eds. Amsterdam: Elsevier, pp. 229-238.
45. Olson, C.R. and Graybiel, A.M. (1983) An outlying visual area in the cerebral cortex of the cat. In: *Molecular and Cellular Interactions Underlying Higher Brain Function*, J.-P. Changeux, J. Glowinski, M. Imbert, and F.E. Bloom, Eds. Amsterdam: Elsevier, pp. 239-245.
46. Graybiel, A.M. (1983) Compartmental organization of the mammalian striatum. In: *Molecular and Cellular Interactions Underlying Higher Brain Function*, J.-P. Changeux, J. Glowinski, M. Imbert, and F.E. Bloom, Eds. Amsterdam: Elsevier, pp. 247-256.
47. Berson, D.M. and Graybiel, A.M. (1983) Organization of the striate-recipient zone of the cat's lateralis posterior-pulvinar complex and its relations with the geniculostriate system. *Neuroscience*, 9:337-372.
48. Edley, S.M. and Graybiel, A.M. (1983) The afferent and efferent connections of the feline nucleus tegmenti pedunculopontinus pars compacta. *J. Comp. Neurol.*, 217:187-215.
49. Graybiel, A.M. and Elde, R.P. (1983) Somatostatin-like immunoreactivity characterizes neurons of the nucleus reticularis thalami in the cat and monkey. *J. Neurosci.*, 3:1308-1321.
50. Oertel, W., Graybiel, A.M., Mugnaini, E., Elde, R.P., Schmechel, D.E., and Kopin, I.J. (1983) Coexistence of glutamic acid decarboxylase- and somatostatin-like immunoreactivity in neurons of the feline nucleus reticularis thalami. *J. Neurosci.*, 3:1322-1332.
51. Graybiel, A.M. and Ragsdale, Jr., C.W. (1983) Biochemical anatomy of the striatum. In: *Chemical Neuroanatomy*, P.C. Emson, Ed. New York: Raven, pp. 427-504.
52. Chesselet, M.-F. and Graybiel, A.M. (1983) Met-enkephalin-like and dynorphin-like immunoreactivities of the basal ganglia of the cat. *Life Sci.*, 33 (Suppl. 1):37-40.
53. Roffler-Tarlov, S. and Graybiel, A.M. (1984) Weaver mutation has differential effects on the dopamine-containing innervation of the limbic and nonlimbic striatum. *Nature*, 307:62-66.
54. Graybiel, A.M., Brecha, N., and Karten, H.J. (1984) Cluster-and-sheet pattern of enkephalin-like immunoreactivity in the superior colliculus of the cat. *Neuroscience*, 12:191-214.
55. Graybiel, A.M. (1984) Neurochemically specified subsystems in the basal ganglia. In: *Functions of the basal ganglia*, D. Evered and M. O'Connor, Eds. London: Pitman, pp. 114-149.
56. Graybiel, A.M. (1984) Modular patterning in the development of the striatum. In: *Cortical Integration: Basic, Archicortical and Cortical Association Levels of Neural Integration*, F. Reinoso-Suárez and C. Ajmone-Marsan, Eds. New York: Raven, pp. 223-235.
57. Graybiel, A.M. (1984) Correspondence between the dopamine islands and striosomes of the mammalian striatum. *Neuroscience*, 13:1157-1187.
58. Graybiel, A.M. and Chesselet, M.-F. (1984) Compartmental distribution of striatal cell bodies expressing [Met]enkephalin-like immunoreactivity. *Proc. Natl. Acad. Sci. U S A*, 81:7980-7984.
59. Illing, R.-B. and Graybiel, A.M. (1985) Convergence of afferents from frontal cortex and substantia nigra onto acetylcholinesterase-rich patches of the cat's superior colliculus. *Neuroscience*, 14:455-482.
60. Lynch, J.C., Graybiel, A.M., and Lobeck, L.J. (1985) The differential projection of two cytoarchitectonic subregions of the inferior parietal lobule of macaque upon the deep layers of the superior colliculus. *J. Comp. Neurol.*, 235:241-254.
61. Nastuk, M.A. and Graybiel, A.M. (1985) Patterns of muscarinic cholinergic binding in the striatum and their relation to dopamine islands and striosomes. *J. Comp. Neurol.*, 237:176-194.

62. Sandell, J.H., Graybiel, A.M., and Chesselet, M.-F. (1986) A new enzyme marker for striatal compartmentalization: NADPH diaphorase activity in the caudate nucleus and putamen of the cat. *J. Comp. Neurol.*, 243:326-334.
63. Graybiel, A.M. (1986) Neuropeptides in the basal ganglia. In: *Neuropeptides in Neurologic and Psychiatric Disease*, J.B. Martin and J.D. Barchas, Eds. New York: Raven, pp. 135-161.
64. Chesselet, M.-F. and Graybiel, A.M. (1986) Striatal neurons expressing somatostatin-like immunoreactivity: evidence for a peptidergic interneuronal system in the cat. *Neuroscience*, 17:547-571.
65. Graybiel, A.M. (1986) Dopamine-containing innervation of the striatum: Subsystems and their striatal correspondents. In: *Recent Developments in Parkinson's Disease*, S. Fahn et al., Eds. New York: Raven, pp. 1-16.
66. Illing, R.-B. and Graybiel, A.M. (1986) Complementary and non-matching afferent compartments in the cat's superior colliculus: Innervation of the acetylcholinesterase-poor domain of the intermediate gray layer. *Neuroscience*, 18:373-394.
67. Roffler-Tarlov, S. and Graybiel, A.M. (1986) Expression of the weaver gene in dopamine-containing neural systems is dose-dependent and affects both striatal and nonstriatal regions. *J. Neurosci.*, 6:3319-3330.
68. Malach, R. and Graybiel, A.M. (1986) Mosaic architecture of the somatic sensory-recipient sector of the cat's striatum. *J. Neurosci.*, 6:3436-3458.
69. Graybiel, A.M., Baughman, R.W., and Eckenstein, F. (1986) Cholinergic neuropil of the striatum observes striosomal boundaries. *Nature*, 323:625-627.
70. Graybiel, A.M., Hirsch, E.C., and Agid, Y.A. (1987) Differences in tyrosine hydroxylase-like immunoreactivity characterize the mesostriatal innervation of striosomes and extrastriosomal matrix at maturity. *Proc. Natl. Acad. Sci. U S A*, 84:303-307.
71. Izzo, P.N., Graybiel, A.M., and Bolam, J.P. (1987) Characterization of substance P- and [Met]enkephalin-immunoreactive neurons in the caudate nucleus of cat and ferret by a single section Golgi procedure. *Neuroscience*, 20:577-587.
72. Malach, R. and Graybiel, A.M. (1987) The somatic sensory corticostriatal projection: Patchwork of somatic sensory zones in the extrastriosomal matrix. In: *Basal Ganglia and Behavior: Sensory Aspects of Motor Functioning*, J.S. Schneider and T.I. Lidsky, Eds. Toronto: H. Huber, pp. 11-16.
73. Olson, C.R. and Graybiel, A.M. (1987) Ectosylvian visual area of the cat: location, retinotopic organization, and connections. *J. Comp. Neurol.*, 261:277-294.
74. Hirsch, E.C., Graybiel, A.M., Duyckaerts, C., and Javoy-Agid, F. (1987) Neuronal loss in the pedunculopontine tegmental nucleus in Parkinson's disease and in progressive supranuclear palsy. *Proc. Natl. Acad. Sci. U S A*, 84:5976-5980.
75. Jimenez-Castellanos, J. and Graybiel, A.M. (1987) Subdivisions of the dopamine-containing A8-A9-A10 complex identified by their differential mesostriatal innervation of striosomes and extrastriosomal matrix. *Neuroscience*, 23:223-242.
76. Graybiel, A.M. and Newman-Gage, H. (1987) Ontogeny of dopaminergic systems in the basal ganglia. In: *Extrapyrmidal Disorders in Childhood*, L. Angelini et al., Eds. Amsterdam: Elsevier, pp. 1-10.
77. Jimenez-Castellanos, J. and Graybiel, A.M. (1987) Subdivisions of the primate substantia nigra pars compacta detected by acetylcholinesterase histochemistry. *Brain Res.*, 437:349-354.
78. Roffler-Tarlov, S. and Graybiel, A.M. (1987) Weaver—A mutant gene that affects the basal ganglia. In: *Basal Ganglia II: Structure and Function: Current Concepts*, M.B. Carpenter and A. Jayaraman, Eds. New York: Plenum, pp. 443-457.
79. Roffler-Tarlov, S. and Graybiel, A.M. (1987) The postnatal development of the dopamine-containing innervation of dorsal and ventral striatum: effects of the weaver gene. *J. Neurosci.*, 7:2364-2372.
80. Bolam, J.P., Izzo, P.N., and Graybiel, A.M. (1988) Cellular substrates of the histochemically defined striosome/matrix system of the caudate nucleus: a combined Golgi and immunocytochemical study in rat and ferret. *Neuroscience*, 24:853-875.
81. Nastuk, M.A. and Graybiel, A.M. (1988) Autoradiographic localization and biochemical characteristics of M1 and M2 muscarinic binding sites in the striatum of the cat, monkey, and human. *J. Neurosci.*, 8:1052-1062.

82. Ragsdale, C.W., Jr. and Graybiel, A.M. (1988) Fibers from the basolateral nucleus of the amygdala selectively innervate striosomes in the caudate nucleus of the cat. *J. Comp. Neurol.*, 269:506-522.
83. Besson, M.-J., Graybiel, A.M., and Nastuk, M.A. (1988) [³H]SCH 23390 binding to D₁ dopamine receptors in the basal ganglia of the cat and primate: delineation of striosomal compartments and pallidal and nigral subdivisions. *Neuroscience*, 26:101-119.
84. Hirsch, E., Graybiel, A.M., and Agid, Y.A. (1988) Melanized dopaminergic neurons are differentially susceptible to degeneration in Parkinson's disease. *Nature*, 334:345-348.
85. Newman-Gage, H. and Graybiel, A.M. (1988) Expression of calcium/calmodulin-dependent protein kinase in relation to dopamine islands and synaptic maturation in the cat striatum. *J. Neurosci.*, 8:3360-3375.
86. Ragsdale, C.W., Jr. and Graybiel, A.M. (1988) Multiple patterns of thalamostriatal innervation in the cat. In: *Cellular Thalamic Mechanisms*, M. Bentivoglio and R. Spreafico, Eds. Amsterdam: Elsevier, pp. 261-267.
87. Graybiel, A.M. (1989). Dopaminergic and cholinergic systems in the striatum. In: *Neural Mechanisms in Disorders of Movement*, A.R. Crossman and M.A. Sambrook, Eds. London: J. Libbey, pp. 3-15.
88. Hirsch, E.C., Graybiel, A.M., and Agid, Y. (1989) Selective vulnerability of pigmented dopaminergic neurons in Parkinson's disease. *Acta Neurol. Scand. (Suppl.)*, 126:19-22.
89. Hirsch, E.C., Graybiel, A.M., Hersh, L.B., Duyckaerts, C., and Agid, Y. (1989) Striosomes and extrastriosomal matrix contain different amounts of immunoreactive choline acetyltransferase in the human striatum. *Neurosci. Lett.*, 96:145-150.
90. Graybiel, A.M., Besson, M.-J., and Weber, E. (1989) Neuroleptic-sensitive binding sites in the nigrostriatal system: Evidence for a differential distribution of sigma sites in the substantia nigra, pars compacta of the cat. *J. Neurosci.*, 9:326-338.
91. Ohta, K., Graybiel, A.M., and Roffler-Tarlov, S. (1989) Dopamine D₁ binding sites in the striatum of the mutant mouse weaver. *Neuroscience*, 28:69-82.
92. Jimenez-Castellanos, J. and Graybiel, A.M. (1989) Evidence that histochemically distinct zones of the primate substantia nigra pars compacta are related to patterned distributions of nigrostriatal projection neurons and striatonigral fibers. *Exp. Brain Res.*, 74:227-238.
93. Nastuk, M.A. and Graybiel, A.M. (1989) Ontogeny of M1 and M2 muscarinic binding sites in the striatum of the cat: relationships to one another and to striatal compartmentalization. *Neuroscience*, 33:125-147.
94. Jimenez-Castellanos, J. and Graybiel, A.M. (1989) Compartmental origins of striatal efferent projections in the cat. *Neuroscience*, 32:297-321.
95. Langer, L.F. and Graybiel, A.M. (1989) Distinct nigrostriatal projection systems innervate striosomes and matrix in the primate striatum. *Brain Res.*, 498:344-350.
96. Graybiel, A.M., Liu, F.-C., and Dunnett, S.B. (1989) Intra-striatal grafts derived from fetal striatal primordia: I. phenotype and modular organization. *J. Neurosci.*, 9:3250-3271.
97. Graybiel, A.M. and Moratalla, R. (1989) Dopamine uptake sites in the striatum are distributed differentially in striosome and matrix compartments. *Proc. Natl. Acad. Sci. U S A*, 86:9020-9024.
98. Graybiel, A.M., Ohta, K., and Roffler-Tarlov, S. (1990) Patterns of cell and fiber vulnerability in the mesostriatal system of the mutant mouse weaver: I. Gradients and compartments. *J. Neurosci.*, 10:720-733.
99. Roffler-Tarlov, S., Pugatch, D., and Graybiel, A.M. (1990) Patterns of cell and fiber vulnerability in the mesostriatal system of the mutant mouse weaver: II. High affinity uptake sites for dopamine. *J. Neurosci.*, 10:734-740.
100. Giménez-Amaya, J.-M. and Graybiel, A.M. (1990) Compartmental origins of the striatopallidal projection in the primate. *Neuroscience*, 34:111-126.
101. Liu, F.-C., Graybiel, A.M., Dunnett, S.B., and Baughman, R.W. (1990) Intra-striatal grafts derived from fetal striatal primordia: II. Reconstitution of cholinergic and dopaminergic systems. *J. Comp. Neurol.*, 295:1-14.
102. Ragsdale, C.W., Jr. and Graybiel, A.M. (1990) A simple ordering of neocortical areas established by the compartmental organization of their striatal projections. *Proc. Natl. Acad. Sci. U S A*, 87:6196-6199.
103. Graybiel, A.M. (1990) Neurotransmitters and neuromodulators in the basal ganglia. *Trends Neurosci.*, 13:244-254.

104. Graybiel, A.M., Liu, F.-C., and Dunnett, S.B. (1990) Cellular reaggregation *in vivo*: modular patterns in intrastriatal grafts derived from fetal striatal primordia. *Prog. Brain Res.*, 82:401-405.
105. Graybiel, A.M., Moratalla, R., and Robertson, H. A. (1990) Amphetamine and cocaine induce drug-specific activation of the *c-fos* gene in striosome-matrix compartment and limbic subdivisions of the striatum. *Proc. Natl. Acad. Sci. U S A*, 87:6912-6916.
106. Graybiel, A.M., Hirsch, E.C., and Agid, Y. (1990) The nigrostriatal system in Parkinson's disease. In: *Parkinson's Disease: Anatomy, Pathology, and Therapy*, M.B. Streifler, A.D. Korczyn, E. Melamed, and M.B.H. Youdim, Eds. New York: Raven, pp. 17-29.
107. Agid, Y., Graybiel, A.M., Ruberg, M., Hirsch, E., Blin, J., Dubois, B., and Javoy-Agid, F. (1990) The efficacy of levodopa treatment declines in the course of Parkinson's disease: do non-dopaminergic lesions play a role? In: *Parkinson's Disease: Anatomy, Pathology, and Therapy*, M.B. Streifler, A.D. Korczyn, E. Melamed, and M.B.H. Youdim, Eds. New York: Raven, pp. 83-99.
108. Graybiel, A.M. (1990) The basal ganglia and the initiation of movement. *Rev. Neurol. (Paris)*, 146:570-574.
109. Besson, M.J., Graybiel, A.M., and Quinn, B. (1990) Co-expression of neuropeptides in the cat's striatum: an immunohistochemical study of substance P, dynorphin B and enkephalin. *Neuroscience*, 39:33-58.
110. Quinn, B., Graybiel, A.M., Moratalla, R., Langston, J.W., Roffler-Tarlov, S., and Ohta, K. (1990) Patterns of vulnerability of mesostriatal neurons. In: *Basic, Clinical, and Therapeutic Aspects of Alzheimer's and Parkinson's Diseases, Vol. I*, T. Nagatsu, A. Fisher, and M. Yoshida, Eds. New York: Plenum, pp. 207-212.
111. Besson, M.-J., Graybiel, A.M., and Quinn, B. (1991) Coexpression of neuropeptides and glutamic acid decarboxylase in cat striatal neurons: dependence on striosomal compartmentation. In: *Basal Ganglia III*, G. Bernardi et al., Eds. New York: Plenum, pp. 29-38.
112. Graybiel, A.M., Flaherty, A.W., and J.-M. Giménez-Amaya. (1991) Striosomes and matrisomes. In: *Basal Ganglia III*, G. Bernardi et al., Eds. New York: Plenum, pp. 3-12.
113. Langer, L.F., Jiménez-Castellanos, J., and Graybiel, A.M. (1991) The substantia nigra and its relations with the striatum in the monkey. In: *Role of the Forebrain in Sensation and Behavior*, G. Holstege, Ed. Amsterdam: Elsevier, pp. 81-99.
114. Giménez-Amaya, J.-M. and Graybiel, A.M. (1991) Modular organization of projection neurons in the matrix-compartment of the primate striatum. *J. Neurosci.*, 11:779-791.
115. Ma, T.P., Graybiel, A.M., and Wurtz, R.H. (1991) Location of saccade-related neurons in the macaque superior colliculus. *Exp. Brain Res.*, 85:21-35.
116. Berson, D.M., Graybiel, A.M., Bowen, W.D., and Thompson, L.A. (1991) Evidence for intrinsic expression of enkephalin-like immunoreactivity and opioid binding sites in cat superior colliculus. *Neuroscience*, 43:513-529.
117. Nastuk, M.A. and Graybiel, A.M. (1991) Pharmacologically defined M1 and M2 muscarinic cholinergic binding sites in the cat's substantia nigra: development and maturity. *Brain Res. Devel. Brain Res.*, 61:1-10.
118. Robertson, H.A., Paul, M.L., Moratalla, R., and Graybiel, A.M. (1991) Expression of the immediate early gene *c-fos* in basal ganglia: Induction by dopaminergic drugs. *Can. J. Neurol. Sci.*, 18:380-383.
119. Liu, F.-C., Dunnett, S.B., Robertson, H.A., and Graybiel, A.M. (1991) Intrastriatal grafts derived from fetal striatal primordia. III. Induction of modular patterns of Fos-like immunoreactivity by cocaine. *Exp. Brain Res.*, 85, 501-506.
120. Ragsdale, C.W., Jr. and Graybiel, A.M. (1991) Compartmental organization of the thalamostriatal connection in the cat. *J. Comp. Neurol.*, 311:134-167.
121. Graybiel, A.M. (1991) Immediate-early genes and the CNS. *Neurosci. Facts*, 2(21):14.
122. Flaherty, A.W. and Graybiel, A.M. (1991) Corticostriatal transformations in the primate somatosensory system. Projections from physiologically mapped body-part representations. *J. Neurophysiol.*, 66:1249-1263.
123. Graybiel, A.M. (1991) Dynamic gene regulation in striatal neurons: perspectives in memorial to Dr. Kyoji Maekawa. *Neurosci. Res.*, 12:41-44.
124. Berson, D.M. and Graybiel, A.M. (1991) Tectorecipient zone of cat lateral posterior nucleus: evidence that collicular afferents contain acetylcholinesterase. *Exp. Brain Res.*, 84:478-486.

125. Graybiel, A.M. (1991) Immediate early gene activation in the striatum: new clue to function and plasticity in the basal ganglia? *IBRO News*, 19(3):7.
126. Graybiel, A.M. (1991) Basal ganglia--input, neural activity, and relation to the cortex. *Curr. Opin. Neurobiol.*, 1:644-651.
127. Graybiel, A.M. Guide to the anatomy of the brain: basal ganglia. (1992) In: *Encyclopedia of Learning and Memory*, L. Squire, Ed. New York: MacMillan, pp. 204-206.
128. Liu, F.-C. and Graybiel, A.M. (1992) Transient calbindin-D_{28K}-positive systems in the telencephalon: ganglionic eminence, developing striatum and cerebral cortex. *J. Neurosci.*, 12:674-690.
129. Hirsch E.C., Mouatt A., Thomasset, M., Javoy-Agid F., Agid Y., and Graybiel A.M. (1992) Expression of calbindin D_{28K}-like immunoreactivity in catecholaminergic cell groups of the human midbrain: normal distribution and distribution in Parkinson's disease. *Neurodegeneration*, 1:83-93.
130. Moratalla, R., Quinn, B., DeLanney, L.E., Irwin, I., Langston, J.W., and Graybiel, A.M. (1992) Differential vulnerability of primate caudate-putamen and striosome-matrix dopamine systems to the neurotoxic effects of 1-methyl-4-phenyl-1,2,3,6-tetrahydropyridine. *Proc. Natl. Acad. Sci. U S A*, 89:3859-3863.
131. Liu, F.-C. and Graybiel, A.M. (1992) Heterogeneous development of calbindin-D_{28K} expression in the striatal matrix. *J. Comp. Neurol.*, 320:304-322.
132. Moratalla, R., Robertson, H.A., and Graybiel, A.M. (1992) Dynamic regulation of *NGFI-A* (*zif268*, *egr1*) gene expression in the striatum. *J. Neurosci.*, 12:2609-2622.
133. Berretta, S., Robertson, H.A., and Graybiel, A.M. (1992) Dopamine and glutamate agonists stimulate neuron-specific expression of Fos-like protein in the striatum. *J. Neurophysiol.*, 68:767-777.
134. Schoen, S. and Graybiel, A.M. (1992) 5'-Nucleotidase: a new marker for striosomal organization in the rat caudoputamen. *J. Comp. Neurol.*, 322:566-576.
135. Hirsch, E.C., Mouatt, A., Faucheux, B., Bonnet, A.-M., Javoy-Agid, F., Graybiel, A.M., and Agid, Y. (1992) Dopamine, tremor, and Parkinson's disease. *Lancet*, 340:125-126.
136. Paul, M.L., Graybiel, A.M., David, J.-C., and Robertson, H.A. (1992) D1-like and D2-like dopamine receptors synergistically activate rotation and *c-fos* expression in the dopamine-depleted striatum in a rat model of Parkinson's disease. *J. Neurosci.*, 12:3729-3742.
137. Parthasarathy, H., Schall, J., and Graybiel, A.M. (1992) Distributed but convergent ordering of corticostriatal projections: analysis of the frontal eye field and the supplementary eye field in the macaque monkey. *J. Neurosci.*, 12:4468-4488.
138. Liu, F.-C., Dunnett, S.B., and Graybiel, A.M. (1992) Influence of mesostriatal afferents on the development and transmitter regulation of intrastriatal grafts derived from embryonic striatal primordia. *J. Neurosci.*, 12:4281-4297.
139. Abeliovich, A., Gerber, D., Tanaka, O., Katsuki, M., Graybiel, A.M., and Tonegawa, S. (1992) On somatic recombination in the central-nervous-system of transgenic mice. *Science*, 257:404-408.
140. Graybiel, A.M. (1993) Acute effects of psychomotor stimulant drugs on gene expression in the striatum. In *Activation of Immediate Early Genes by Drugs of Abuse*. NIH Publication #93-3504:72-81.
141. Graybiel, A.M., Moratalla, R., Quinn, B., DeLanney, L.E., Irwin, I., and Langston, J.W. (1993) Early-stage loss of dopamine uptake-site binding in MPTP-treated monkeys. In: *Parkinson's Disease: From Basic Research to Treatment*, H. Narabayashi, T. Nagatsu, N. Yanagisawa, and Y. Mizuno, Eds. New York: Raven, pp. 34-39.
142. Moratalla, R., Vickers, E.A., Robertson, H.A., Cochran, B.H., and Graybiel, A.M. (1993) Coordinate expression of *c-fos* and *jun B* is induced in the rat striatum by cocaine. *J. Neurosci.*, 13:423-433.
143. Flaherty, A.W. and Graybiel, A.M. (1993) Two input systems for body representations in the primate striatal matrix: experimental evidence in the squirrel monkey. *J. Neurosci.*, 13:1120-1137.
144. Berretta, S., Robertson, H.A., and Graybiel, A.M. (1993) Neurochemically specialized projection neurons of the striatum respond differentially to psychomotor stimulants. In: *Chemical Signalling in Basal Ganglia*, G.W. Arbuthnott and P.C. Emson, Eds. Amsterdam: Elsevier, pp. 201-205.
145. Graybiel, A.M. (1993) Functions of the nigrostriatal system. *J. Clin. Neurosci.*, 1:12-17.

146. Schoen, S.W. and Graybiel, A.M. (1993) Species-specific patterns of glycoprotein expression in the developing rodent caudoputamen: association of 5'-nucleotidase activity with dopamine islands and striosomes in rat, but with extrastriosomal matrix in mouse. *J. Comp. Neurol.*, 333:578-596.
147. Fotuhi, M., Dawson, T.M., Sharp, A.H., Martin, L.J., Graybiel, A.M., and Snyder, S.H. (1993) Phosphoinositide second messenger system is enriched in striosomes: Immunohistochemical demonstration of inositol 1,4,5-trisphosphate receptors and phospholipase C, β and γ in primate basal ganglia. *J. Neurosci.*, 13:3300-3308.
148. Liu, F.-C., Dunnett, S.B., and Graybiel, A.M. (1993) Intrastratial grafts derived from fetal striatal primordia--IV. Host and donor neurons are not intermixed. *Neuroscience*, 55:363-372.
149. Walker, R.H., Arbuthnott, G.W., Baughman, R.W., and Graybiel, A.M. (1993) Dendritic domains of medium spiny neurons in the primate striatum: relationships to striosomal borders. *J. Comp. Neurol.*, 337:614-628.
150. Walker, R.H. and Graybiel, A.M. (1993) Dendritic arbors of spiny neurons in the primate striatum are directionally polarized. *J. Comp. Neurol.*, 337:629-639.
151. Flaherty, A.W. and Graybiel, A.M. (1993) Output architecture of the primate putamen. *J. Neurosci.*, 13:3222-3237.
152. Kimura, M., Aosaki, T., and Graybiel, A.M. (1993) Role of basal ganglia in the acquisition and initiation of learned movement. In: *Role of the Cerebellum and Basal Ganglia in Voluntary Movement*, N. Mano, I. Hamada, and M.R. DeLong, Eds. Amsterdam: Elsevier, pp. 83-87.
153. Flaherty, A.W. and Graybiel, A.M. (1994) Anatomy of the basal ganglia. In: *Movement Disorders 3*, C.D. Marsden and S. Fahn, Eds. Oxford: Butterworth-Heinemann, pp. 3-27.
154. Flaherty, A.W. and Graybiel, A.M. (1994) Input-output organization of the sensorimotor striatum in the squirrel monkey. *J. Neurosci.*, 14:599-610.
155. Graybiel, A.M. and Illing, R.-B. (1994) Enkephalin-positive and acetylcholinesterase-positive patch systems in the superior colliculus have matching distributions but distinct developmental histories. *J. Comp. Neurol.*, 340:297-310.
156. Illing, R.-B. and Graybiel, A.M. (1994) Pattern formation in the developing superior colliculus: ontogeny of the periodic architecture in the intermediate layers. *J. Comp. Neurol.*, 340:311-327.
157. Quinn, B. and Graybiel, A.M. (1994) Myeloarchitectonics of the primate caudate-putamen. In: *The Basal Ganglia IV: New Ideas and Data on Structure and Function*, G. Percheron, J.S. McKenzie, and J. Féger, Eds. New York: Plenum, pp. 35-41.
158. Roffler-Tarlov, S., Cheng, S., Lin, C.S., Wensley, C.H., Graybiel, A.M., and Gusella, J.F. (1994) The chromosomal location of the murine mutation weaver. *Neurodegeneration*, 3:61-72.
159. Aosaki, T., Tsubokawa, H., Ishida, A., Watanabe, K., Graybiel, A.M., and Kimura, M. (1994) Responses of tonically active neurons in the primate's striatum undergo systematic changes during behavioral sensorimotor conditioning. *J. Neurosci.*, 14:3969-3984.
160. Aosaki, T., Graybiel, A.M., and Kimura, M. (1994) Effect of the nigrostriatal dopamine system on acquired neural responses in the striatum of behaving monkeys. *Science*, 265:412-415.
161. Graybiel, A.M., Aosaki, T., Flaherty, A.W., and Kimura, M. (1994) The basal ganglia and adaptive motor control. *Science*, 265:1826-1831.
162. Xu, M., Moratalla, R., Gold, L.H., Hiroi, N., Koob, G.F., Graybiel, A.M., and Tonegawa, S. (1994) Dopamine D1 receptor mutant mice are deficient in striatal expression of dynorphin and in dopamine-mediated behavioral responses. *Cell*, 79:729-742.
163. Xu, M., Hu, X.-T., Cooper, D.C., Moratalla, R., Graybiel, A.M., White, F.J., and Tonegawa, S. (1994) Elimination of cocaine-induced hyperactivity and dopamine-mediated physiological effects in dopamine D1 receptor mutant mice. *Cell*, 79:945-955.
164. Liu, F.-C., Dunnett, S.B., and Graybiel, A.M. (1995) Embryonic striatal grafting: progress and future directions for therapeutic approaches to neurodegenerative diseases of the basal ganglia. In: *Age-Related Dopamine-Dependent Disorders*, M. Segawa and Y. Nomura, Eds. Basel: Karger, pp. 225-234.
165. Liu, F.-C., Takahashi, H., McKay, R.D.G., and Graybiel, A.M. (1995) Dopaminergic regulation of transcription factor expression in organotypic cultures of developing striatum. *J. Neurosci.*, 15: 2367-2384.

166. Graybiel, A.M. and Kimura, M. (1995) Adaptive neural networks in the basal ganglia. In: *Models of Information Processing in the Basal Ganglia*, J.C. Houk, J.L. Davis, and D.G. Beiser, Eds. Cambridge: MIT, pp. 103-116.
167. Graybiel, A.M., Berretta, S., Moratalla, R., Liu, F.-C., and Elibol, B. (1995) Effects of cocaine on immediate-early gene response in striatal neurons. In: *The Neurobiology of Cocaine: Cellular and Molecular Mechanisms*, R.P. Hammer, Ed. Boca Raton: CRC, pp. 215-223.
168. Aosaki, T., Kimura, M., and Graybiel, A.M. (1995) Temporal and spatial characteristics of tonically active neurons of the primate's striatum. *J. Neurophysiol.*, 73:1234-1252.
169. Graybiel, A. (1995) The basal ganglia. *Trends Neurosci.*, 18:60-62.
170. Kimura, M. and Graybiel, A.M. (1995) Role of basal ganglia in sensory motor association learning. In: *Functions of the Cortico-Basal Ganglia Loop*, M. Kimura and A.M. Graybiel, Eds. Tokyo: Springer, pp. 2-17.
171. Eblen, F. and Graybiel, A.M. (1995) Highly restricted origin of prefrontal cortical inputs to striosomes in the macaque monkey. *J. Neurosci.*, 15:5999-6013.
172. Liu, F.-C. and Graybiel, A.M. (1995) Dopamine-mediated signaling in organotypic striatal slice cultures. In: *Molecular and Cellular Mechanisms of Neostriatal Function*, M.A. Ariano and D.J. Surmeier, Eds. New York: Austin, pp. 311-319.
173. Flaherty, A.W. and Graybiel, A.M. (1995) Motor and somatosensory corticostriatal projection magnifications in the squirrel monkey. *J. Neurophysiol.*, 74:2638-2648.
174. Graybiel, A.M. (1995) Building action repertoires: memory and learning functions of the basal ganglia. *Curr. Opin. Neurobiol.*, 5:733-741.
175. Quinn, B. and Graybiel, A.M. (1996) A differentiated silver intensification procedure for the peroxidase-diaminobenzidine reaction. *J. Histochem. Cytochem.*, 44:71-74.
176. Roffler-Tarlov, S., Martin, B., Graybiel, A.M., and Kauer, J.S. (1996) Cell death in the midbrain of the murine mutation *weaver*. *J. Neurosci.*, 16:1819-1826.
177. Graybiel, A.M. (1996) Basal ganglia: New therapeutic approaches to Parkinson's disease. *Curr. Biol.*, 6:368-371.
178. Moratalla, R., Elibol, B., Vallejo, M., and Graybiel, A.M. (1996) Network-level changes in expression of inducible Fos-Jun proteins in the striatum during chronic cocaine treatment and withdrawal. *Neuron*, 17:147-156.
179. Hiroi, N. and Graybiel, A.M. (1996) Atypical and typical neuroleptic treatments induce distinct programs of transcription factor expression in the striatum. *J. Comp. Neurol.*, 374:70-83.
180. Moratalla, R., Xu, M., Tonegawa, S., and Graybiel, A.M. (1996) Cellular responses to psychomotor stimulant and neuroleptic drugs are abnormal in mice lacking the D1 dopamine receptor. *Proc. Natl. Acad. Sci. U S A*, 93:14928-14933.
181. Liu, F.-C. and Graybiel, A.M. (1996) Spatiotemporal dynamics of CREB phosphorylation: Transient vs. sustained phosphorylation in the developing striatum. *Neuron*, 17:1133-1144.
182. Moratalla, R., Vallejo, M., Elibol, B., and Graybiel, A.M. (1996) D1-class dopamine receptors influence cocaine-induced persistent expression of Fos-related proteins in striatum. *NeuroReport*, 8:1-5.
183. Liu, F.C. and Graybiel, A.M. (1996) Protein phosphatases regulate CREB phosphorylation and Fos expression in the developing striatum. In: *The Basal Ganglia V*, C. Ohye, M. Kimura, and J.S. McKenzie, Eds. New York: Plenum, pp. 97-103.
184. Graybiel, A.M. (1997) The basal ganglia and cognitive pattern generators. *Schizophr. Bull.*, 23:459-469.
185. Parthasarathy, H.B. and Graybiel, A.M. (1997) Cortically driven immediate-early gene expression reflects modular influence of sensorimotor cortex on identified striatal neurons in the squirrel monkey. *J. Neurosci.*, 17:2477-2491.
186. Berretta, S., Parthasarathy, H.B., and Graybiel, A.M. (1997) Local release of GABAergic inhibition in the motor cortex induces immediate-early gene expression in indirect pathway neurons of the striatum. *J. Neurosci.*, 17:4752-4763.
187. Holt, D.J., Graybiel, A.M., and Saper, C.B. (1997) Neurochemical architecture of the human striatum. *J. Comp. Neurol.*, 384:1-25.

188. Xu, M., Koeltzow, T.E., Santiago, G.T., Moratalla, R., Cooper, D.C., Hu, X.-T., White, N.M., Graybiel, A.M., White, F.J., and Tonegawa, S. (1997) Dopamine D3 receptor mutant mice exhibit increased behavioral sensitivity to concurrent stimulation of D1 and D2 receptors. *Neuron*, 19:837-848.
189. Liu, F.-C. and Graybiel, A.M. (1998) Dopamine and calcium signal interactions in the developing striatum: control by kinetics of CREB phosphorylation. In: *Catecholamines: Bridging Basic Science with Clinical Medicine*, D.S. Goldstein, G. Eisenhofer, and R. McCarty, Eds. San Diego: Academic, pp. 682-686.
190. Liu, F.-C. and Graybiel, A.M. (1998) Region-dependent dynamics of cAMP response element-binding protein phosphorylation in the basal ganglia. *Proc. Natl. Acad. Sci. U S A*, 95:4708-4713.
191. Graybiel, A.M. (1998). Basal ganglia circuits and schizophrenia. *The Decade of the Brain*, 9:8-10.
192. Graybiel, A.M. (1998) Cortico-basal ganglia loop systems. *Progress in Medicine*, 18:1440-1447.
193. Liu, F.-C. and Graybiel, A.M. (1998) Activity-regulated phosphorylation of cAMP response element binding protein in the developing striatum: implications for patterning the neurochemical phenotypes of striatal compartments. *Dev. Neurosci.*, 20:229-236.
194. Graybiel, A.M. (1998) The basal ganglia and chunking of action repertoires. *Neurobiol. Learn. Mem.*, 70:119-136.
195. Kawasaki, H., Springett, G.M., Toki, S., Canales, J.J., Harlan, P., Blumenstiel, J.P., Chen, E.J., Bany, I.A., Mochizuki, N., Ashbacher, A., Matsuda, M., Housman, D.E., and Graybiel, A.M. (1998) A Rap guanine nucleotide exchange factor enriched highly in the basal ganglia. *Proc. Natl. Acad. Sci. U S A*, 95:13278-13283.
196. Kawasaki, H., Springett, G.M., Mochizuki, N., Toki, S., Nakaya, M., Matsuda, M., Housman, D.E., and Graybiel, A.M. (1998) A family of cAMP-binding proteins that directly activate Rap1. *Science*, 282:2275-2279.
197. Matsumoto, N., Hanakawa, T., Maki, S., Graybiel, A.M., and Kimura, M. (1999) Nigrostriatal dopamine system in learning to perform sequential motor tasks in a predictive manner. *J. Neurophysiol.*, 82:978-998.
198. Berretta, S., Sachs, Z., and Graybiel, A.M. (1999) Cortically driven Fos induction in the striatum is amplified by local dopamine D2-class receptor blockade. *Eur. J. Neurosci.*, 11:4309-4319.
199. Damier, P., Hirsch, E.C., Agid, Y., and Graybiel, A.M. (1999) The substantia nigra of the human brain: I. Nigrosomes and the nigral matrix, a compartmental organization based on calbindin D_{28K} immunohistochemistry. *Brain*, 122:1421-1436.
200. Damier, P., Hirsch, E.C., Agid, Y., and Graybiel, A.M. (1999) The substantia nigra of the human brain: II. Patterns of loss of dopamine-containing neurons in Parkinson's disease. *Brain*, 122:1437-1448.
201. Anderson, M.E. and Graybiel, A.M. (1999) Basal ganglia and the regulation of movement. In: *Encyclopedia of Life Sciences*. London: Macmillan.
202. Graybiel, A.M. and Penney, J.B. (1999) Chemical architecture of the basal ganglia. In: *Handbook of Chemical Neuroanatomy, Vol. 15: The Primate Nervous System, Part III*, F.E. Bloom, A. Björklund and T. Hökfelt, Eds. Amsterdam: Elsevier, pp. 227-284.
203. Holt, D.J., Herman, M.M., Hyde, T.M., Kleinman, J.E., Sinton, C.M., German, D.C., Hersh, L.B., Graybiel, A.M., and Saper, C.B. (1999) Evidence for a deficit in cholinergic interneurons in the striatum in schizophrenia. *Neuroscience*, 94:21-31.
204. Jog, M.S., Kubota, Y., Connolly, C.I., Hillegaart, V., and Graybiel, A.M. (1999) Building neural representations of habits. *Science*, 286:1745-1749.
205. Liu, F.-C. and Graybiel, A.M. (1999) Neural development of the striatal dopamine system. In: *The Development of Dopaminergic Neurons*, U. di Porzio, R. Pernas-Alonso, and C. Perrone-Capano, Eds. Austin, TX: R.G. Landes, pp. 87-100.
206. Canales, J.J. and Graybiel, A.M. (2000) Patterns of gene expression and behavior induced by chronic dopamine treatments. *Ann. Neurol.*, 47(Suppl. 1):S53-S59.
207. Canales, J.J. and Graybiel, A.M. (2000) A measure of striatal function predicts motor stereotypy. *Nat. Neurosci.*, 3:377-383.
208. Gardier, A.M., Moratalla, R., Cuéllar, B., Sacerdote, M., Guibert, B., Lebecq, H., and Graybiel, A.M. (2000) Interaction between the serotonergic and dopaminergic systems in *d*-fenfluramine-induced activation of *c-fos* and *jun B* genes in rat striatal neurons. *J. Neurochem.*, 74:1363-1373.

209. Tan, A., Moratalla, R., Lyford, G.L., Worley, P., and Graybiel, A.M. (2000) The activity-regulated cytoskeletal associated protein Arc is expressed in different striosome-matrix patterns following exposure to amphetamine and cocaine. *J. Neurochem.*, 74:2074-2078.
210. Mochizuki, N., Ohba, Y., Kobayashi, S., Otsuka, N., Graybiel, A.M., Tanaka, S., and Matsuda, M. (2000) Crk activation of JNK via C3G and R-Ras. *J. Biol. Chem.*, 275:12667-12671.
211. Graybiel, A.M. (2000) The basal ganglia. *Curr. Biol.*, 10:R509-R511.
212. Graybiel, A.M., Canales, J.J., and Capper-Loup, C. (2000) Levodopa-induced dyskinesias and dopamine-dependent stereotypies: a new hypothesis. *Trends Neurosci.*, 23 (Suppl.):S71-S77.
213. Graybiel, A.M. (2000) Motor and non-motor functions of the basal ganglia. *Kinesis*, 5:22-26.
214. Graybiel, A.M. and Rauch, S.L. (2000) Toward a neurobiology of obsessive-compulsive disorder. *Neuron*, 28:343-347.
215. Graybiel, A.M. and Canales, J.J. (2001) The neurobiology of repetitive behaviors: clues to the neurobiology of Tourette syndrome. In: *Tourette Syndrome and Related Disorders*, D.J. Cohen, C. Goetz, and J. Jankovic, Eds. Philadelphia: Lippincott-Williams & Wilkins, pp. 123-131.
216. Matsumoto, N., Minamimoto, T., Graybiel, A.M., and Kimura, M. (2001) Neurons in the thalamic CM-Pf complex supply striatal neurons with information about behaviorally significant sensory events. *J. Neurophysiol.*, 85:960-976.
217. Graybiel, AM (2001) Neural systems V: basal ganglia. *Am. J. Psychiatry*, 158:21.
218. Toki, S., Kawasaki, H., Tashiro, N., Housman, D.E., and Graybiel, A.M. (2001) Guanine nucleotide exchange factors CalDAG-GEFI and CalDAG-GEFII are colocalized in striatal projection neurons. *J. Comp. Neurol.*, 437:398-407.
219. Djurfeldt, M., Ekeberg, Ö., and Graybiel, A.M. (2001) Cortex-basal ganglia interaction and attractor states. *Neurocomputing*, 38-40:573-579.
220. Graybiel, A.M. and Blazquez, P.M. (2002) Adjusting behavior to context: striatal network functions in learning and memory. In: *Catecholamine Research: From Molecular Insights to Clinical Medicine*, T. Nagatsu, R. Nabeshima, R. McCarthy, and D.D. Goldstein, Eds. New York: Kluwer Academic/Plenum Publishers, pp. 361-364.
221. Jog, M.S., Connolly, C.I., Kubota, Y., Iyengar, D.R., Garrido, L., Harlan, R., and Graybiel, A.M. (2002) Tetrode technology: Advances in implantable hardware, neuroimaging, and data analysis techniques. *J. Neurosci. Methods*, 117:141-152.
222. Brown, L.L., Feldman, S.M., Smith, D.M., Cavanaugh, J.R., Ackermann, R.F., and Graybiel, A.M. (2002) Differential metabolic activity in the striosome and matrix compartments of the rat striatum during natural behaviors. *J. Neurosci.*, 22:305-314.
223. Graybiel, A.M. and Saka, E. (2002) A genetic basis for obsessive grooming. *Neuron*, 33:1-2.
224. Blazquez, P., Fujii, N., Kojima, J., and Graybiel, A.M. (2002) A network representation of response probability in the striatum. *Neuron*, 33:973-982.
225. Saka, E., Iadarola, M., Fitzgerald, D.J., and Graybiel, A.M. (2002) Local circuit neurons in the striatum regulate neural and behavioral responses to dopaminergic stimulation. *Proc. Natl. Acad. Sci. U S A*, 99:9004-9009.
226. Canales, J.J., Capper-Loup, C., Hu, D., Choe, E.S., Upadhyay, U., and Graybiel, A.M. (2002) Shifts in striatal responsivity evoked by chronic stimulation of dopamine and glutamate systems. *Brain*, 125:2353-2363.
227. Capper-Loup, C., Canales, J.J., Kadaba, N., and Graybiel, A.M. (2002) Concurrent activation of dopamine D1 and D2 receptors required to evoke neural and behavioral phenotypes of cocaine sensitization. *J. Neurosci.*, 22:6218-6227.
228. Graybiel, A.M. Guide to the anatomy of the brain: the basal ganglia. (2002) In: *Encyclopedia of Learning and Memory, 2nd Ed.*, J.H. Byrne, Ed. New York: MacMillan.
229. Graybiel, A.M. and Kubota, Y. (2003) Understanding corticobasal ganglia networks as part of a habit formation system. In: *Mental and Behavioral Dysfunction in Movement Disorders*, M.-A. Bédard, Y. Agid, S. Chouinard, S. Fahn, A.D. Korczyn, and P. Lespérance, Eds. Totowa, NJ: Humana, pp. 51-57.
230. Courtemanche, R., Fujii, N., and Graybiel, A.M. (2003) Synchronous, focally modulated β -band oscillations characterize local field potential activity in the striatum of awake behaving monkeys. *J. Neurosci.*, 23:11741-11752.

231. Graybiel, A.M. and Saka, E. (2003) The basal ganglia and the control of action. In: *The New Cognitive Neurosciences, 3rd Ed.*, M.S. Gazzaniga, Ed. Cambridge, MA: MIT Press, pp. 495-510.
232. Fujii, N. and Graybiel, A.M. (2003) Representation of action sequence boundaries by macaque prefrontal cortical neurons. *Science*, 301:1246-1249.
233. Smith, A.C., Frank, L.M., Wirth, S., Yanike, M., Hu, D., Kubota, Y., Graybiel, A.M., Suzuki, W.A., and Brown, E.N. (2004) Dynamic analysis of learning in behavioral experiments. *J. Neurosci.*, 24:447-461.
234. Saka, E. and Graybiel, A.M. (2003) Pathophysiology of Tourette syndrome: striatal pathways revisited. *Brain Dev.*, 25 Suppl 1:S15-S19.
235. Crittenden, J.R., Bergmeier, W., Zhang, Y., Piffath, C.L., Liang, Y., Wagner, D.D., Housman, D.E., and Graybiel, A.M. (2004) CalDAG-GEFI integrates signaling for platelet aggregation and thrombus formation. *Nat. Med.*, 10:982-986.
236. Saka, E., Goodrich, C., Harlan, P., Madras, B., and Graybiel, A.M. (2004) Repetitive behaviors in monkeys are linked to specific striatal activation maps. *J. Neurosci.*, 24:7557-7565.
237. Graybiel, A.M. (2004) Network-level neuroplasticity in cortico-basal ganglia pathways. *Parkinsonism Relat. Disord.*, 10:293-296.
238. Boraud, T., Brown, P., Goldberg, J.A., Graybiel, A.M., and Magill, P.J. (2005) Oscillations in the basal ganglia: The good, the bad, and the unexpected. In: *The Basal Ganglia VIII*, J.P. Bolam, C.A. Ingham, and P.J. Magill, Eds. New York: Springer Science and Business Media, pp. 3-24.
239. Fujii, N. and Graybiel, A.M. (2005) Time-varying covariance of neural activities recorded in striatum and frontal cortex as monkeys perform sequential-saccade tasks. *Proc. Natl. Acad. Sci. U S A*, 102:9032-9037.
240. Barnes, T.D., Kubota, Y., Hu, D., Jin, D.Z., and Graybiel, A.M. (2005) Activity of striatal neurons reflects dynamic encoding and recoding of procedural memories. *Nature*, 437:1158-1161.
241. Graybiel, A.M. (2005) The basal ganglia: learning new tricks and loving it. *Curr. Opin. Neurobiol.*, 15:638-644.
242. Bernardi, B., Guidetti, G.F., Campus, F., Crittenden, J.R., Graybiel, A.M., Balduini, C., and Torti, M. (2006) The small GTPase Rap1b regulates the cross-talk between platelet integrin $\alpha_2\beta_1$ and integrin $\alpha_{IIb}\beta_3$. *Blood*, 107:2728-2735.
243. Grillner, S. and Graybiel, A.M. (2006) Introduction. In: *Microcircuits: The Interface between Neurons and Global Brain Function*, S. Grillner and A.M. Graybiel, Eds. Cambridge, MA: MIT Press, pp. 1-4.
244. Bergman, H., Graybiel, A.M., Kimura, M., Plenz, D., Seung, H.S., Surmeier, D.J., and Wickens, J.R. (2006) Microcircuits, molecules and motivated behavior: microcircuits in the striatum. In: *Microcircuits: The Interface between Neurons and Global Brain Function*, S. Grillner and A.M. Graybiel, Eds. Cambridge, MA: MIT Press, pp. 165-191.
245. Tippett, L.J., Waldvogel, H.J., Thomas, S.J., Hogg, V.M., van Roon-Mom, W., Synek, B.J., Graybiel, A.M., and Faull, R.L.M. (2007) Striosomes and mood dysfunction in Huntington's disease. *Brain*, 130:206-221.
246. DeCoteau, W.E., Thorn, C.A., Gibson, D.J., Courtemanche, R., Mitra, P., Kubota, Y., and Graybiel, A.M. (2007) Learning-related coordination of striatal and hippocampal theta rhythms during acquisition of a procedural maze task. *Proc. Natl. Acad. Sci. U S A*, 104:5644-5649.
247. DeCoteau, W.E., Thorn, C., Gibson, D.J., Courtemanche, R., Mitra, P., Kubota, Y., and Graybiel, A.M. (2007) Oscillations of local field potentials in the rat dorsal striatum during spontaneous and instructed behaviors. *J. Neurophysiol.*, 97:3800-3805.
248. Bergmeier, W., Goerge, T., Wang, H.-W., Crittenden, J.R., Baldwin, A.C.W., Cifuni, S.M., Housman, D.E., Graybiel, A.M., and Wagner, D.D. (2007) Mice lacking the signaling molecule, CalDAG-GEFI, represent a model for leukocyte adhesion deficiency type III. *J. Clin. Invest.*, 117:1699-1707.
249. Pasvolsky, R., Feigelson, S.W., Filic, S.S., Simon, A.J., Tal-Lapidot, G., Grabovsky, V., Crittenden, J.R., Amariglio, N., Safran, M., Graybiel, A.M., Rechavi, G., Ben-Dor, S., Etzioni, A., and Alon, R. (2007) A LAD-III syndrome is associated with defective expression of the Rap-1 activator CalDAG-GEFI in lymphocytes, neutrophils, and platelets. *J. Exper. Med.*, 204:1571-1582.
250. Weiss, L.A., Shen, Y., Korn, J.M., Arking, D.E., Miller, D.T., Fossdal, R., Saemundsen, E., Stefansson, H., Ferreira, M.A.R., Green, T., Platt, O.S., Ruderfer, D.M., Walsh, C.A., Altshuler, D., Chakravarti, A., Tanzi, R.E., Stefansson,

- K., Santangelo, S.L., Gusella, J.F., Sklar, P., Wu, B.-L., and Daly, M. J. (2008) Association between microdeletion and microduplication at 16p11.2 and autism. *N.E J. Med.*, 358:667-675.
251. Graybiel, A.M. (2008) Habits, rituals and the evaluative brain. *Annu. Rev. Neurosci.*, 31:359-387.
252. Sato, K., Sumi-Ichinose, C. Kaji, R., Ikemoto, K., Nomura, T., Nagatsu, I., Ichinose, H., Ito, M., Sako, W., Nagahiro, S., Graybiel, A.M., and Goto, S. (2008) Differential involvement of striosome and matrix dopamine systems in a transgenic model of dopa-responsive dystonia. *Proc. Natl. Acad. Sci. U S A*, 105:12551-12556.
253. Tort, A.B.L., Kramer, M.A., Thorn, C., Gibson, D.J., Kubota, Y., Graybiel, A.M., and Kopell, N.J. (2008) Dynamic cross-frequency couplings of local field potential oscillations in rat striatum and hippocampus during performance of a T-maze task. *Proc. Natl. Acad. Sci. U S A*, 105:20517-20522.
254. Graybiel, A.M. (2009) Basal ganglia: habit. In: *Encyclopedia of Neuroscience*, L. Squire, Ed. Oxford: Academic Press, vol. 2, pp. 93-96.
255. Crittenden, J.R., Cantuti-Castelvetri, I., Saka, E., Keller-McGandy, C.E., Hernandez, L.F., Kett, L.R., Young, A.B., Standaert, D., and Graybiel, A.M. (2009) Dysregulation of CalDAG-GEFI and CalDAG-GEFII predicts the severity of motor side-effects induced by anti-parkinsonian therapy. *Proc. Natl. Acad. Sci. U S A*, 106:2892-2896.
256. Han, X., Qian, X., Bernstein, J.G., Zhou, H.-h., Franzesi, G.T., Stern, P., Bronson, R.T., Graybiel, A.M., Desimone, R., and Boyden, E.S. (2009) Millisecond-timescale optical control of neural dynamics in the nonhuman primate brain. *Neuron*, 62:191-198.
257. Kubota, Y., Liu, J., Hu, D., DeCoteau, W.E., Eden, U.T., Smith, A.C., and Graybiel, A.M. (2009) Stable encoding of task structure coexists with flexible coding of task events in mouse sensorimotor striatum. *J. Neurophysiol.*, 102: 2142–2160.
258. Prerau, M.J., Smith, A.C., Eden, U.T., Kubota, Y., Yanike, M., Suzuki, W., Graybiel, A.M., and Brown, E.N. (2009) Characterizing learning by simultaneous analysis of continuous and binary measures of performance. *J. Neurophysiol.*, 102:3060-3072.
259. Graybiel, A.M. and Mink, J.W. (2009) The basal ganglia and cognition. In: *The Cognitive Neurosciences IV*, M. Gazzaniga, Ed. Cambridge, MA: MIT Press, pp. 565-585.
260. Pennartz, C.M.A., Berke, J.D., Graybiel, A.M., Ito, R., Lansink, C.S., van der Meer, M., Redish, A.D., Smith, K.S., and Voorn, P. (2009) Corticostriatal interactions during learning, memory processing, and decision making. *J. Neurosci.*, 29:12831-12838.
261. Jin, D.J., Fujii, N., and Graybiel, A.M. (2009) Neural representation of time in cortico-basal ganglia circuits. *Proc. Natl. Acad. Sci. U S A*, 106:19156-19161.
262. Graybiel, A.M. (2009) Dynamic templates for neuroplasticity in the striatum. In: *Dopamine Handbook*, L.L. Iversen, S.D. Iversen, S.B. Dunnett, and A. Björklund, Eds. Oxford, UK: Oxford University Press, pp. 333-338.
263. Graybiel, A.M. (2010) Templates for neural dynamics in the striatum: striosomes and matrisomes. In: *Handbook of Brain Microcircuits*, G. Shepherd and S. Grillner, Eds. New York: Oxford University Press, pp. 120-126.
264. Erickson, K.I., Boot, W.R., Basak, C., Neider, M.B., Prakash, R.S., Voss, M.W., Graybiel, A.M., Simons, D.J., Fabiani, M., Gratton, G., and Kramer, A.F. (2010) Striatal volume predicts level of video game skill acquisition. *Cereb. Cortex*, 11:2522-2530.
265. Crittenden, J.R., Dunn, D.E., Merali, F.I., Woodman, B., Borkowska, A.E., Frosch, M.P., Bates, G.P., Housman, D.E., Lo, D.C., and Graybiel, A.M. (2010) CalDAG-GEFI down-regulation in the striatum as a neuroprotective change in Huntington's Disease. *Hum. Mol. Genet.*, 19:1756-1765.
266. Thorn, C.A., Atallah, H., Howe, M., and Graybiel, A.M. (2010) Differential dynamics of activity changes in dorsolateral and dorsomedial striatal loops during learning. *Neuron*, 66:781-795.
267. Desrochers, T.M., Jin, D.Z., Goodman, N.D., and Graybiel, A.M. (2010) Optimal habits can develop spontaneously through sensitivity to local cost. *Proc. Natl. Acad. Sci. U S A*, 107:20512-20517.
268. Cantuti-Castelvetri, I., Hernandez, L.F., Keller-McGandy, C., Kett, L.R., Landy, A., Hollingsworth, Z.R., Saka, E., Crittenden, J.R., Nillni, E.A., Young, A.B., Standaert, D.G., and Graybiel, A.M. (2010) Levodopa-induced dyskinesia is associated with increased thyrotropin releasing hormone in the dorsal striatum of hemi-parkinsonian rats. *PLoS ONE*, 5:e13861.

269. Sako, W., Morigaki, R., Kaji, R., Tooyama, I., Okita, S., Kitazato, K., Nagahiro, S., Graybiel, A.M., and Goto, S. (2011) Identification and localization of a neuron-specific isoform of TAF1 in rat brain: implications for neuropathology of DYT3 dystonia. *Neuroscience*, 189:100-107.
270. Desai, M., Kahn, I., Knoblich, U., Bernstein, J., Atallah, H., Kopell, N., Buckner, R.L., Graybiel, A.M., Moore, C.I., and Boyden, E.S. (2011) Mapping brain networks in awake mice using combined optical neural control and fMRI. *J. Neurophysiol.*, 105:1393-1405.
271. Kahn, I., Desai, M., Knoblich, U., Bernstein, J., Henniger, M., Graybiel, A.M., Boyden, E.S., Buckner, R.L., and Moore, C.I. (2011) Characterization of the functional MRI response temporal linearity via optical control of neocortical pyramidal neurons. *J. Neurosci.*, 31:15086-15091.
272. Barnes, T.D., Mao, J., Hu, D., Kubota, Y., Dreyer, A.A., Stamoulis, C., Brown, E.M., and Graybiel, A.M. (2011) Advance-cueing produces enhanced action-boundary patterning of spike activity in the sensorimotor striatum. *J. Neurophysiol.*, 105:1861-1878.
273. Amemori, K.-I., Gibb, L.G., and Graybiel, A.M. (2011) Shifting responsibly: The importance of striatal modularity to reinforcement learning in uncertain environments. *Front. Hum. Neurosci.*, 5:47.
274. Kitsukawa, T., Nagata, M., Yanagihara, D., Tomioka, R., Utsumi, H., Kubota, Y., Yagi, T., Graybiel, A.M., and Yamamori, T. (2011) A novel instrumented multi-peg running wheel system, step-wheel, for monitoring and controlling complex sequential stepping in mice. *J. Neurophysiol.*, 106:479-487.
275. Zhao, S., Ting, J., Atallah, H.E., Qiu, L., Tan, J., Gloss, B., Augustine, G., Deisseroth, K., Luo, M., Graybiel, A.M., and Feng, G. (2011) Cell-type-specific optogenetic mice for dissecting neural circuitry function. *Nat. Methods*, 8:745-752.
276. Crittenden, J.R. and Graybiel, A.M. (2011) Basal ganglia disorders associated with imbalances in the striatal striosome and matrix compartments. *Front. Neuroanat.*, 5:59.
277. Graybiel, A.M. and Morris, R.G. (2011) Editorial Overview. Behavioural and cognitive neuroscience. *Curr. Opin. Neurobiol.*, 21:365-367.
278. Howe, M.W., Atallah, H.E., McCool, A., Gibson, D., and Graybiel, A.M. (2011) Habit learning is associated with major shifts in frequencies of oscillatory activity and synchronized spike firing in striatum. *Proc. Natl. Acad. Sci. U S A*, 108:16801-16808.
279. Amemori, K.-I. and Graybiel, A.M. (2012) Localized microstimulation of primate pregenual cingulate cortex induces negative decision-making. *Nat. Neurosci.*, 15:776-785. (*Nature Neuroscience News & Views*)
280. Feingold, J., Desrochers, T.M., Fujii, N., Harlan, R., Tierney, P.L., Shimazu, H., Amemori, K.-I., and Graybiel, A.M. (2012) A system for recording neural activity chronically and simultaneously from multiple cortical and sub-cortical regions in non-human primates. *J. Neurophysiol.*, 107:1979-1995.
281. Smith, K.S., Virkud, A., Deisseroth, K., and Graybiel, A.M. (2012) Reversible on-line control of habitual behavior by optogenetic perturbation of medial prefrontal cortex. *Proc. Natl. Acad. Sci. U S A*, 109:18932-18937.
282. Fletcher, R.R., Amemori, K.-I., Goodwin, M., and Graybiel, A.M. (2012) Wearable wireless sensor platform for studying autonomic activity and social behavior in non-human primates. 34th International Conference of the IEEE Engineering in Medicine & Biology Society, San Diego, California, August 28 – September 1.
283. Surmeier, D.J. and Graybiel, A.M. (2012) A feud that wasn't: Acetylcholine evokes dopamine release in the striatum. *Neuron*, 75:1-3.
284. Lemaire, N., Hernandez, L.F., Hu, D., Kubota, Y., Howe, M.W., and Graybiel, A.M. (2012) Effects of dopamine depletion on LFP oscillations in striatum are task- and learning-dependent and are selectively reversed by L-DOPA. *Proc. Natl. Acad. Sci. U S A*, 109:18126-18131.
285. Hernandez, L.F., Kubota, Y., Hu, D., Howe, M.W., Lemaire, N., and Graybiel, A.M. (2013) Selective effects of dopamine depletion and L-DOPA therapy on learning-related firing dynamics of striatal neurons. *J. Neurosci.*, 33:4782-4795. (This Week in the Journal)
286. Smith, K.S. and Graybiel, A.M. (2013) Using optogenetics to study habits. *Brain Res.*, 1511:102-114.
287. Smith, K.S. and Graybiel, A.M. (2013) A dual operator view of habitual behavior reflecting cortical and striatal activity dynamics. *Neuron*, 79:361-374. (*PNAS QnAs*)

288. Burguière, E., Monteiro, P., Feng, G., and Graybiel, A.M. (2013) Optogenetic stimulation of lateral orbitofronto-striatal pathway suppresses compulsive behaviors. *Science*, 340:1243-1246. (*Science Perspectives*)
289. Howe, M.W., Tierney, P.L., Sandberg, S.G., Phillips, P.E.M., and Graybiel, A.M. (2013) Prolonged dopamine signalling in striatum signals proximity and value of distant rewards. *Nature*, 500:575-579. (*Nature News & Views*)
290. Kahn, I., Knoblich, U., Desai, M., Bernstein, J., Graybiel, A.M., Boyden, E.S., Buckner, R.L., and Moore, C.I. (2013) Optogenetic drive of neocortical pyramidal neurons generates fMRI signals that are correlated with spiking activity. *Brain Res.*, 1511:33-45.
291. Thorn, C.A. and Graybiel, A.M. (2014) Differential entrainment and learning-related dynamics of spike and local field potential activity in the sensorimotor and associative striatum. *J. Neurosci.*, 34:2845-2859.
292. Atallah, H.E., Howe, M.W., McCool, A., and Graybiel, A.M. (2014) Neurons in the ventral striatum exhibit cell-type specific representations of outcome during learning. *Neuron*, 82:1145-1156. (*Neuron Previews*)
293. Smith, K.S. and Graybiel, A.M., (2014) Investigating habits: strategies, technologies, and models. *Front. Neurosci.*, 8:39.
294. Crittenden, J.R., Lacey, C.J., Lee, T., Bowden, H.A., and Graybiel, A.M. (2014) Severe drug-induced repetitive behaviors and striatal overexpression of VAcHT in ChAT-ChR2-EYFP BAC transgenic mice. *Front. Neural Circuits*, 8:57.
295. Graybiel, A.M. and Smith, K.S. (2014) Good habits, bad habits. *Sci. Am.*, 310:38-43.
296. Holmes, E.A., Craske, M.G., and Graybiel, A.M. (2014) A call for mental-health science. *Nature*, 511:287-289.
297. Schreiweis, C., Bornschein, U., Burguiere, E., Kerimoglu, C., Schreiter, S., Dannemann, M., Goyal, S., Hevers, W., Rea, E., French, C.A., Puliyadi, R., Groszer, M., Fisher, S.E., Mundry, R., Winter, C., Pääbo, S., Enard, W., and Graybiel, A.M. (2014) Humanized Foxp2 accelerates making transitions from declarative to procedural learning. *Proc. Natl. Acad. Sci. U S A*, 111:14253-14258.
298. Burguière, E., Monteiro, P., Mallet, L., Feng, G., and Graybiel, A.M. (2015) Striatal circuits, habits, and implications for obsessive-compulsive disorder. *Curr. Opin. Neurobiol.*, 30:59-65.
299. Amemori, S., Amemori, K., Cantor, M.L., and Graybiel, A.M. (2015) A non-invasive head-holding device for chronic neural recordings in awake behaving monkeys. *J. Neurosci. Methods*, 240:154-160.
300. Amemori, K., Amemori, S., and Graybiel, A.M. (2015) Motivation and affective judgments differentially recruit neurons in the primate dorsolateral prefrontal and anterior cingulate cortex. *J. Neurosci.*, 35:1939-1953.
301. Newman, H., Liu, F.-C., and Graybiel, A.M. (2015) Dynamic ordering of early generated striatal cells destined to form the striosomal compartment of the striatum. *J. Comp. Neurol.*, 523:943-962.
302. Friedman, A., Keselman, M.D., Gibb, L.G., and Graybiel, A.M. (2015) A multistage mathematical approach to automated clustering of high-dimensional noisy data. *Proc. Natl. Acad. Sci. U S A*, 112:4477-4482.
303. Friedman, A., Homma, D., Gibb, L.G., Amemori, K., Rubin, S.J., Hood, A.S., Riad, M.H., and Graybiel, A.M. (2015) A corticostriatal path targeting striosomes controls decision-making under conflict. *Cell*, 161:1320-1333. (*Cell Previews*)
304. Desrochers, T.M., Amemori, K., and Graybiel, A.M. (2015) Habit learning by naive macaques is marked by response sharpening of striatal neurons representing the cost and outcome of acquired action sequences. *Neuron*, 87:853-868.
305. Graybiel, A.M. and Grafton, S.T. (2015) The striatum: where skills and habits meet. *Cold Spring Harb. Perspect. Biol.*, 7:a021691.
306. Adamantidis, A. et al. (2015) Optogenetics: 10 years after ChR2 in neurons—views from the community. *Nat. Neurosci.*, 18:1202-1212.
307. Feingold, J., Gibson, D.J., DePasquale, B., and Graybiel, A.M. (2015) Bursts of beta oscillation differentiate postperformance activity in the striatum and motor cortex of monkeys performing movement tasks. *Proc. Natl. Acad. Sci. U S A*, 112:13687-13692.
308. Kalueff, A.V., Stewart, A.M., Song, C., Berridge, K.C., Graybiel, A.M., and Fentress, J.C. (2016) Neurobiology of rodent self-grooming and its value for translational neuroscience. *Nat. Rev. Neurosci.*, 17:45-59.
309. Smith, K.S. and Graybiel, A.M. (2016) Habit formation coincides with shifts in reinforcement representations in the sensorimotor striatum. *J. Neurophysiol.*, 115:1487-1498.

310. Smith, K.S. and Graybiel, A.M. (2016) Habit formation. *Dialogues Clin. Neurosci.*, 18:33-43.
311. Graybiel, A.M. (2016) The striatum and decision-making based on value. In: *Micro-, Meso- and Macro-Dynamics of the Brain*, G. Buzsáki and Y. Christen, Eds. Cham: Springer, pp. 81-84.
312. Friedman, A., Slocum, J.F., Tyulmankov, D., Gibb, L.G., Altshuler, A., Raungwises, S., Shi, Q., Toro Arana, S.E., Beck, D.W., Sholes, J.E.C., and Graybiel, A.M. (2016) Analysis of complex neural circuits with non-linear multi-dimensional hidden state models. *Proc. Natl. Acad. Sci. U S A*, 113:6538-6543
313. Crittenden, J.R. and Graybiel, A.M. (2016) Disease-associated changes in the striosome and matrix compartments of the dorsal striatum. In: *Handbook of Basal Ganglia Structure and Function*, H. Steiner and K.Y. Tseng, Eds. Amsterdam: Elsevier, pp. 801-821.
314. Chen, Y.-C., Kuo, H.-Y., Bornschein, U., Takahashi, H., Chen, S.-Y., Lu, K.-M., Chen, G.-M., Lin, J.-R., Lee, Y.-H., Chou, Y.-C., Cheng, S.-J., Chien, C.-T., Enard, W., Hevers, W., Pääbo, S., Graybiel, A.M., and Liu, F.-C. (2016) Foxp2 controls synaptic wiring of corticostriatal circuits and vocal communication by opposing Mef2C. *Nat. Neurosci.*, 19:1513-1522.
315. Correia, S.S., Lee, A., McGrath, A.G., Graybiel, A.M., and Goosens, K.A. (2016) Amygdala-ventral striatum circuit activation decreases long-term fear. *eLife*, 5:e1266.
316. Crittenden, J.R., Tillberg, P.W., Riad, M.H., Shima, Y., Gerfen, C.R., Curry, J., Housman, D.E., Nelson, S.B., Boyden, E.S., and Graybiel, A.M. (2016) Striosome-dendron bouquets highlight a unique striatonigral circuit targeting dopamine-containing neurons. *Proc. Natl. Acad. Sci. U S A*, 113:11318-11323.
317. Schwerdt, H.N., Kim, M., Karasan, E., Amemori, S., Homma, D., Shimazu, H., Yoshida, T., Langer, R., Graybiel, A.M., and Cima, M.J. (2017) Subcellular electrode arrays for multisite recording of dopamine in vivo. IEEE International Conference on Micro Electro Mechanical Systems (MEMS), Las Vegas, NV, January 22 – 26.
318. Nakamura, T., Nagata, M., Yagi, T., Graybiel, A.M., Yamamori, T., and Kitsukawa, T. (2017) Learning new sequential stepping patterns requires striatal plasticity during the earliest phase of acquisition. *Eur. J. Neurosci.*, 45:901-911.
319. Schwerdt, H.N., Kim, M.J., Amemori, S., Homma, D., Yoshida, T., Shimazu, H., Yerramreddy, H., Karasan, E., Langer, R., Graybiel, A.M., and Cima, M.J. (2017) Subcellular probes for neurochemical recording from multiple brain sites. *Lab Chip*, 17:1104-1115.
320. Crittenden, J.R., Lacey, C.J., Weng, F.-J., Garrison, C.E., Gibson, D.J., Lin, X., and Graybiel, A.M. (2017) Striatal cholinergic interneurons modulate spike-timing in striosomes and matrix by an amphetamine-sensitive mechanism. *Front. Neuroanat.*, 11:20.
321. Yamanaka, K., Hori, Y., Minamimoto, T., Yamada, H., Matsumoto, N., Enomoto, K., Aosaki, T., Graybiel, A.M., and Kimura, M. (2018) Roles of centromedian parafascicular nuclei of thalamus and cholinergic interneurons in the dorsal striatum in associative learning of environmental events. *J. Neural. Transm.*, 125:501-513.
322. Spencer, K.C., Sy, J.C., Rhamadi, K., Graybiel, A.M., Langer, R., and Cima, M.J. (2017) Characterization of mechanically matched hydrogel coatings to improve the biocompatibility of neural implants. *Sci. Rep.*, 7:1952.
323. Niemz, J., Kliche, S., Pils, M.C., Morrison, E., Manns, A., Freund, C., Crittenden, J.R., Graybiel, A.M., Galla, M., Jänsch, L., and Huehn, J. (2017) The guanine-nucleotide exchange factor CalDAG GEF1 fine-tunes functional properties of regulatory T cells. *J. Eur. Microbiol. Immunol.*, 2:112-126.
324. Friedman, A., Homma, D., Bloem, B., Gibb, L.G., Amemori, K., Hu, D., Delcasso, S., Truong, T.F., Yang, J., Hood, A.S., Mikofalvy, K.A., Beck, D.W., Nguyen, N., Nelson, E.D., Toro Arana, S.E., Vorder Bruegge, R.H., Goosens, K.A., and Graybiel, A.M. (2017) Chronic stress alters striosome-circuit dynamics, leading to aberrant decision-making. *Cell*, 171:1191-1205. (*Cell Previews*)
325. Schwerdt, H.N., Shimazu, H., Amemori, K.-I., Amemori, S., Tierney, P.L., Gibson, D.J., Hong, S., Yoshida, T., Langer, R., Cima, M.J., and Graybiel, A.M. (2017) Long-term dopamine neurochemical monitoring in primates. *Proc. Natl. Acad. Sci. U S A*, 114:13260-13265.
326. Bloem, B., Huda, R., Sur, M., and Graybiel, A.M. (2017) Two-photon imaging in mice shows striosomes and matrix have overlapping but differential reinforcement-related responses. *eLife*, 6:e32353.
327. Kaji, R., Bhatia, K.P., and Graybiel, A.M. (2018) Pathogenesis of dystonia: is it of cerebellar or basal ganglia origin? *J. Neurol. Neurosurg. Psychiatry*, 89:488-492.

328. Dagdeviren, C., Ramadi, K.B., Joe, P., Spencer, K., Schwerdt, H.N., Shimazu, H., Delcasso, S., Amemori, K.I., Nunez-Lopez, C., Graybiel, A.M., Cima, M.J., and Langer, R. (2018) Miniaturized neural system for chronic, local intracerebral drug delivery. *Sci. Transl. Med.*, 10:eaa2742.
329. Davis, M.I., Crittenden, J.R., Feng, A.Y., Kupferschmidt, D.A., Naydenov, A., Stella, N., Graybiel, A.M., and Lovinger, D.M. (2018) The cannabinoid-1 receptor is abundantly expressed in striatal striosomes and striosome-dendron bouquets of the substantia nigra. *PLoS ONE*, 13:e0191436.
330. Martiros, N., Burgess, A.A., and Graybiel, A.M. (2018) Inversely active striatal projection neurons and interneurons selectively delimit useful behavioral sequences. *Curr. Biol.*, 28:560-573.
331. Kelly, S.M., Raudales, R., He, M., Lee, J.H., Kim, Y., Gibb, L.G., Wu, P., Matho, K., Osten, P., Graybiel, A.M., and Huang, Z.J. (2018) Radial glial lineage progression and differential intermediate progenitor amplification underlie striatal compartments and circuit organization. *Neuron*, 99:345-361.
332. Delcasso, S., Denagamage, S., Britton, Z., and Graybiel, A.M. (2018) HOPE: hybrid-drive combining optogenetics, pharmacology and electrophysiology. *Front. Neural Circuits*, 12:41.
333. Ramadi, K., Dagdeviren, C., Spencer, K.C., Joe, P., Cotler, M., Rousseau, E., Nunez-Lopez, C., Graybiel, A.M., Langer, R., and Cima, M.J. (2018) Focal, remote-controlled, chronic chemical modulation of brain microstructures. *Proc. Natl. Acad. Sci. U S A*, 115:7254-7259.
334. Amemori, K., Amemori, S., Gibson, D.J., and Graybiel, A.M. (2018) Striatal microstimulation induces persistent and repetitive negative decision-making predicted by striatal beta-band oscillation. *Neuron*, 99:829-841.
335. Schwerdt, H.N., Zhang, E., Kim, M.J., Yoshida, T., Stanwicks, L., Amemori, S., Dagdeviren, H. E., Langer, R., Cima, M.J., and Graybiel, A.M. (2018) Cellular-scale probes enable stable chronic subsecond monitoring of dopamine neurochemicals in a rodent model. *Commun. Biol.*, 1:144.
336. Hong, S., Amemori, S., Chung, E., Gibson, D.J., Amemori, K., and Graybiel, A.M. (2018) Predominant striatal input to the lateral habenula in macaques comes from striosomes. *Curr. Biol.*, 29:51-61.
337. Cotler, M.J., Rousseau, E.B., Ramadi, K.B., Fang, J., Graybiel, A.M., Langer, R., and Cima, M.J. (2019) Steerable microinvasive probes for localized drug delivery to deep tissue. *Small*, 15:e1901459.
338. Amemori, S., Amemori, K.-I., Yoshida, T., Papageorgiou, G.K., Shimazu, H., Desimone, R., and Graybiel, A.M. (2020) Microstimulation of primate neocortex targeting striosomes induces negative decision-making. *Euro. J. Neurosci.*, 51:731-741. (Cover)
339. Ironside, M., Amemori, K., McGrath, C.L., Pedersen, M.L., Kang, M.S., Amemori, S., Frank, M.J., Graybiel, A.M., and Pizzagalli, D.A. (2020) Approach-avoidance conflict in major depression: Congruent neural findings in human and non-human primates. *Biol. Psychiatry*, 87:399-408.
340. Capponi, S., Stöffler, N., Irimia, M., Van Schaik, F.M.A., Ondik, M.M., Biniossek, M.L., Lehmann, L., Mitschke, J., Vermunt, M.W., Creyghton, M.P., Graybiel, A.M., Reinheckel, T., Schilling, O., Blencowe, B.J., Crittenden, J.R., and Timmers, H.Th.M. (2020) Neuronal-specific microexon splicing of *TAF1* mRNA is directly regulated by SRRM4/nSR100. *RNA Biol.*, 17:62-74.
341. Amemori, K., Amemori, S., Gibson, D.J., and Graybiel, A.M. (2020) Striatal beta oscillation and neuronal activity in the primate caudate nucleus differentially represent valence and arousal under approach-avoidance conflict. *Front. Neurosci.*, 14:89.
342. Ramadi, K.B., Bashyam, A., Frangieh, C.J., Rousseau, E.B., Cotler, M.J., Langer, R., Graybiel, A.M., and Cima, M.J. (2020) Computationally guided intracerebral drug delivery via chronically implanted microdevices. *Cell Rep.*, 31, 107734.
343. Matsushima, A. and Graybiel, A.M. (2020) Combinatorial developmental controls on striatonigral circuits. *Cell Rep.*, 31:107778.
344. Ramadi, K.B., Dagdeviren, C., Bhagchandani, P., Nunez Lopez, C., Kim, M.J., Langer, R., Graybiel, A.M., and Cima, M.J. (2020) Simultaneous recording and marking of brain microstructures. *J. Neural Eng.*, 17:044001.
345. Raman, R., Rousseau, E.B., Wade, M., Tong, A., Cotler, M.J., Kuang, J., Aponte Lugo, A., Zhang, E., Graybiel, A.M., White, F.M., Langer, R., and Cima, M.J. (2020) Platform for micro-invasive membrane-free biochemical sampling of brain interstitial fluid. *Sci. Adv.*, 6:eabb0657.

346. Schwerdt, H.N., Amemori, K., Gibson, D.J., Stanwicks, L.L., Yoshida, T., Bichot, N.P., Amemori, S., Desimone, R., Langer, R., Cima, M.J., and Graybiel, A.M. (2020) Dopamine and beta-band oscillations differentially link to striatal value and motor control. *Sci. Adv.*, 6:eabb9226.
347. Friedman, A., Hueske, E., Drammis, S.M., Toro Arana, S.E., Nelson, E.D., Carter, C.W., Delcasso, S., Rodriguez, R.X., Lutwak, H., DiMarco, K.S., Zhang, Q., Rakocevic, L.I., Hu, D., Xiong, J.K., Zhao, J., Gibb, L.G., Yoshida, T., Siciliano, C.A., Diefenbach, T.J., Ramakrishnan, C., Deisseroth, K., and Graybiel, A.M. (2020) Striosomes mediate value-based learning vulnerable in age and Huntington's model. *Cell*, 183:918-934.
348. Schlossmacher, M.G. and Graybiel, A.M. (2020) Conversations with Dr. Oleh Hornykiewicz, founding father of the dopamine era in Parkinson's: How do you wish to be remembered? *Mov. Disord.*, 35:1922-1932.
349. Morigaki, R., Lee, J.H., Yoshida, T., Wüthrich, C., Hu, D., Crittenden, J.R., Friedman, A., Kubota, Y., and Graybiel, A.M. (2020) Spatiotemporal up-regulation of mu opioid receptor 1 in striatum of mouse model of Huntington's disease differentially affecting caudal and striosomal regions. *Front. Neuroanat.*, 14:608060.
350. Graybiel, A.M. and Matsushima, A. (2020) The ups and downs of the striatum: dopamine biases upstate balance of striosomes and matrix. *Neuron*, 108:1013-1015.
351. Crittenden, J.R., Gipson, T.A., Smith, A.C., Bowden, H.A., Yildirim, F., Fischer, K.B., Yim, M., Housman, D.E., and Graybiel, A.M. (2021) Striatal transcriptome changes linked to drug-induced repetitive behaviors. *Euro. J. Neurosci.*, 53:2450-2468.
352. Pedersen, M.L., Ironside, M., Amemori, K.-I., McGrath, C.L., Kang, M.S., Graybiel, A.M., Pizzagalli, D.A., and Frank, M.J. (2021) Computational phenotyping of brain-behavior dynamics underlying approach-avoidance conflict in major depressive disorder. *PLoS Comput. Biol.*, 17:e1008955.
353. Amemori, S., Graybiel, A.M., and Amemori, K.-I. (2021) Causal evidence for induction of pessimistic decision-making in primates by the network of frontal cortex and striosomes. *Front. Neurosci.*, 15:649167.
354. Rolle, C.E., Pedersen, M.L., Johnson, N., Amemori, K., Ironside, M., Graybiel, A.M., Pizzagalli, D.A., and Etkin, A. (2021) The role of the dorsal-lateral prefrontal cortex in reward sensitivity during approach-avoidance conflict. *Cereb. Cortex*, 32:1269-1285.
355. Crittenden, J.R., Zhai, S., Sauvage, M., Kitsukawa, T., Burguiere, E., Thomsen, M., Zhang, H., Costa, C., Martella, G., Ghiglieri, V., Picconi, B., Pescatore, K.A., Unterwald, E.M., Jackson, W.S., Housman, D.E., Caine, S.B., Sulzer, D., Calabresi, P., Smith, A.C., Surmeier, D.J., and Graybiel, A.M. (2021) CalDAG-GEFI mediates striatal cholinergic modulation of dendritic excitability, synaptic plasticity and psychomotor behaviors. *Neurobiol. Dis.*, 158:105473.
356. Thomsen, M., Crittenden, J.R., Lindsley, C.W., and Graybiel, A.M. (2022) Effects of acute and repeated administration of the selective M₄ PAM VU0152099 on cocaine versus food choice in male rats. *Addict. Biol.*, 27:e13145.
357. Bloem, B., Huda, R., Amemori, K., Abate, A.S., Krishna, G., Wilson, A.L., Carter, C.W., Sur, M., and Graybiel, A.M. (2022) Multiplexed action-outcome encoding by striatal striosome-matrix compartments detected with a novel mouse cost-benefit foraging task. *Nat. Commun.*, 13:1541.
358. Crittenden, J.R., Yoshida, T.M., Venu, S., Mahar, A., and Graybiel, A.M. (2022) Cannabinoid receptor 1 is required for neurodevelopment of striosome-dendron bouquets. *eNeuro*, 9:ENEURO.0318-21.2022.
359. Matsushima, A., Pineda, S.S., Crittenden, J.R., Lee, H., Galani, K., Mantero, J., Tombaugh, G., Kellis, M., Heiman, M., and Graybiel, A.M. (2023) Transcriptional vulnerabilities of striatal neurons in human and rodent models of Huntington's disease. *Nat. Commun.*, 14:282.
360. Graybiel, A.M. and Matsushima, A. (2023) Striosomes and matrisomes: scaffolds for dynamic coupling of volition and action. *Annu. Rev. Neurosci.*, 46:359-380.
361. Kuo, H.-Y., Chen, S.-Y., Huang, R.-C., Takahashi, H., Wu, C.-E., Pang, H.-Y., Lee, Y.-H., Enard, W., Pääbo, S., Graybiel, A.M., and Liu, F.-C. (2023) Speech- and language-linked *FOXP2* mutation targets protein motors in striatal neurons. *Brain*, 146:3541-3557.
362. Arasaratnam, C.J., Song, J.J., Yoshida, T., Curtis, M.A., Graybiel, A.M., Faull, R.L.M., and Waldvogel, H.J. (2023) DARPP-32 cells and neuropil define striosomal system and isolated matrix cells in human striatum. *J. Comp. Neurol.*, 531:888-920.

363. Hirokane, K., Nakamura, T., Kubota, Y., Hu, D., Yagi, T., Graybiel, A.M., and Kitsukawa, T. (2023) Emergence of rhythmic chunking in complex stepping of mice. *iScience*, 26:106765.
364. Xia, M., Agca, B.N., Yoshida, T., Choi, J., Amjad, U., Bose, K., Keren, N., Zukerman, S., Cima, M.J., Graybiel, A.M., and Schwerdt, H.N. (2023) Scalable, flexible carbon fiber electrode thread arrays for three-dimensional probing of neurochemical activity in deep brain structures of rodents. *Biosens. Bioelectron.*, 241:115625.
365. Kim, M.J., Gibson, D.J., Hu, D., Mahar, A., Schofield, C.J., Sompolpong, P., Yoshida, T., Tran, K.T., and Graybiel, A.M. (2023) Dopamine release plateau and outcome signals in dorsal striatum contrast with classic reinforcement learning formulations. *bioRxiv*, 2023.08.15.553421.
366. Hirokane, K., Nakamura, T., Terashita, T., Kubota, Y., Hu, D., Yagi, T., Graybiel, A.M., and Kitsukawa, T. (2023) Rhythm receptive fields in striatum of mice executing complex continuous movement sequences. *bioRxiv*, 2023.09.23.559115.
367. Amjad, U., Choi, J., Murray, R., Gibson, D.J., Graybiel, A.M., and Schwerdt, H. (2023) Synchronous measurements of extracellular action potentials and neurochemical activity with carbon fiber electrodes in nonhuman primates. *bioRxiv*, 2023.12.23.573130.
368. Amemori, S., Graybiel, A.M., and Amemori, K. (2024) Cingulate microstimulation induces negative decision-making via reduced top-down influence on primate fronto-cingulo-striatal network. *Nat. Commun.*, 15:4201.
369. Hirokane, K., Nakamura, T., Terashita, T., Kubota, Y., Hu, D., Yagi, T., Graybiel, A.M., and Kitsukawa, T. (2024) Representation of rhythmic chunking in striatum of mice executing complex continuous movement sequences. *Cell Rep.*, 43:114312.
370. Hueske, E., Stine, C., Yoshida, T., Crittenden, J.R., Gupta, A., Johnson, J.C., Achanta, A.S., Loftus, J., Mahar, A., Hu, D., Azocar, J., Gray, R.J., Bruchas, M.R., and Graybiel, A.M. (2024) Developmental and adult striatal patterning of nociceptin ligand marks striosomal population with direct dopamine projections. *bioRxiv*, 2024.05.15.594426.
371. Lazaridis, I., Crittenden, J.R., Ahn, G., Hirokane, K., Yoshida, T., Mahar, A., Skara, V., Meletis, K., Parvataneni, K., Ting, J.T., Hueske, E., Matsushima, A., and Graybiel, A.M. (2024) Striosomes target nigral dopamine-containing neurons via direct-D1 and indirect-D2 pathways paralleling classic direct-indirect basal ganglia systems. *bioRxiv*, 2024.06.01.596922.
372. Amjad, U., Choi, J., Murray, R., Gibson, D.J., Graybiel, A.M., and Schwerdt, H. (2024) Synchronous measurements of extracellular action potentials and neurochemical activity with carbon fiber electrodes in nonhuman primates. *eNeuro*, 11:ENEURO.0001-24.2024.
373. Lazaridis, I., Crittenden, J.R., Ahn, G., Hirokane, K., Wickersham, I.R., Yoshida, T., Mahar, A., Skara, V., Loftus, J.H., Parvataneni, K., Meletis, K., Ting, J.T., Hueske, E., Matsushima, A., and Graybiel, A.M. (2024) Striosomes control dopamine via dual pathways paralleling canonical basal ganglia circuits. *Curr. Biol.*, 34:5263–5283.
374. Kim, M.J., Gibson, D.J., Hu, D., Mahar, A., Schofield, C.J., Sompolpong, P., Yoshida, T., Tran, K.T., and Graybiel, A.M. (2024) Dopamine release plateau and outcome signals in dorsal striatum contrast with classic reinforcement learning formulations. *Nat. Commun.*, 15:8856.
375. Liu, Q., Huang, B., Guiberson, N.G.L., Chen, S., Zhu, D., Ma, G., Ma, X.-M., Crittenden, J.R., Yu, J., Graybiel, A.M., Dawson, T.M., Dawson, V.L., and Xiong, Y. (2024) CalDAG-GEFI acts as a guanine nucleotide exchange factor for LRRK2 to regulate LRRK2 function and neurodegeneration. *Sci. Adv.*, 10:eadn5417.
376. Hueske, E., Stine, C., Yoshida, T., Crittenden, J.R., Gupta, A., Johnson, J.C., Achanta, A.S., Bhagavatula, S., Loftus, J.H., Mahar, A., Hu, D., Azocar, J., Gray, R.J., Bruchas, M.R., and Graybiel, A.M. (2024) Developmental and adult striatal patterning of nociceptin ligand marks striosomal population with direct dopamine projections. *J. Comp. Neurol.*, 532:e70003.
377. Morigaki, R., Yoshida, T., Fujikawa, J., Crittenden, J.R., and Graybiel, A.M. (2025) Molecular unbalances between striosome and matrix compartments characterize the pathogenesis of Huntington's disease model mouse. *bioRxiv*, 2025.07.20.665815.
378. Graybiel, A.M. (2025) Surprises from the basal ganglia: stop and go have new meaning. *Mov. Disord.*, 40:2077-2082.
379. Morigaki, R., Yoshida, T., Fujikawa, J., Crittenden, J.R., and Graybiel, A.M. (2025) Molecular imbalances between striosome and matrix compartments characterize the pathogenesis of Huntington's disease model mouse. *Int. J. Mol. Sci.*, 26:8573.

380. Zhai, S., Cui, Q., Wokosin, D., Sun, L., Tkatch, T., Crittenden, J.R., Graybiel, A., and Surmeier, D.J. (2025) State-dependent modulation of spiny projection neurons controls levodopa-induced dyskinesia in a mouse model of Parkinson's disease. *Sci. Adv.*, 11:eadv8224.
381. Szymula, K.P., Brynildsen, J.K., Fotiadis, P., Kim, J.Z., Pasqualetti, F., Graybiel, A.M., Desrochers, T.M., and Bassett, D.S. (2025) Habit learning is associated with efficiently controlled network dynamics in naive macaque monkeys. *npj Complex.*, In press.
382. Lazaridis, I., Ahn, G., Hirokane, K., Choi, W., and Graybiel, A.M. (2025) Striatal astrocytes influence dopamine dynamics and behavioral state transitions. In revision.
383. Papageorgiou, G.K., Gibson, D.J., Amemori, K., Schwerdt, H.N., Naim, M., Wang, M.C., Yoshida, T., Sharma, J., Upadhyay, U., Yang, G.R., and Graybiel, A.M. (2025) Functional distinctions between orbitofrontal cortex and anterior cingulate cortex subregions in decision-making and autonomic regulation. *Nat. Commun.* In revision.
384. Tan, A.Y.S., Arasaratnam, C.J., Thai, N.S.S.S., Penney, E.B., Acuña-Sunshine, G., Diesta, C.C.E., Ang, M.C., Muñoz, E., Fernandez-Cerado, C., Cleofas, V., Legarda, G.P., Velasco, S., Sy, M.A., Turner, C.P., Graybiel, A.M., Dragunow, M., Curtis, M.A., Waldvogel, H.J., Faull, R.L.M., and Singh-Bains, M.K. (2025) Regional and compartmental changes drive progressive patterns of striatal degeneration in X-linked dystonia parkinsonism. *Ann. Neurol.* In revision.
385. Pizzagalli, D.A., Treadway, M.T., Kangas, B.D., Romoli, B., Breton, J., Bruchas, M.R., Graybiel, A.M., Hueske, E., Prakash, N., Der-Avakian, A., Berretta, S., Bath, K.G., and Dulcis, D. (2025) Nociceptin orphanin F/Q pathways are dysregulated by stress and modulate reward learning and motivation across species. *Biol. Psychiatry.* In review.

Abstracts:

1. Graybiel, A.M. (1970) The cortical projection of the pulvinar-posterior complex of the thalamus in the cat. *Anat. Rec.*, 166:309.
2. Graybiel, A.M. and Nauta, W.J.H. (1971) Some projections of superior colliculus and visual cortex upon the posterior thalamus of the cat. *Anat. Rec.*, 169:328.
3. Graybiel, A.M., Nauta, H.J.W., Lasek, R.J. and Nauta, W.J.H. (1973) Experimental anatomical evidence for a cerebello-olivary pathway in the cat. *Anat. Rec.*, 175:332.
4. Graybiel, A.M. (1974) Some afferent connections of the oculomotor cortex in the cat. *Soc. Neurosci. Abstr.*
5. Graybiel, A.M. (1974) Some efferents of the pretectal region in the cat. *Anat. Rec.*, 178:365.
6. Graybiel, A.M. and Sciascia, T.R. (1975) Origin and distribution of nigrotectal fibers in the cat. *Soc. Neurosci. Abstr.*, 1:174.
7. Kaiserman-Abramof, I.R., Graybiel, A.M. and Nauta, W.J.H. (1975) Neural connections of area 17 in an anophthalmic mouse strain. *Soc. Neurosci. Abstr.*, 1:102.
8. Graybiel, A.M. (1976) Evidence for a lateral-tegmental projection to the superficial collicular layers and to paramedian midbrain regions in the cat. *Anat. Rec.*, 184:416.
9. Langer, T., Sherk, H. and Graybiel, A.M. (1977) The pathway from the cat's superior colliculus to the parabigeminal nucleus: A study of its cells of origin. *Soc. Neurosci. Abstr.*, 3:566.
10. Graybiel, A.M. and Ragsdale, C.W., Jr. (1978) Striosomal organization of the caudate nucleus: I. Acetylcholinesterase histochemistry of the striatum in the cat, rhesus monkey and human being. *Soc. Neurosci. Abstr.*, 4:44.
11. Edley, S.M., Graybiel, A.M. and Ragsdale, C.W., Jr. (1978) Striosomal organization of the caudate nucleus: II. Evidence that neurons in the striatum are grouped in highly branched mosaics. *Soc. Neurosci. Abstr.*, 4:47.
12. Berson, D.M. and Graybiel, A.M. (1978) Thalamo-cortical projections and histochemical identification of subdivisions of the LP-pulvinar complex in the cat. *Soc. Neurosci. Abstr.*, 4:620.
13. Graybiel, A.M. (1978) Connections of the basal ganglia: a general survey. Development and Chemical Specificity of Neurons, Schatzalp/Davos, Switzerland, 11-15 September, 1978.
14. Ragsdale, C.W., Jr. and Graybiel, A.M. (1979) Acetylcholinesterase staining in the striatum of the fetal and neonatal cat. *Neurosci. Lett.* (Suppl. 3), S26.
15. Graybiel, A.M., Berson, D.M., Langer, T.P. and Colby, C.L. (1979) A pretectal projection to the dorsal lateral geniculate complex in the cat. *Soc. Neurosci. Abstr.*, 5:787.
16. Ragsdale, C.W., Jr. and Graybiel, A.M. (1979) Striosomal organization of the caudate nucleus: III. Distribution of afferents from the frontal cortex of the cat. *Soc. Neurosci. Abstr.*, 5:79.
17. Langer, T.P., Kaneko, C.R.S. and Graybiel, A.M. (1979) Efferent projections of the pontine oculomotor pauser region in the cat. *Soc. Neurosci. Abstr.*, 55:374.
18. Moon Edley, S. and Graybiel, A.M. (1980) Connections of the nucleus tegmenti pedunculopontinis, pars compacta (TPc) in cat. *Anat. Rec.*, 196:129A.
19. Graybiel, A.M., Ragsdale, C.W., Jr., Yoneoka, E.S. and Elde, R.P. (1980) Opioid peptides, substance P and somatostatin in the striatum: An immunohistochemical study in the cat and kitten. *Soc. Neurosci. Abstr.*, 6:342.
20. Olson, C.R. and Graybiel, A.M. (1980) Sensory regions of the cat's claustrum: An anatomical and physiological study. *Soc. Neurosci. Abstr.*, 6:123.
21. Graybiel, A.M., Ahmad-Mirza, R. and Elde, R.P. (1981) Somatostatin-like immunoreactivity characterizes neurons of the nucleus reticularis thalami in the cat. *Anat. Rec.*, 199:99A.
22. Graybiel, A.M., Pickel, V.M., Joh, T.H., Reis, D.J. and Elde, R.P. (1981) Discontinuous distribution of tyrosine hydroxylase immunoreactivity in the striatum of the fetal and neonatal cat and its relation to compartments of acetylcholinesterase staining and met-enkephalin immunoreactivity. *Neurosci. Lett.* (Suppl. 7), S476.
23. Graybiel, A.M. (1981) Organization of the afferent and efferent connections of the striatum in relation to histochemically distinct compartments. 8th International Society for Neurochemistry, Nottingham, U.K.

24. Graybiel, A.M. and Ragsdale, C.W., Jr. (1981) Dopamine islands and acetylcholinesterase patches are coextensive in the striatum of the fetal cat. *Soc. Neurosci. Abstr.*, 7:849.
25. Olson, C.R. and Graybiel, A.M. (1981) A visual area in the anterior ectosylvian sulcus of the cat. *Soc. Neurosci. Abstr.*, 7:831.
26. Berson, D.M. and Graybiel, A.M. (1981) Subsystems within the visual association cortex as delineated by their thalamic and transcortical affiliations. International Neurobiology Society, 9th meeting, Abbaye de Fontevraud, France, 1-4 September, 1981.
27. Graybiel, A.M. (1981) The architecture of the striatum: Striosomal compartments. International Neurobiology Society, 9th meeting, Abbaye de Fontevraud, France, 1-4 September, 1981.
28. Olson, C.R. and Graybiel, A.M. (1981) An outlying cortical area in the cat. International Neurobiology Society, 9th meeting, Abbaye de Fontevraud, France, 1-4 September, 1981.
29. Oertel, W., Graybiel, A.M., Mugnaini, E., Elde, R., Schmechel, D. and Kopin, I. (1981) Coexistence of glutamate decarboxylase immunoreactivity and somatostatin-like immunoreactivity in neurons of nucleus reticularis thalami of the cat. *Soc. Neurosci. Abstr.*, 7:223.
30. Roffler-Tarlov, S. and Graybiel, A.M. (1982) Bands of acetylcholinesterase (AChE) in cerebellum of normal and mutant mice. American Soc. for Neurochemistry, March, 1982.
31. Chesselet, M.-F., Reisine, T.D., Glowinski, J. and Graybiel, A.M. (1982) Striatal somatostatin: immunohistochemistry and effects on dopaminergic transmission. *Soc. Neurosci. Abstr.*, 8:287.
32. Graybiel, A.M. and Ragsdale, C.W. (1982) Histochemical subdivisions of the macaque's lateral geniculate body and striate cortex: Demonstration by pseudocholinesterase and acetylcholinesterase staining and effects of eye enucleation. *Soc. Neurosci. Abstr.*, 8:705.
33. Illing, R.-B. and Graybiel, A.M. (1982) Pseudocholinesterase and acetylcholinesterase staining in cat and monkey retina. *Soc. Neurosci. Abstr.*, 8:133.
34. Brown, B.L. and Graybiel, A.M. (1983) Zonal organization in the cerebellar vermis of the cat. *Anat. Rec.*, 205:25A.
35. Chesselet, M.-F. and Graybiel, A.M. (1983) Non-matching distributions of enkephalin-like and dynorphin-like immunoreactivity in the basal ganglia of the cat. Internatl. Narcotic Research Conference, Garmisch, Rep. Fed. Germany, June, 1983.
36. Roffler-Tarlov, S. and Graybiel, A.M. (1983) Weaver mutation has differential effects on the dopamine innervation of the limbic and non-limbic striatum. *Soc. Neurosci. Abstr.*, 9:661.
37. Graybiel, A.M., Chesselet, M.-F., Wu, J.-Y., Eckenstein, F. and Joh, T.E. (1983) The relation of striosomes in the caudate nucleus of the cat to the organization of early-developing dopaminergic fibers, GAD-positive neuropil, and CAT-positive neurons. *Soc. Neurosci. Abstr.*, 9:14.
38. Lynch, J.C. and Graybiel, A.M. (1983) Comparison of afferents traced to the superior colliculus from the frontal eye fields and from two sub-regions of area 7 of the rhesus monkey. *Soc. Neurosci. Abstr.*, 9.
39. Ragsdale, C.W., Jr. and Graybiel, A.M. (1983) Butyrylcholinesterase in the dorsal and ventral striatum: Observations of histochemical distributions in adult, fetal and neonatal cats. *Soc. Neurosci. Abstr.*, 9:15.
40. Nastuk, M.A. and Graybiel, A.M. (1983) The distribution of muscarinic binding sites in the feline striatum and its relationship to other histochemical staining patterns. *Soc. Neurosci. Abstr.*, 9:15.
41. Chesselet, M.-F. and Graybiel, A.M. (1983) Subdivisions of the pallidum and the substantia nigra demonstrated by immunohistochemistry. *Soc. Neurosci. Abstr.*, 9:16.
42. Brown, B.L. and Graybiel, A.M. (1983) Development of the acetylcholinesterase band pattern in cat cerebellum. *Soc. Neurosci. Abstr.*, 9:1091.
43. Illing, R.-B. and Graybiel, A.M. (1983) Organisation and interrelationships of frontal, nigral and bulbospinal afferents to the superior colliculus and periaqueductal gray matter in the cat. *Soc. Neurosci. Abstr.*, 9:750.
44. Graybiel, A.M. and Chesselet, M.-F. (1984) Distribution of cell bodies expressing substance P, enkephalin and dynorphin B in kitten and cat striatum. *Anat. Rec.*, 208:64A.

45. Graybiel, A.M. and Chesselet, M.-F. (1984) Striatal cell bodies expressing dynorphin B-like (DYN) and met-enkephalin-like (ENK) immunoreactivities have complementary distributions in kittens and contrasting distributions in cats. *Soc. Neurosci. Abstr.*, 10:514.
46. Chesselet, M.-F. and Graybiel, A.M. (1984) Intrastratial connections: a fluorescent tracer and immunohistochemical study. *Soc. Neurosci. Abstr.*, 10:515.
47. Malach, R. and Graybiel, A.M. (1984) Organization of somatosensory corticostriatal projections. *Soc. Neurosci. Abstr.*, 10:513.
48. Ragsdale, C.W. and Graybiel, A.M. (1984) Further observations on the striosomal organization of frontostriatal projections in cats and monkeys. *Soc. Neurosci. Abstr.*, 10:514.
49. Roffler-Tarlov, S. and Graybiel, A.M. (1984) The dopamine-containing innervation of the caudoputamen is present at birth in the weaver mutant and forms islands, but fails to develop normally. *Soc. Neurosci. Abstr.*, 10:705.
50. Graybiel, A.M. (1984) Neuropeptides in the basal ganglia. Annual meeting of Association for Research in Nervous and Mental Diseases. *Arch. Neurol.*, 41:1221.
51. Graybiel, A.M. (1985) Special Lecture: Neurochemical specializations in the basal ganglia: the old motor system in a new light. *Soc. Neurosci. Abstr.*, 11:306.
52. Nastuk, M.A. and Graybiel, A.M. (1985) Differential distribution of M1 and M2 muscarinic binding sites in the striatum of the adult and immature cat. *Soc. Neurosci. Abstr.*, 11:204.
53. Graybiel, A.M. and Newman-Gage, H. (1985) The developmental relationship between dopamine islands and early striosomal neuron clusters in the fetal cat striatum. *Soc. Neurosci. Abstr.*, 11:205.
54. Jimenez-Castellanos, J. and Graybiel, A.M. (1985) The dopamine-containing innervation of striosomes: Nigral subsystems and their striatal correspondents. *Soc. Neurosci. Abstr.*, 11:1249.
55. Roffler-Tarlov, S. and Graybiel, A.M. (1985) Dose-dependent expression of the weaver gene on the dopamine-containing innervation of the forebrain and effects outside of the striatum. *Soc. Neurosci. Abstr.*, 11:365.
56. Newman-Gage, H. and Graybiel, A.M. (1985) Developmental anatomy of dopamine islands in the caudate nucleus of the cat. *Soc. Neurosci. Abstr.*, 11:206.
57. Ragsdale, C.W. Jr. and Graybiel, A.M. (1985) Evidence in the cat that thalamostriatal fibers innervate striosome or matrix tissue according to their site of origin. *Soc. Neurosci. Abstr.*, 11:203.
58. Graybiel, A.M. and Chesselet, M.-F. (1985) Striosomal distribution of cell bodies containing opioid peptides: Immunohistochemical demonstration in the striatum of cats and primates. International Narcotic Research Conference, 1985.
59. Graybiel, A.M. (1985) The compartmental organization of the striatum. *Neurosci. Lett.* (Suppl 22), S409.
60. Graybiel, A.M. and Ragsdale, C.W. Jr. (1985) Patterns of expression of butyrylcholinesterase activity in the developing and mature brain. *Neurosci. Lett.* (Suppl 22), S244.
61. Graybiel, A.M., Baughman, R.W., Eckenstein, F. (1986) The cholinergic neuropil of the striatum: Immunohistochemical evidence for striosomal organization in primate and cat. 2nd International Basal Ganglia Society Symposium, University of Victoria, British Columbia, 21-23 July, 1986.
62. Nastuk, M.A. and Graybiel, A.M. (1986) Autoradiography of M1 and M2 muscarinic binding in the striatum. *Trends in Pharmacol. Sci. Suppl.*, 92-93.
63. Newman-Gage, H., Graybiel, A.M. and Matthew, W.D. (1986) Immunoreactivity of synaptic vesicle protein in the striatum: Ontogenetic progression from islandic to diffuse distribution. 2nd International Basal Ganglia Society Symposium, University of Victoria, British Columbia, 21-23 July, 1986.
64. Besson, M.-J., Graybiel, A.M., and Quinn, B. (1986) Coexistence of dynorphin B-like and substance P-like immunoreactivity in striatal neurons in the cat. *Soc. Neurosci. Abstr.*, 12:876.
65. Newman-Gage, H. and Graybiel, A.M. (1986) Synapse-related antibody immunostaining in the developing cat striatum: A light and electron microscopic study. *Soc. Neurosci. Abstr.*, 12:1326.
66. Jimenez-Castellanos, J. and Graybiel, A.M. (1986) Innervations of striosomes and extrastriosomal matrix by different subdivisions of the midbrain A8-A9-A10 dopamine-containing cell complex. *Soc. Neurosci. Abstr.*, 12:1327.

67. Roffler-Tarlov, S., and Graybiel, A.M. (1986) Effects of the weaver gene on the islandic and diffuse dopamine-containing innervations of the striatum: A biochemical and anatomical study. *Soc. Neurosci. Abstr.*, 12:1327.
68. Feigenbaum, L.A., Graybiel, A.M., Vonsattel, J.P., Richardson, E.P. and Bird, E.D. (1986) Striosomal markers in the striatum in Huntington's Disease. *Soc. Neurosci. Abstr.*, 12:1328.
69. Graybiel, A.M. (1986) Neurotransmitters in the basal ganglia: Chemoarchitecture of the striatum in health and disease. 10th International Congress of Neuropathology, Stockholm, 88.
70. Besson, M.-J., Nastuk, M. and Graybiel, A.M. (1987) Autoradiographic localization of D1 dopamine receptors with 3H-SCH 23390 in cat and monkey basal ganglia. Sixth International Catecholamine Symposium, 115.
71. Hirsch, E., Graybiel, A.M., and Javoy-Agid, F. (1987) Differences in tyrosine hydroxylase like immunoreactivity characterize the mesostriatal innervation of striosomes and extra-striosomal matrix at maturity. Sixth International Catecholamine Symposium, Jerusalem, 14-19 June, 1987.
72. Graybiel, A.M., Dunnett, S.B., Baughman, R.W. and Liu, F.-C. (1987) Cholinergic neurons and neuropil and tyrosine hydroxylase-positive fibers cluster together in circumscribed patches in intrastriatal grafts derived from embryonic striatal donor tissue. 2nd World Congress of Neurosci.
73. Roffler-Tarlov, S., Pugatch, D. and Graybiel, A.M. (1987) Early effects of the weaver gene on the dopamine-containing innervation of the dorsal striatum. Sixth International Congress of Pharmacology.
74. Graybiel, A.M. (1987) Functional neuroanatomy and neurochemistry of the basal ganglia. 2nd World Congress of Neurosci.
75. Graybiel, A.M., Weber, E., Besson, M.-J. and Karuzis, K. (1987) Haloperidol-sensitive sigma receptors in the substantia nigra pars compacta: Autoradiographic evidence for specific anatomical localization of [3H]DTG binding sites. *Soc. Neurosci. Abstr.*, 13:28.
76. Jimenez-Castellanos, J. and Graybiel, A.M. (1987) Neurochemical compartmentalization of the substantia nigra pars compacta in the primate. *Soc. Neurosci. Abstr.*, 13:27.
77. Roffler-Tarlov, S., Graybiel, A.M., Martin, B. and Kauer, J. (1987) The mesencephalic dopamine-containing neurons in the weaver mouse. *Soc. Neurosci. Abstr.*, 13:1599.
78. Roffler-Tarlov, S. and Graybiel, A.M. (1987) The development of the mesostriatal dopamine-containing systems is affected by the mutant gene weaver. Dopamine 87: Dopamine Systems and their Regulation. Satellite to IUPHAR Congress of Pharmacology.
79. Graybiel, A.M., Ohta, K. and Roffler-Tarlov, S. (1988) Toward a genetic analysis of the striosomal system: patterns of nigrostriatal loss in the mutant mouse weaver. *Soc. Neurosci. Abstr.*, 14:1066.
80. Hirsch, E.C., Graybiel, A.M. and Agid, Y.A. (1988) Selective vulnerability of mesencephalic neuromelanin-pigmented neurons in Parkinson's disease. *Soc. Neurosci. Abstr.*, 14:8.
81. Liu, F.-C., Graybiel, A.M. and Dunnett, S.B. (1988) Modular organization of fetal striatal grafts. *Soc. Neurosci. Abstr.*, 14:763.
82. Gimenez-Amaya, J.M. and Graybiel, A.M. (1988) Compartmental origins of the striatopallidal projection in the primate. *Soc. Neurosci. Abstr.*, 14:156.
83. Walker, R.H., Graybiel, A.M., Baughman, R.W. and Arbuthnott, G.W. (1988) A novel method for targeting neurons in a lightly fixed striatal slice preparation. *Soc. Neurosci. Abstr.*, 14:1066.
84. Roffler-Tarlov, S. and Graybiel, A.M. (1988) Regional effects of the weaver gene on presynaptic dopamine uptake sites in striatum. *Soc. Neurosci. Abstr.*, 14:1066.
85. Feigenbaum, L.A. and Graybiel, A.M. (1988) Heterogeneous striatal afferent connections from distinct regions of the dopamine-containing midbrain of the primate. *Soc. Neurosci. Abstr.*, 14:156.
86. Besson, M.-J., Graybiel, A.M. and Quinn, B. (1988) Patterns of coexistence of neuropeptides and glutamic acid decarboxylase in neurons of the feline striatum. *Soc. Neurosci. Abstr.*, 14:156.
87. Graybiel, A.M. (1988) The dopaminergic-cholinergic balance in extrapyramidal disorders: A new view of the chemical neuroanatomy. Neural Mechanisms in Disorders of Movement, Manchester, 12-14 April, 1988.

88. Hirsch, E.C., Graybiel, A.M., Javoy-Agid, F., Cervera, P., Hauw, J.J., Duyckaerts, C. and Agid, Y. (1988) Distribution of seven different neuropeptides in human substantia nigra of control and parkinsonian brains. 9th International Symposium of Parkinson's Disease.
89. Hirsch, E.C., Graybiel, A.M., Agid, Y. (1988) Selective vulnerability of the neuromelanin-pigmented subpopulation of dopamine- containing mesencephalic neurons in Parkinson's disease. 9th International Symposium on Parkinson's disease.
90. Graybiel, A.M. (1988) The dopaminergic-cholinergic balance in the basal ganglia: A new view of the chemical neuroanatomy. 9th International Symposium on Parkinson's Disease.
91. Graybiel, A.M., Newman-Gage, H., Nastuk, M.A., Ragsdale, Jr., C.W. and Liu, F.-C. (1988) Development of opiate patches in relation to striatal maturation. Seventh Meeting of the International Society for Developmental Neuroscience.
92. Giménez-Amaya, J.-M. and Graybiel, A.M. (1989) Two types of compartmental ordering of striatopallidal projection neurons in the primate. International Basal Ganglia Society, Third Triennial Meeting.
93. Graybiel, A.M., Flaherty, A.W. and Langer, L.F. (1989) Afferent-fiber mosaics in the primate striatum. International Basal Ganglia Society, Third Triennial Meeting.
94. Liu, F.-C., Graybiel, A.M. and Dunnett, S.B. (1989) Fetal striatal grafting: potentials and limitations as a neuronal replacement therapy. IIIrd International Symposium on Neural Transplantation, Churchill College, Cambridge, U.K., 6-11 August 1989.
95. Gimenez-Amaya, J.-M. and Graybiel, A.M. (1989) Evidence that the extra-striosomal matrix of the primate striatum contains a mosaic of neuronal cell-clusters preferentially projecting to the external and to the internal pallidum. *Soc. Neurosci. Abstr.*, 15:909.
96. Roffler-Tarlov, S., Koeleveld, R., Kaniucki, M., Graybiel, A.M. and Bohn, M. (1989) Adrenal medulla implants in the caudoputamen of the mutant mouse weaver. *Soc. Neurosci. Abstr.*, 15:909.
97. Liu, F.-C., Graybiel, A.M., Emson, P.C. and Gerfen, C. (1989) Developmental expression of calbindin-28KD in striatum of postnatal rats. *Soc. Neurosci. Abstr.*, 15:909.
98. Flaherty, A.W., Graybiel, A.M., Sur, M. and Garraghty, P. (1989) Distinctive patterns of projections to striatum from physiologically mapped somatosensory representations in primate cortex. *Soc. Neurosci. Abstr.*, 15:909.
99. Langer, L.F. and Graybiel, A.M. (1989) The nigrostriatal pathway in the primate. Symposium: Role of the Forebrain in Sensation and Behavior.
100. Graybiel, A.M., Langer, L.F., Jimenez-Castellanos, J., Nastuk, M., Besson, M.-J. Hirsch, E., Agid, Y., Roffler-Tarlov, S., Ohta, K., Quinn, B., Langston, W., Dunnett, S.B., and Liu, F.-C. (1989) Properties of the dopamine-containing mesostriatal projection. Alzheimer's and Parkinson's Diseases: Basic Therapeutic Strategies, Second International Conference, Kyoto, Japan, 8-10 November, 1989.
101. Ohta, K. Graybiel, A.M., Roffler-Tarlov, S., and Yoshida, M. (1989) Dopamine D₁ binding sites in the striatum of the weaver mutant mouse. Alzheimer's and Parkinson's Diseases: Basic Therapeutic Strategies, Second International Conference, Kyoto, Japan, 8-10 November, 1989.
102. Quinn, B. and Graybiel, A.M. (1989) A novel procedure for fontana silver impregnation and immunohistochemistry on single tissue sections. United States and Canadian Academy of Pathology, Washington, DC, 25-27 April, 1990.
103. Quinn, B., Graybiel, A.M., Moratalla, R., and Langston, J.W. (1990) Patterns of depletion of mesostriatal innervation in squirrel monkeys exposed to MPTP. International Congress of Movement Disorders.
104. Ma, T., Graybiel, A.M., and Wurtz, R.H. (1990) Distribution of saccade-related neurons in the macaque superior colliculus. Forum in Cellular and Organ Biology.
105. Graybiel, A.M., Moratalla, R., Robertson, H.A., and Peterson, M.R. (1990) Cocaine and amphetamine induce the immediate-early gene *c-fos* in striosome and matrix compartments of the striatum. *Soc. Neurosci. Abstr.*, 16:1232.
106. Quinn, B., Graybiel, A.M., Winsky, L. and Jacobowitz, D.M. (1990) Immunostaining for protein 10 calcium-binding protein forms striosome-related patchwork in the rat. *Soc. Neurosci. Abstr.*, 16:1228.
107. Flaherty, A.M. and Graybiel, A.M. (1990) Proprioception and the striatum: primate somatosensory cortical area 3A projects more broadly to the striatum than do areas 3B or 1. *Soc. Neurosci. Abstr.*, 16:1231.

108. Parthasarathy, H.B., Schall, J.D., and Graybiel, A.M. (1990) Dual-tracer comparison of the corticostriatal projections of the frontal eye field and the supplementary eye field in the primate. *Soc. Neurosci. Abstr.*, 16:1231.
109. Moratalla, R., Robertson, H.A., DiZio, P.A. and Graybiel, A.M. (1990) Parallel induction of *jun* B and *c-fos* evoked in the striatum by the psychomotor stimulant drugs cocaine and amphetamine. *Soc. Neurosci. Abstr.*, 16:953.
110. Liu, F.-C., Graybiel, A.M., and Dunnett, S.B. (1990) Autoradiographic study of fetal striatal grafts placed in host striatum pulse-labeled with [³H]-thymidine. *Soc. Neurosci. Abstr.*, 16:1286.
111. Roffler-Tarlov, S., Graybiel, A.M., and Martin, B. (1990) Genetic perturbation of dendrite formation. *Soc. Neurosci. Abstr.*, 16:932.
112. Paul, M.L., Graybiel, A.M., and Robertson, H.A. (1990) Synergistic activation of the immediate-early gene *c-fos* in striosomes by D1- and D2-selective dopamine agonists. *Soc. Neurosci. Abstr.*, 16:954.
113. Robertson, H.A., Graybiel, A.M., and Paul, M.L. (1990) Activation of rat striatal *c-Fos* by indirect infusion of dopaminergic agonists and forskolin. *Soc. Neurosci. Abstr.*, 16:1232.
114. Liu, F.-C., Graybiel, A.M. and Dunnett, S.B. (1990) Selective hypertrophy of calbindin D_{28K}-positive neurons in embryonic cortical primordium transplants. Massachusetts Alzheimer's Disease Research Center, Fifth Annual Scientific Poster Session, Massachusetts General Hospital, Boston, MA, 9 November, 1990.
115. Quinn, B. and Graybiel, A. M. (1991) Characterization of an enhanced one-bath gold chloride impregnation for neural fibers in human brain. Abstr. submitted to American Neuropath Conference in Baltimore.
116. Berretta, S., Robertson, H.A. and Graybiel, A.M. (1991) Immediate-early gene expression induced by the psychostimulant cocaine is specific to subpopulations of striatal projection neurons. *Eur. J. Neurosci.*, Suppl.4:166.
117. Moratalla, R., Robertson, H.A. and Graybiel, A.M. (1991) The immediate-early gene NGFI-A (*zif268*, *egr1*) is selectively induced in the striosomal system following acute amphetamine treatment. *Eur. J. Neurosci.*, Suppl.4:274.
118. Robertson, H.A., Paul, M.L. David, J.-C., Murphy, K.M., Peterson, M.R. and Graybiel, A.M. (1991) Synergistic activation of the immediate-early gene *c-fos* in striosomes and dorsolateral caudoputamen by D1- and D2-selective dopamine agonists. *Eur. J. Neurosci.*, Suppl.4:153.
119. Paul, M.L., Graybiel, A.M. and Robertson, H.A. (1991) Priming of the D1 dopamine receptor can be dissociated from intrastriatal activation of the immediate-early gene *c-FOS*. *Eur. J. Neurosci.*, Suppl.4:10.
120. Paul, M.L., Graybiel, A.M., Peterson, M.R., and Robertson, H.A. (1991) Priming of a D1-like dopamine receptor and intrastriatal activation of immediate-early genes. *Soc. Neurosci. Abstr.*, 17:853.
121. Berretta, S., Christie, R., Robertson, H.A. and Graybiel, A.M. (1991) Molecular characteristics of striatal neurons that express Fos on stimulation by indirect dopamine agonists. *Soc. Neurosci. Abstr.*, 17:853.
122. Flaherty, A.W. and Graybiel, A.M. (1991) A second input system for body representations in the primate striatal matrix. *Soc. Neurosci. Abstr.*, 17:1299.
123. Hiroi, N., Robertson, H.A. and Graybiel, A.M. (1991) Fos is induced by the antipsychotic drug clozapine in the rat striatum. *Soc. Neurosci. Abstr.*, 17:685.
124. Liu, F.-C., Dunnett, S.B. and Graybiel, A.M. (1991) The influence of TH-containing afferents on the development of modular organization in embryonic striatal grafts. *Soc. Neurosci. Abstr.*, 17:853.
125. Moratalla, R., Robertson, H.A. and Graybiel, A.M. (1991) NGFI-A mRNA expression is induced in the rat striatum by indirect dopamine agonists. *Soc. Neurosci. Abstr.*, 17:853.
126. Schoen, S.W. and Graybiel, A.M. (1991) 5'-nucleotidase: a new enzymatic marker for striosomal organization in the rat caudoputamen. *Soc. Neurosci. Abstr.*, 17:452.
127. Walker, R.H., Arbuthnott, G.W. and Graybiel, A.M. (1991) Intracellular labelling of medium spiny neurons in the primate caudate nucleus: anatomical relationship of dendrites to striosomal borders. *Soc. Neurosci. Abstr.*, 17:456.
128. Fotuhi, M., Dawson, T.M., Sharp, A.H., Martin, L.J., Graybiel, A.M. and Snyder, S.H. (1991) The phosphoinositide second messenger system is enriched in striosomes of the primate striatum. *Soc. Neurosci. Abstr.*, 17:854.
129. Quinn, B. and Graybiel, A.M. (1991) Fiber architectonics of the striosome-matrix organization of primate caudate-putamen. *Soc. Neurosci. Abstr.*, 17:452.
130. Roffler-Tarlov, S. and Graybiel, A.M. (1991) Genetics effects on dopamine uptake sites in the striatum. *Soc. Neurosci. Abstr.*, 17:1289.

131. Hirsch, E.C., Mouatt, A., Graybiel, A.M., Thomasset, M., Javoy-Agid, F. and Agid, Y. (1991) 28kd Calcium binding protein in midbrain catecholaminergic neurons from control subjects and patients with Parkinson's disease. *Soc. Neurosci. Abstr.*, 17:1289.
132. Hirsch, E.C., Mouatt, A., Graybiel, A.M., Thomasset, M., Javoy-Agid, F. and Agid, Y. (1991) Does calcium binding protein play a protective role for midbrain catecholaminergic neurons in Parkinson's disease? 10th International Symp. on Parkinson's Disease, Japan.
133. Graybiel, A.M. (1991) Gene regulation and neurochemical specialization of the basal ganglia. ACNP Abstract.
134. Johnson, K.K., Blay, J., Graybiel, A.M. and Robertson, H.A. (1991) D-amphetamine and cocaine induce c-fos in the striatum of neonatal and immature rats. *Can. Fed. Biol. Sci. Abstr.*
135. Schoen, S.W., and Graybiel, A.M. (1992) 5'-nucleotidase activity in the developing rodent caudoputamen identifies dopamine islands and striosomes in rat, but extrastriosomal matrix in mouse. ENA Abstr.
136. Graybiel, A.M., Moratalla, R., Berretta, S., Hiroi, N., Fusco, E., Brashers-Krug, T., Paul, M.L., Johnson, K., David, J.-C., Vickers, E., Robertson, H.A., and Cochran, B.H. (1992) A New look at the dopamine-containing innervation of striosomes. Seventh International Catecholamine Symposium Abstr., Amsterdam, 22-26 June 1992.
137. Aosaki, A., Ishida, A., Watanabe, K., Imai, H., Graybiel, A.M. and Kimura, K. (1992) Effects of dopaminergic agents on the tonically active neurons of the striatum in hemi-parkinsonian monkeys. *Soc. Neurosci. Abstr.*, 18:693.
138. Berretta, S., Milbrandt, J., Evan, G. and Graybiel, A.M. (1992) The glutamate agonist quinolinic acid regulates the expression of *NGFI-A*-like immunoreactivity in striatal neurons. *Soc. Neurosci. Abstr.*, 18:1043.
139. Eblen, F.M. and Graybiel, A.M. (1992) Striosome/matrix affiliations of prefronto-striatal projections in the monkey. *Soc. Neurosci. Abstr.*, 18:309.
140. Flaherty, A.W. and Graybiel, A.M. (1992) Input-output modularity of motor and somatosensory processing in the primate basal ganglia. *Soc. Neurosci. Abstr.*, 18:309.
141. Fusco, E. and Graybiel, A.M. (1992) Cocaine exposure through the maternal circulation selectively increases fos-like immunoreactivity in cells of dopamine islands/striosomes of embryonic striatum. *Soc. Neurosci. Abstr.*, 18:1203.
142. Liu, F.-C., Dunnett, S.B., and Graybiel, A.M. (1992) Hypertrophy of calbindin-D_{28K}-positive and parvalbumin-positive cells in intrastriatal cortical grafts. *Soc. Neurosci. Abstr.*, 18:1121.
143. Hiroi, N. and Graybiel, A.M. (1992) Effects of chronic clozapine treatment on induction of Fos-like proteins in the striatum. *Soc. Neurosci. Abstr.*, 18:1043.
144. Moratalla, R. and Graybiel, A.M. (1992) Opposite effects of reserpine pretreatment on amphetamine-induced and cocaine-induced expression of *zif268* and *c-fos* mRNAs in rat striatum and cortex. *Soc. Neurosci. Abstr.*, 18:1203.
145. Schoen, S.W., and Graybiel, A.M. (1992) 5'-nucleotidase activity in the developing caudoputamen: association with dopamine islands and striosomes in rat, but extrastriosomal matrix in mouse. *Soc. Neurosci. Abstr.*, 18:1205.
146. Quinn, B, Toga, A.W., and Graybiel, A.M. (1992) Myeloarchitectonics and the striosome-matrix structure of the caudate-putamen. IVth IBAGS Abst.
147. Hiroi, N. and Graybiel, A.M. (1992) Differential effects of clozapine and metoclopramide on induction of fos-like proteins in the rat striatum. International Basal Ganglia Society, Giens, France, 6-9 October, 1992.
148. Graybiel, A.M., Berretta, S., Moratalla, R., Hiroi, N., Brashers-Krug, T., Fusco, E., Johnson K., Vickers, E., Cochran, B., and Robertson, H.A. (1992) Psychomotor stimulants induce rapid and specific changes in gene expression in the striatum. EBPS Abstract.
149. Aosaki, T., Kimura, K., and Graybiel, A.M. (1992) Physiologically identified tonically active neurons of primate striatum lie in the matrix compartment. IVth International Basal Ganglia Society, Giens, France, 6-9 October, 1992.
150. Berretta, S., Robertson, H.A., and Graybiel, A.M. (1992) Dopamine and glutamate agonists induce Fos-like protein in an overlapping subpopulation of DARPP-32-positive but enkephalin-negative striatal neurons. IVth International Basal Ganglia Society, Giens, France, 6-9 October, 1992.
151. Moratalla, R., Quinn, B., DeLanney, L.E., Irwin, I., Langston, J.W. and Graybiel, A.M. (1992) MPTP produces differential nigrostriatal degeneration in the striosome-matrix and caudate-putamen subdivisions of the primate's striatum. IV International Basal Ganglia Society, Giens, France, 6-9 October, 1992.

152. Flaherty, A.W., and Graybiel, A.M. (1992) Multiple stages of sensorimotor processing in the primate basal ganglia. IVth International Basal Ganglia Society, Giens, France, 6-9 October, 1992.
153. Hiroi, N. and Graybiel, A.M. (1993) Atypical and typical neuroleptics differentially activate Fos family members in striatal neurons. *Eur. J. Neurosci.*, Suppl 6:263.
154. Moratalla, R. and Graybiel, A.M. (1993) Reserpine sensitizes striatal IEG induction by amphetamine but not by cocaine. *Eur. J. Neurosci.*, Suppl 6:263.
155. Fusco, E. and Graybiel, A.M. (1993) Selective striosomal expression of NGFI-A in developing forebrain. *Eur. J. Neurosci.*, Suppl 6:263.
156. Aosaki T., Tsubokawa H., Watanabe K., Graybiel A.M., and Kimura M. (1993) Tonicly active neurons in the primate striatum acquire responses to sensory stimuli during behavioral conditioning. *Soc. Neurosci. Abstr.*, 19:1585.
157. Berretta S. and Graybiel A.M. (1993) Rapid phosphorylation of CREB-like proteins in striatum occurs in response to amphetamine. *Soc. Neurosci. Abstr.*, 19:129.
158. Brashers-Krug T. and Graybiel A.M. (1993) Dopamine-rich striosomes in the sensorimotor striatum. *Soc. Neurosci. Abstr.*, 19:782.
159. Eblen F. and Graybiel A.M. (1993) Highly restricted inputs to striosomes from prefrontal cortex in the macaque monkey. *Soc. Neurosci. Abstr.*, 19:1435.
160. Hiroi N. and Graybiel A.M. (1993) Typical and atypical neuroleptics stimulate contrasting patterns of neuropeptide and Fos/FRA expression in the striatum. *Soc. Neurosci. Abstr.*, 19:129.
161. Holt D.J., Graybiel A.M., and Saper C.B. (1993) Organization of chemical compartmentalization in the human striatum. *Soc. Neurosci. Abstr.*, 19:1435.
162. Kimura M., Aosaki T., and Graybiel A.M. (1993) Differential localization of tonically active neurons of primate striatum in the matrix and striosome/matrix boundaries. *Soc. Neurosci. Abstr.*, 19:1585.
163. Liu F.-C., Takahashi H., McKay R.D.G., and Graybiel A.M. (1993) Dopaminergic regulation of gene expression in striatal slice culture. *Soc. Neurosci. Abstr.*, 19:132.
164. Moratalla R. and Graybiel A.M. (1993) Reserpine potentiates striatal IEG response to amphetamine through D1-like receptor activation. *Soc. Neurosci. Abstr.*, 19:129.
165. Schultz, J.G., Nitsch, R.M., Farber, S.A., Graybiel, A.M., Growdon, J.H., and Wurtman, R.J. (1993) Release of Amyloid β -Protein Precursor Derivatives from various Brain Regions is Stimulated by Electrical Polarization. *Soc. Neurosci. Abstr.*, 19:1037.
166. Graybiel, A.M. and A.W. Flaherty (1993) Templates for conditional sensory-motor association learning. Symposium on Functional Linkages between Cerebral Cortex and Basal Ganglia in the Control of Voluntary Movement, Osaka, Japan.
167. Damier, P., Hirsch, E.C., Agid, Y. and Graybiel, A.M. (1994) Compartmental patterns of calbindin D_{28K} immunoreactivity as a template for assessing dopaminergic neuronal loss in Parkinson's disease brains. 11th Int'l Symposium on Parkinson's Disease, Rome, 26-30 March, 1994.
168. Graybiel, A.M. (1994) Dynamic regulation of transcription factors in the basal ganglia. XIXth CINP Congress, Washington, DC.
169. Berretta, S., H.B. Parthasarathy, and Graybiel, A.M. (1994) Differential induction of immediate-early genes (IEGs) by cortical activation in striatal neuronal subpopulations. *Soc. Neurosci. Abstr.*, 20:987.
170. Damier, P., Hirsch, E.C., Agid, Y., and Graybiel, A.M. (1994) A novel method for assessing dopaminergic neuronal loss in Parkinson's disease. *Soc. Neurosci. Abstr.*, 20:1780.
171. Elibol, B., Moratalla, R., Hiroi, N. and Graybiel, A.M. (1994) Low vs. high dose and acute vs. subchronic haloperidol treatment induces distinct patterns of immediate-early gene expression in the striatum. *Soc. Neurosci. Abstr.*, 20:990.
172. Fusco, E., Milbrandt, J.D., Iadarola, M. J., and Graybiel, A.M. (1994) Prenatal delineation of the striosomal system by selective transcription factor expression. *Soc. Neurosci. Abstr.*, 20:1697.
173. Gardier, A.M., Moratalla, R., and Graybiel, A.M. (1994) Effects of 5-HT_{1A/1B} and D₁ receptor antagonists on the induction of striatal jun B and fos-like immunoreactivity by dexfenfluramine. *Soc. Neurosci. Abstr.*, 20:1190.

174. Hiroi, N., Xu, M., Moratalla, R., Tonegawa, S., and Graybiel, A.M. (1994) Absence of dynorphin-immunoreactive striosomes in the caudoputamen of mice mutant for the dopamine D1 receptor. *Soc. Neurosci. Abstr.*, 20:786.
175. Holt, D., Graybiel, A.M., Hyde, T.M., Herman, M.M., Kleinman, J.E., German, D.C., and Saper, C.B. (1994) Decreased density of cholinergic interneurons in the striatum of schizophrenics. *Soc. Neurosci. Abstr.*, 20:784.
176. Liu, F.-C. and Graybiel, A.M. (1994) Dopamine receptors and calcium channel activation regulate phosphorylation of CREB in organotypic cultures of striatum. *Soc. Neurosci. Abstr.*, 20:990.
177. Moratalla, R., Elibol, B., and Graybiel, A.M. (1994) Acute and chronic psychomotor stimulants induce different sets of immediate-early genes in the striatum. *Soc. Neurosci. Abstr.*, 20:990.
178. Parthasarathy, H.B., Berretta, S., and Graybiel, A.M. (1994) Cortical stimulation induces selective patterns of Jun B expression in the striatum. *Soc. Neurosci. Abstr.*, 20:987.
179. Xu, M., Gold, L.H., Graybiel, A.M., Hiroi, N., Hu, X.T., Koob, G., Moratalla, R., White, F.J., and Tonegawa, S. (1994) Analysis of dopamine receptor one (D1) deficient mice. *Soc. Neurosci. Abstr.*, 20:643.
180. Graybiel, A.M., Aosaki, T., and Kimura, M. (1994) Effects of dopamine depletion on neural activity in the primate striatum. Dopamine '94 Quebec City.
181. Graybiel, A.M. (1994) Dopamine and dynamic neural processing in the basal ganglia. 11th Int. Symposium on Parkinson's Disease, Rome, 26-30 March, 1994.
182. Graybiel, A.M. (1994) Dynamic neural processing in the basal ganglia. American Neuropsychiatric Association, Newport, RI, 22 July, 1994.
183. Graybiel, A.M., Damier, P., Agid, Y. and Hirsch, E.C. (1994) Une nouvelle méthode pour analyser la perte des neurones dopaminergiques au cours de la maladie de Parkinson. Annual Meeting of the French Society of Neuroscience.
184. Fusco, E. and Graybiel, A. M. (1995) Temporal and spatial regulation of transcription factor expression in the developing striatum. *Soc. Neurosci. Abstr.*, 21:1043.
185. Moratalla, R., Xu, M., Tonegawa, S. and Graybiel, A. M. (1995) Cocaine and amphetamine fail to induce c-Fos- and Jun B-like proteins in the striatum of dopamine D1 receptor mutant mice. *Soc. Neurosci. Abstr.*, 21:1905.
186. Liu, F.-C. and Graybiel, A. M. (1995) Differential regulation of CREB phosphorylation by calcineurin in developing striosomes and matrix of organotypic striatal cultures. *Soc. Neurosci. Abstr.*, 21:1424.
187. Xu, M., Caine, S.B., Cooper, D.C., Gold, L.H., Graybiel, A.M., Hu, X.T., Koeltzow, T., Koob, G.F., Moratalla, R., White, F.J. and Tonegawa, S. (1995) Analyses of dopamine D3 and D1 receptor mutant mice. *Soc. Neurosci. Abstr.*, 21:363.
188. Damier, P., Hirsch, E.C., Agid, Y. and Graybiel, A.M. (1995) Pattern of cell loss in the substantia nigra in Parkinson's disease. *Soc. Neurosci. Abstr.*, 21:1250.
189. Connolly, C., Kimura, M. and Graybiel, A.M. (1995) The coordination of degrees of freedom in the striatum. International Basal Ganglia Society, May 1995.
190. Liu, F.-C. And Graybiel, A.M. (1995) Regulation of CREB-like protein expression by protein phosphorylates in striatal slice cultures. International Basal Ganglia Society, May 1995.
191. Graybiel, A.M. (1995) The basal ganglia and adaptive control of behavioral routines. Israel, June 1995.
192. Graybiel, A.M. (1995) To move or not to move: the basal ganglia and adaptive control of behavioral routines. IBRO.
193. Barragan, E.I., Fusco, E. and Graybiel, A.M. (1996) Prenatal striatal development in organotypic slice cultures. *Soc. Neurosci. Abstr.*, 22:989.
194. Berretta, S., Sachs, Z. and Graybiel, A.M. (1996) Blockade of dopamine receptors amplifies cortical activation on induction of immediate-early genes in the striatum. *Soc. Neurosci. Abstr.*, 22:1089.
195. Brown, L.L., Goldbloom, L.M., Smith, D.M., Feldman, S.M. and Graybiel, A.M. (1996) Patchy domains of metabolic activity in the striatal matrix compartment. *Soc. Neurosci. Abstr.*, 22:1087.
196. Damier, P., Agid, Y., Graybiel, A.M. And Hirsch, A.C. (1996) Role of astroglial environment in selectivity of dopaminergic lesion in Parkinson's disease. *Soc. Neurosci. Abstr.*, 22:219.
197. Fusco, E. and Graybiel, A.M. (1996) Developmental changes in basal ganglia responsiveness to amphetamine and cocaine. *Soc. Neurosci. Abstr.*, 22:410.

198. Graybiel, A.M., Parthasarathy, H.B., Flaherty, A.W. and Beretta, S. (1996) Cortically-driven immediate-early gene expression in striatal neurons shows selectivity for enkephalinergic neurons of the rat and monkey striatum. *Soc. Neurosci. Abstr.*, 22:410.
199. Hillegaart, V., Beretta, S. and Graybiel, A.M. (1996) Effects of chronic cocaine exposure on corticostriatal transmission in the rat. *Soc. Neurosci. Abstr.*, 22:410.
200. Jog, M., Connolly, C., Hillegaart, V., Wilson, M. and Graybiel, A.M. (1996) Ensemble recordings from striatum of freely-behaving rats. *Soc. Neurosci. Abstr.*, 22:1086.
201. Liu, F.-C. and Graybiel, A.M. (1996) Phosphatase control of dynorphin expression in organotypic cultures of developing striatum. *Soc. Neurosci. Abstr.*, 22:892.
202. Moratalla, R., Elibol, B., Vallejo, M. and Graybiel, A.M. (1996) Circuit-level changes in bZip gene expression induced in the striatum during chronic cocaine treatment and withdrawal. *Soc. Neurosci. Abstr.*, 22:410.
203. Watanabe, K., Matsumoto, N., Graybiel, A.M. and Kimura, M. (1996) The nigrostriatal dopamine system influences activity of tonically active striatal neurons through D2-class dopamine receptors. *Soc. Neurosci. Abstr.*, 22:1085.
204. Beretta, S., Sachs, Z. and Graybiel, A.M. (1997) Blockade of striatal, but not cortical, D2-class dopamine receptors increases cortically-driven Fos induction in the striatum. *Soc. Neurosci. Abstr.*, 23:193.
205. Jog, M.S., Kubota, Y., Connolly, C., Iyengar, D. and Graybiel, A.M. (1997) Behavior-related ensemble activity of neurons in rat striatum. *Soc. Neurosci. Abstr.*, 23:464.
206. Liu, F.-C. and Graybiel, A.M. (1997) Dopamine D1-class receptor mediated prolonged phosphorylation of CREB in the developing olfactory tubercle. *Soc. Neurosci. Abstr.*
207. Matsumoto, N., Minamimoto, T., Graybiel, A.M. and Kimura, M. (1997) Expression of behaviorally conditioned responses of tonically active striatal neurons depends on thalamic input from the CM-Pf complex. *Soc. Neurosci. Abstr.*, 23:464.
208. Liu, F.-C. and Graybiel, A.M. (1997) Prolonged phosphorylation of CREB in the ventral striatum mediated by dopamine D1-class receptors. *Soc. Neurosci. Abstr.*, 23:1282.
209. Fusco, E. and Graybiel, A.M. (1997) Dopaminergic and glutamatergic regulation distinguishes inducible and constitutive pools of immediate-early gene proteins during striatal development. *Soc. Neurosci. Abstr.*, 23:1284.
210. Moratalla, R., Fusco, E., Xu, M., Tonegawa, S. and Graybiel, A.M. (1997) Striosomes, but not normal dynorphin-positive patches, are present in neonatal D1 receptor knockout mice. *Soc. Neurosci. Abstr.*, 23:1284.
211. Goldbloom, L.M., Brown, L.L., Smith, D.M. and Graybiel, A.M. (1997) The regional distribution of calbindin and its relationship to striosomes in the rat neostriatum. *Soc. Neurosci. Abstr.*, 23:1284.
212. Hillegaart, V., Ahlenius, S. and Graybiel, A.M. (1997) Treadmill locomotion induces c-Fos expression in psychomotor thalamic regions, as well as in regions of the hypothalamus related to regulation of adrenocortical stress hormones. *Soc. Neurosci. Abstr.*, 23:1320.
213. Kubota, Y., Jog, M.S., Connolly, C., Iyengar, D. and Graybiel, A.M. (1998) Dynamic properties of task-related activity recorded in the rat striatum during discriminative procedural learning in a T-maze. *Soc. Neurosci. Abstr.*, 24:181.
214. Canales, J.J. and Graybiel, A.M. (1998) Chronic and acute amphetamine induce specific patterns of Fos induction in striatum. *Soc. Neurosci. Abstr.*, 24:1846.
215. Liu, F.-C., Wang, H.-F., Wang, T.-W. and Graybiel, A.M. (1998) Regulation of DARPP-32 expression by retinoic acid in striatal cell cultures. *Soc. Neurosci. Abstr.* 24:414.
216. Hungs, M., Schoen, S.W., Azerbayjani, A.S., Noth, J., Graybiel, A.M. and Kreutzberg, G.W. (1998) Synaptic localization of 5'-nucleotidase activity in the striosomes and extrastriosomal matrix of adult rat caudoputamen. *Soc. Neurosci. Abstr.*, 24:664.
217. Jog, M.S., Connolly, C.I., Kubota, Y., Iyengar, D.I. and Graybiel, A.M. (1998) Methods of tetrode calibration, implantation, neuroimaging and analysis of multiunit recordings in striatum. *Soc. Neurosci. Abstr.*, 24:1652.
218. Kubota, Y. and Graybiel, A.M. (1998) Plasticity in task-related striatal activity in the rat during procedural learning. 6th Triennial Meeting, International Basal Ganglia Society, Brewster, MA, 15-18 October, 1998.

219. Canales, J.J. and Graybiel, A.M. (1998) Compartmental distribution of Fos in the striatum following acute and chronic amphetamine treatment. 6th Triennial Meeting, International Basal Ganglia Society Brewster, MA, 15-18 October, 1998.
220. Fujii, N., Kojima, J., Blazquez, P., and Graybiel, A.M. (1999) Learning-dependent modulation of neuronal activity in the macaque supplementary eye field. *Soc. Neurosci. Abstr.*, 25:368.
221. Toki, S., Kawasaki, H., Matsuda, M., Housman, D.E., and Graybiel, A.M. (1999) Colocalization of Rap1- and Ras-targeting CalDAG-GEFs in striatal neurons. *Soc. Neurosci. Abstr.*, 25:1695.
222. Kubota, Y., Jog, M.S., Connolly, C., and Graybiel, A.M. (1999) Cross-correlational analysis of neuronal activity in the rat striatum during T-maze procedural learning. *Soc. Neurosci. Abstr.*, 25:1384.
223. Blazquez, P., Kojima, J., Fujii, N., Courtemanche, R., and Graybiel, A.M. (2000) Aversive conditioning and habituation as well as reward conditioning modify the activity of tonically active neurons in the macaque striatum. Program No. 254.14. *2000 Neuroscience Meeting Planner*. New Orleans, LA: Society for Neuroscience, 2000. Online.
224. Kubota, Y., Hu, D., DeCoteau, W.E., Harlan, R., and Graybiel, A.M. (2000) Multi-neuronal activity in mouse striatum recorded chronically during T-maze learning. Program No. 254.13. *2000 Neuroscience Meeting Planner*. New Orleans, LA: Society for Neuroscience, 2000. Online.
225. Kawasaki, H., Toki, S., Matsuda, M., Tashiro, N., Housman, D.E., and Graybiel, A.M. (2000) Expression of Rap1-targeting cAMP-GEFI and cAMP-GEFII in rat brain. Program No. 724.1. *2000 Neuroscience Meeting Planner*. New Orleans, LA: Society for Neuroscience, 2000. Online.
226. DeCoteau, W.E., Hu, D., Kubota, Y., and Graybiel, A.M. (2000) Striatal lesions impair performance of a T-maze procedural learning task in rats. Program No. 254.19. *2000 Neuroscience Meeting Planner*. New Orleans, LA: Society for Neuroscience, 2000. Online.
227. Fujii, N., Blazquez, P., and Graybiel, A.M. (2000) Performance of repetitive tasks induces modulation of neuronal activity in the supplementary eye field and striatum in macaque monkey. Program No. 360.1. *2000 Neuroscience Meeting Planner*. New Orleans, LA: Society for Neuroscience, 2000. Online.
228. Fujii, N. and Graybiel, A.M. (2001) Contrasting neuronal activity during sequential oculomotor behavior between lateral prefrontal cortex and frontal eye field. Program No. 729.16. *2001 Neuroscience Meeting Planner*. San Diego, CA: Society for Neuroscience, 2001. Online.
229. Hu, D., Kubota, Y., and Graybiel, A.M. (2001) Successive resculpting of task-related activity patterns in the striatum during action-sequence procedural learning, extinction and relearning. Program No. 514.9. *2001 Neuroscience Meeting Planner*. San Diego, CA: Society for Neuroscience, 2001. Online.
230. Brown, L.L. and Graybiel, A.M. (2001) Preferential activation of the striatal matrix compartment during natural walking. Program No. 68.2. *2001 Neuroscience Meeting Planner*. San Diego, CA: Society for Neuroscience, 2001. Online.
231. Blazquez, P.M., Fujii, N., DeCoteau, W.E., and Graybiel, A.M. (2001) Tonically active neurons in the primate striatum have responses that correlate with the probability of behavioral response in reward and aversive Pavlovian conditioning and habituation. Program No. 514.8. *2001 Neuroscience Meeting Planner*. San Diego, CA: Society for Neuroscience, 2001. Online.
232. Courtemanche, R., Fujii, N., and Graybiel, A.M. (2001) Local field potential oscillations in the awake macaque striatum. Program No. 67.3. *2001 Neuroscience Meeting Planner*. San Diego, CA: Society for Neuroscience, 2001. Online.
233. Saka, E., Harlan, P., Fitzgerald, D.J., Iadarola, M., and Graybiel, A.M. (2001) Ablation of cholinergic and somatostatinergic interneurons in the striatum by substance P-linked pseudomonas exotoxin (SP-PE35) leads to changes in striosome-matrix excitability. Program No. 826.17. *2001 Neuroscience Meeting Planner*. San Diego, CA: Society for Neuroscience, 2001. Online.
234. Djurfeldt, M., Kubota, Y., Hu, D., DeCoteau, W.E., and Graybiel, A.M. (2001) Changes in correlated activity in the rat sensorimotor striatum during learning of a T-maze task. Program No. 514.10. *2001 Neuroscience Meeting Planner*. San Diego, CA: Society for Neuroscience, 2001. Online.

235. Saka, E., Harlan, P., Madras, B., and Graybiel, A.M. (2002) Chronic cocaine exposure induced neuronal responses changes in primate caudate and putamen. Program No. 264.9. *2002 Neuroscience Meeting Planner*. Orlando, FL: Society for Neuroscience, 2002. Online.
236. Kubota, Y., DeCoteau, W.E., Liu, J., and Graybiel, A.M. (2002) Task-related activity in the medial striatum during performance of a conditional T-maze task. Program No. 765.7. *2002 Neuroscience Meeting Planner*. Orlando, FL: Society for Neuroscience, 2002. Online.
237. DeCoteau, W.E., Courtemanche, R., Kubota, Y., and Graybiel, A.M. (2002) Anti-phase theta-range oscillations in striatum and hippocampus recorded in rats during T-maze task performance. Program No. 765.6. *2002 Neuroscience Meeting Planner*. Orlando, FL: Society for Neuroscience, 2002. Online.
238. Mao, J.-B., Kubota, Y., Smith, A.C., Brown, E.N., and Graybiel, A.M. (2003) Development of signals predictive of behavioral outcome during procedural learning in the rat. Program No. 704.2. *2003 Neuroscience Meeting Planner*. New Orleans, LA: Society for Neuroscience, 2003. Online.
239. Courtemanche, R. Fujii, N., and Graybiel, A.M. (2003) Synchrony and focalization of striatal local field potential oscillations in macaque monkeys performing oculomotor saccade tasks. Program No. 390.8. *2003 Neuroscience Meeting Planner*. New Orleans, LA: Society for Neuroscience, 2003. Online.
240. Kubota, Y., Liu, J., DeCoteau, W.E., and Graybiel, A.M. (2003) Learning-related plasticity in the mouse striatum during successive training on two versions of procedural T-maze tasks. Program No. 704.1. *2003 Neuroscience Meeting Planner*. New Orleans, LA: Society for Neuroscience, 2003. Online.
241. Fujii, N. and Graybiel, A.M. (2003) Representation of action boundaries by neurons in the prefrontal cortex of the macaque monkey. Program No. 919.10. *2003 Neuroscience Meeting Planner*. New Orleans, LA: Society for Neuroscience, 2003. Online.
242. Madras, B.K., Goodrich, C.M., Topcuoglu, E.S., and Graybiel, A. (2003) Cocaine-induced behaviors in squirrel monkeys change with repeated exposure. Program No. 135.7. *2003 Neuroscience Meeting Planner*. New Orleans, LA: Society for Neuroscience, 2003. Online.
243. Smith, A.C., Frank, L.M., Wirth, S., Yanike, M., Hu, D., Kubota, Y., Graybiel, A.M., Suzuki, W.A., and Brown, E.N. (2003) Dynamic analysis of learning in behavioral experiments. Program No. 834.13. *2003 Neuroscience Meeting Planner*. New Orleans, LA: Society for Neuroscience, 2003. Online.
244. Graybiel, A.M. (2003) Learning and memory mechanisms of the basal ganglia: plasticity in cortico-basal ganglia loops. In: Instituto Juan March de Estudios e Investigaciones. Workshop on Neuronal Degeneration and Novel Therapeutic Approaches in Parkinson's Disease, p 18: Madrid: Ediciones Peninsular.
245. Graybiel, A.M., Courtemanche, R., DeCoteau, W., and Kubota, Y. (2004) Oscillations in LFP activity are prominent in the striatum of monkeys and rats and are subject to task-dependent modulations. IBAGS 8th Triennial Meeting, Crieff, Scotland, September 5-9, 2004.
246. DeCoteau, W.E., Mao, J., Gibson, D.J., Courtemanche, R., Kubota, Y., and Graybiel, A.M. (2004) Striatal theta-gamma local field potential oscillations coordinate with hippocampus rhythms in behaviorally selective patterns. Program No. 70.4. *2004 Neuroscience Meeting Planner*. San Diego, CA: Society for Neuroscience, 2004. Online.
247. Feingold, J., Fujii, N., and Graybiel, A.M. (2004) Monkeys use their eyes to plan an upcoming sequence of arm movements. Program No. 191.11. *2004 Neuroscience Meeting Planner*. San Diego, CA: Society for Neuroscience, 2004. Online.
248. Fujii, N. and Graybiel, A.M. (2004) Temporal co-modulation of local field potentials (LFPs) in the macaque caudate nucleus and prefrontal cortex. Program No. 186.3. *2004 Neuroscience Meeting Planner*. San Diego, CA: Society for Neuroscience, 2004. Online.
249. Kubota, Y., Liu, J., DeCoteau, W.E., and Graybiel, A.M. (2004) Sub-populations of mouse striatal neurons exhibit response plasticity during successive training on two procedural T-maze tasks. Program No. 70.5. *2004 Neuroscience Meeting Planner*. San Diego, CA: Society for Neuroscience, 2004. Online.
250. Prerau, M.A., Kubota, Y., Graybiel, A., and Brown, E.N. (2004) Estimated learning from simultaneously recorded continuous and discrete measures of performance. Program No. 922.22. *2004 Neuroscience Meeting Planner*. San Diego, CA: Society for Neuroscience, 2004. Online.

251. Saka, E. and Graybiel, A.M. (2005) Striosome-dominant neuronal activity in dorsolateral striatum is correlated with the severity of dyskinesias in a rat model of parkinsonism. 9th International Congress of Parkinson's Disease & Movement Disorders, New Orleans, LA, March 8-9, 2005.
252. Plotkin, J., Cepeda, C., Andre, V.M., Wu, N., Kleiman-Weiner, M., Yamazaki, I., Graybiel, A.M., Crittenden, J.R., and Levine, M.S. (2005) Enhanced AMPA receptor function in CalDAG-GEFI-deficient mice. Program No. 1030.19. *2005 Neuroscience Meeting Planner*. Washington, DC: Society for Neuroscience, 2005. Online.
253. Graybiel, A.M., Fujii, N., and Jin, D.Z. (2005) Representation of time and states in the macaque prefrontal cortex and striatum during sequential saccade tasks. Program No. 400.7. *2005 Neuroscience Meeting Planner*. Washington, DC: Society for Neuroscience, 2005. Online.
254. Crittenden, J.R., Costa, C., Martella, G., Calabresi, P., Harlan, P., Sauvage, M., Housman, D.E., and Graybiel, A.M. (2005) CalDAG-GEFI is critical for striatal plasticity. Program No. 1030.18. *2005 Neuroscience Meeting Planner*. Washington, DC: Society for Neuroscience, 2005. Online.
255. Sauvage, M., Crittenden, J.R., DeCoteau, W.E., Smith, C., Housman, D.E., and Graybiel, A.M. (2005) CalDAG-GEFI and striatum plasticity: CalDAG-GEFI is critical for behavioral sensitization to amphetamine. Program No. 1030.17. *2005 Neuroscience Meeting Planner*. Washington, DC: Society for Neuroscience, 2005. Online.
256. Barnes, T.D., Kubota, Y., Hu, D., Jin, D.Z., and Graybiel, A.M. (2005) Successive reorganizations of activity of striatal projection neurons during learning, unlearning and relearning of a procedural task. Program No. 400.15. *2005 Neuroscience Meeting Planner*. Washington, DC: Society for Neuroscience, 2005. Online.
257. Bergmeier, W., Crittenden, J.R., Chauhan, A., Fiffath, C.L., Cifuni, S., Housman, D.E., Graybiel, A.M., and Wagner, D.D. (2006) CalDAG-GEFI plays a central role in platelet activation and thrombus formation in injured arterioles and venules. In submission, 7th Annual Conference on Arteriosclerosis, Thrombosis and Vascular Biology, Denver, CO, Apr. 27-29, 2006.
258. Feledy, T.M., Feingold, J., Jin, D.Z., and Graybiel, A.M. (2006) Eye-movement patterns emerge as monkeys perform a free-viewing scan task. Program No. 48.12. *2006 Neuroscience Meeting Planner*. Atlanta, GA: Society for Neuroscience, 2006. Online.
259. Thorn, C.A., Gibson, D.J., DeCoteau, W.E., Kubota, Y., Mitra, P., and Graybiel, A.M. (2006) Striatal and hippocampal theta rhythms exhibit task-specific coherence relationships that are modulated by learning in a T-maze task. Program No. 352.15. *2006 Neuroscience Meeting Planner*. Atlanta, GA: Society for Neuroscience, 2006. Online.
260. Crittenden, J.R., Picconi, B., Ghiglieri, V., Calabresi, P., Harlan, P., Housman, D.E., and Graybiel, A.M. (2006) CalDAG-GEFI is required for sensitization to amphetamine-induced stereotypy and corticostriatal LTP, but not for locomotor sensitization and LTD. Program No. 56.5. *2006 Neuroscience Meeting Planner*. Atlanta, GA: Society for Neuroscience, 2006. Online.
261. Barnes, T.D., Jin, D.Z., Hu, D., Kubota, Y., and Graybiel, A.M. (2006) Single cell analysis of striatal projection neuron firing recorded as rats learn a procedural T-maze task. Program No. 556.21. *2006 Neuroscience Meeting Planner*. Atlanta, GA: Society for Neuroscience, 2006. Online.
262. Crittenden, J.R., Sauvage, M., Picconi, B., Costa, C., Martella, M., Andre, V., Cepeda, C., Levine, M., Calabresi, P., Housman, D.E., and Graybiel, A.M. The striatum-enriched signaling molecule, CalDAG-GEFI, is essential for cortico-striatal LTP and sensitization of drug-induced stereotypies. Cellular and Molecular Treatments of Neurological Diseases, Cambridge, MA 2006.
263. Crittenden, J.R., Sauvage, M., Hershcovitch, L., Housman, D.E., and Graybiel, A.M. Mice lacking the striatum-enriched signaling molecule, CalDAG-GEFI, do not undergo amphetamine-induced sensitization of stereotypy. Autism Consortium Retreat, Oct. 26, 2006, Cambridge, MA.
264. Feledy, T.M., Feingold, J., Jin, D., and Graybiel, A.M. (2007) Optimal eye-movement paths emerge as monkeys perform a free-viewing scan task. COSYNE07, Salt Lake City, UT, Feb. 22-27, 2007.
265. Kitsukawa, T., Kubota, Y., Hu, D., Yamamori, Y., and Graybiel, A.M. (2007) Contrasting spike activity in the striatum and motor cortex of mice performing complex stepping patterns in a running wheel. Program No. 622.22. *2007 Neuroscience Meeting Planner*. San Diego, CA: Society for Neuroscience, 2007. Online.
266. Crittenden, J.R., Cantuti-Castelvetri, I., Saka, E., Fernandez-Hernandez, L., Keller-McGandy, C., Harlan, P., Kett, L. R., Housman, D. E., Young, A. B., and Graybiel, A.M. (2007) The striatal signaling molecule, CalDAG-GEF2, is up-

- regulated in the dopamine-depleted striatum of hemi-parkinsonian rats. Program No. 371.13. *2007 Neuroscience Meeting Planner*. San Diego, CA: Society for Neuroscience, 2007. Online.
267. Cantuti-Castelvetri, I., Saka, E., Keller-McGandy, C.E., Bouzou, B., Crittenden, J.R., Hernandez-Fernandez, L., Kett, L.R., Hollingsworth, Z.R., Clark, T., Young, A.B., Standaert, D., and Graybiel, A.M. (2007) Striatal thyrotropin releasing hormone is increased in response to chronic L-DOPA treatment in a rat model of Parkinson disease. Program No. 254.11. *2007 Neuroscience Meeting Planner*. San Diego, CA: Society for Neuroscience, 2007. Online.
268. Feingold, J., DePasquale, B.D., and Graybiel, A.M. (2007) Modulation of cortical 8-20 Hz power in supplementary motor areas during self-timed sequential arm movements in monkeys. Program No. 664.7. *2007 Neuroscience Meeting Planner*. San Diego, CA: Society for Neuroscience, 2007. Online.
269. Ninokura, Y. and Graybiel, A.M. (2007) Representation of forthcoming behavioral steps by unit activity in the macaque caudate nucleus during performance of a sequential reaching task. Program No. 662.2. *2007 Neuroscience Meeting Planner*. San Diego, CA: Society for Neuroscience, 2007. Online.
270. Desrochers-Feledy, T.M., Feingold, J., Sim, J., Jin, D.Z., and Graybiel, A. M. (2007) Monkeys have behaviorally optimal eye movement patterns in a free-viewing scan task. Program No. 719.2. *2007 Neuroscience Meeting Planner*. San Diego, CA: Society for Neuroscience, 2007. Online.
271. Thorn, C.A. and Graybiel, A.M. (2007) Medial and lateral striatal LFPs exhibit task-dependent patterns of coherence in multiple frequency bands. Program No. 622.14. *2007 Neuroscience Meeting Planner*. San Diego, CA: Society for Neuroscience, 2007. Online.
272. Feingold, J., Fujii, N., Desrochers-Feledy, T.M., Harlan, R., and Graybiel, A.M. (2007) A method for recording neural activity simultaneously from independently moveable, chronically implanted electrodes in cortical and sub-cortical areas of monkeys. Neural Coding, Computation and Dynamics (NCCD), September 15-18, 2007, Hossegor, France.
273. Crittenden, J.R., Sauvage, M., Cepeda, C., Andre, V., Costa, C., Martella, G., Liu, T., Verma, S., Levine, M., Calabresi, P., Housman, D.E., and Graybiel, A.M. (2007) CalDAG-GEFI modulates behavioral sensitization to psychomotor stimulants and is required for cortico-striatal long-term potentiation. ACNP (American College of Neuropharmacology) Annual Meeting, Dec. 9-13, 2007, Boca Raton, Florida.
274. Crittenden, J.R., Dunn, D., Merali, F.I., Woodman, B., Bates, G.P., Housman, D.E., Lo, D.C., and Graybiel, A.M. (2008) Down-regulation of the striatum-enriched signaling molecule, CalDAG-GEF1/RasGRP2, is protective in a model of mutant Htt-induced neurodegeneration. Hereditary Disease Foundation, HD2008, Cambridge, MA; August 8-10, 2008.
275. Amemori, K.-I. and Graybiel, A. M. (2008) Enhancement of neuronal activity in the primate anterior cingulate cortex during approach-avoidance conflict. Program No. 590.22. *2008 Neuroscience Meeting Planner*. Washington, DC: Society for Neuroscience, 2008. Online.
276. Han, X., Qian, X., Bernstein, J., Zhou, H., Graybiel, A., Desimone, R., and Boyden, E. S. (2008) Millisecond-timescale optical control of specific genetically-targeted neurons and neural circuits in primate cerebral cortex. Program No. 493.10. *2008 Neuroscience Meeting Planner*. Washington, DC: Society for Neuroscience, 2008. Online.
277. Kramer, M. A., Tort, A. B. L., Thorn, C. A., Gibson, D. J., Kubota, Y., Graybiel, A. M., and Kopell, N. (2008) Dynamic cross-frequency couplings of local field potential oscillations in rat striatum and hippocampus during performance of a T-maze task. Program No. 191.4. *2008 Neuroscience Meeting Planner*. Washington, DC: Society for Neuroscience, 2008. Online.
278. Ninokura, Y. and Graybiel, A. M. (2008) Effects of explicit and implicit instruction of multiple targets in numerical representation in the macaque caudate nucleus. Program No. 472.21. *2008 Neuroscience Meeting Planner*. Washington, DC: Society for Neuroscience, 2008. Online.
279. Thorn, C. A., Atallah, H., Howe, M., and Graybiel, A. (2008) Ensemble unit activity differs between lateral and medial striatal regions during T-maze task learning. Program No. 578.7. *2008 Neuroscience Meeting Planner*. Washington, DC: Society for Neuroscience, 2008. Online.
280. Barnes, T. D., Mao, J., Kubota, Y., Hu, D., Stamoulis, C., and Graybiel, A. M. (2008) Role of the dorsolateral striatum in learning a discriminative procedural task that requires short-term memory processes. Program No. 578.8. *2008 Neuroscience Meeting Planner*. Washington, DC: Society for Neuroscience, 2008. Online.

281. Desrochers, T. M., Habenicht, L. M., Gibson, D. J., Feingold, J., and Graybiel, A. M. (2008) Neurons in the frontal eye field respond during uninstructed eye movement performance in a free-moving task. Program No. 855.8. *2008 Neuroscience Meeting Planner*. Washington, DC: Society for Neuroscience, 2008. Online.
282. Thorn, C. and Graybiel, A. (2009) Projection neurons in medial and lateral striatum show different ensemble patterns during learning. COSYNE 2009, Program No. I-38, Feb. 26-Mar. 1, 2009, Salt Lake City, UT.
283. Desrochers, T. and Graybiel, A. (2009) FEF neural responses during uninstructed, optimal eye movements in a free-viewing scan task. COSYNE 2009, Feb. 26-Mar. 1, 2009, Salt Lake City, UT.
284. Amemori, K.-I. and Graybiel, A.M. (2009) Stimulation of the macaque rostral anterior cingulate cortex alters decision in approach-avoidance conflict. Program No. 194.1. *2009 Neuroscience Meeting Planner*. Chicago, IL: Society for Neuroscience, 2009. Online.
285. Atallah, H.E., Howe, M.H., and Graybiel, A.M. (2009) Dynamic modulation of ensemble activity in the nucleus accumbens during T-maze learning. Program No. 567.12. *2009 Neuroscience Meeting Planner*. Chicago, IL: Society for Neuroscience, 2009. Online.
286. Burguiere, E., Kubota, Y., Masliah, E., and Graybiel, A.M. (2009) Dissociation of learning deficits and action initiation deficits in alpha-synuclein over-expression mouse model of Parkinson's disease. Program No. 661.25. *2009 Neuroscience Meeting Planner*. Chicago, IL: Society for Neuroscience, 2009. Online.
287. Crittenden, J.R., Dunn, D.E., Borkowska, A.E., Woodman, B., Merali, F.I., Frosch, M.P., Housman, D.E., Bates, G.P., Lo, D.C., and Graybiel, A.M. (2009) Down-regulation of CalDAG-GEFI is neuroprotective in a Huntington's disease model. Program No. 432.18. *2009 Neuroscience Meeting Planner*. Chicago, IL: Society for Neuroscience, 2009. Online.
288. Desrochers, T. M., Amemori, K.-I., Jin, D. Z., and Graybiel, A. M. (2009) Monkey eye movement patterns in a free-viewing scan task: reward and reduction of entropy as drives. Program No. 71.14. *2009 Neuroscience Meeting Planner*. Chicago, IL: Society for Neuroscience, 2009. Online.
289. Feingold, J., DePasquale, B.D., and Graybiel, A.M. (2009) Modulation of beta power in the prefrontal cortex and caudate nucleus of monkeys during self-timed sequential arm movements. Program No. 863.4. *2009 Neuroscience Meeting Planner*. Chicago, IL: Society for Neuroscience, 2009. Online.
290. Nagata, M., Nomura, M., Aoyagi, T., Yamamori, T., Kubota, Y., Graybiel, A.M., and Kitsukawa, T. (2009) Sequential timing control of complex stepping in mice. Program No. 95.19. *2009 Neuroscience Meeting Planner*. Chicago, IL: Society for Neuroscience, 2009. Online.
291. Smith, K.S. and Graybiel, A.M. (2009) Reward devaluation in a T-maze task shows dynamics of stimulus-response habit formation. Program No. 567.10. *2009 Neuroscience Meeting Planner*. Chicago, IL: Society for Neuroscience, 2009. Online.
292. Thorn, C.A. and Graybiel, A.M. (2009) Projection neurons are entrained to different local field frequencies in dorsomedial and dorsolateral striatum. Program No. 567.9. *2009 Neuroscience Meeting Planner*. Chicago, IL: Society for Neuroscience, 2009. Online.
293. Hernandez, L.F., Hu, D., Kubota, Y., and Graybiel, A.M. (2009) Dopamine depletion produces selective blockade of learning-related plasticity in firing patterns in the sensorimotor striatum of rats trained on a conditional T-maze task. Program No. 661.24. *2009 Neuroscience Meeting Planner*. Chicago, IL: Society for Neuroscience, 2009. Online.
294. Moore, C., Desai, M., Kahn, I., Ishizawa, Y., Brown, E., Buckner, R., and Graybiel, A. (2009) The impact of isoflurane anesthesia on tactile activation of cortex and striatum: High resolution 9.4t fMRI studies in squirrel monkeys. Program No. 198.2. *2009 Neuroscience Meeting Planner*. Chicago, IL: Society for Neuroscience, 2009. Online.
295. Desai, M., Bernstein, J., Atallah, H., Kahn, I., Moore, C.I., Kopell, N., Graybiel, A., and Boyden, E. (2009) Integration of optical neural control and high-field fMRI: Towards systematic exploration of functional neural dynamics with 'Opto-fMRI'. Program No. 484.26. *2009 Neuroscience Meeting Planner*. Chicago, IL: Society for Neuroscience, 2009. Online.
296. Barnes, T.D., Hu, D., Mao, J., Kubota, Y., Howe, M., Jin, D., and Graybiel, A.M. (2009) Comparison of training-induced activity in the dorsolateral striatum during training on three versions of a T-maze task. Program No. 567.11. *2009 Neuroscience Meeting Planner*. Chicago, IL: Society for Neuroscience, 2009. Online.

297. Crittenden, J.R., Fernandez-Hernandez, L., Yim, M., Keller-McGandy, C., Cantuti-Castelvetri, I., Standaert, D.G., and Graybiel, A.M. (2009) Evaluation of the striatum-enriched genes, CalDAG-GEFI and CalDAG-GEFII, for the treatment and prevention of L-DOPA-induced dyskinesias. Michael J. Fox Foundation Parkinson's Disease Therapeutic Conference, New York, NY.
298. Schreiweis, C., Goyal, S., Paabo, S., Graybiel, A.M., and Enard, W. (2010) Speech and language evolution in a mouse: Cognitive abilities of humanized Foxp2 mice. Forum of European Neuroscience, Amsterdam, Abstract No.: 024.43
299. Crittenden, J.R., Yim, M.J., Fischer, K.B., and Graybiel, A.M. (2010) Sensitization and tolerance to amphetamine-induced behaviors in mice are differentially maintained during withdrawal. 10th Triennial Meeting of the International Basal Ganglia Society, Long Branch, NJ, June 20-24, 2010.
300. Thorn, C.A., Howe, M., and Graybiel, A.M. (2010) Simultaneous activation of dorsolateral and dorsomedial striatal loops during T-maze learning. 10th Triennial Meeting of the International Basal Ganglia Society, Long Branch, NJ, June 20-24, 2010.
301. Smith, K.S. and Graybiel, A.M. (2010) Neural plasticity in infralimbic cortex and dorsolateral striatum associated with habit formation. 10th Triennial Meeting of the International Basal Ganglia Society, Long Branch, NJ, June 20-24, 2010.
302. Desrochers, T.M., Jin, D.Z., Goodman, N.D., and Graybiel, A.M. (2010) Uninstructed monkey eye movement patterns driven by reward in a naturalistic free-viewing scan task. Program No. 77.18. *2010 Neuroscience Meeting Planner*. San Diego, CA: Society for Neuroscience, 2010. Online.
303. Thorn, C.A. and Graybiel, A.M. (2010) Investigating the interaction of model-free and model-based reinforcement learning systems during T-maze learning. *Soc. Neurosci. Abstr.*, 708.1. *2010 Neuroscience Meeting Planner*. San Diego, CA: Society for Neuroscience, 2010. Online.
304. Amemori, K.I. and Graybiel, A.M. (2010) Localized microstimulation of macaque pregenual anterior cingulate cortex increases rejection of cued outcomes in approach-avoidance decision-making. Program No. 306.4. *2010 Neuroscience Meeting Planner*. San Diego, CA: Society for Neuroscience, 2010. Online.
305. Hernandez, L.F., Hu, D., Kubota, Y., and Graybiel, A.M., (2010) L-DOPA modifies task-related firing patterns of projection neurons in the dopamine-depleted striatum during performance of a T-maze task. Program No. 708.22. *2010 Neuroscience Meeting Planner*. San Diego, CA: Society for Neuroscience, 2010. Online.
306. Crittenden, J.R., Sauvage, M., Burguiere, E., Yim, M.J., Costa, C., Martella, G., Ghiglieri, V., Zhang, H., Pescatore, K.A., Liu, T., Unterwald, E.M., Picconi, B., Sulzer, D., Calabresi, P., and Graybiel, A.M. (2010) CalDAG-GEFI is required for normal striatum-based egocentric maze learning in mice and the balance between cholinergic and dopaminergic signaling in the striatum. Program No. 380.15. *2010 Neuroscience Meeting Planner*. San Diego, CA: Society for Neuroscience, 2010. Online.
307. Atallah, H.E., Howe, M.W., and Graybiel, A.M. (2010) Dynamic modulation of ensemble activity in the ventromedial striatum during T-maze learning and re-learning. Program No. 708.2. *2010 Neuroscience Meeting Planner*. San Diego, CA: Society for Neuroscience, 2010. Online.
308. Crittenden, J.R., Dunn, D.E., Bowden, H.A., Woodman, B., Yim, M.J., Frosch, M.P., Bates, G.P., Housman, D.E., Lo, D.C., and Graybiel, A.M. (2010) Dysregulation of the striatum-enriched signaling molecules, CalDAG-GEFI and CalDAG-GEFII, in Huntington's disease. Hereditary Disease Foundation HD2010: The Milton Wexler Celebration of Life, Cambridge, MA, August 4-7, 2010.
309. Kahn, I., Knoblich, U., Desai, M., Bernstein, J., Graybiel, A.M., Boyden, E.S., Buckner, R.L., and Moore, C.I. (2010) Opto-fMRI: Blood oxygenation level-dependent (BOLD) response is correlated with optically-driven pyramidal spiking activity. Program No. 106.8. *2010 Neuroscience Meeting Planner*. San Diego, CA: Society for Neuroscience, 2010. Online.
310. Bernstein, J.G., Desai, M., Kahn, I., Atallah, H., Kopell, N., Buckner, R.L., Moore, C.I., Graybiel, A.M., and Boyden, E.S. (2010) Opto-fMRI: Ultra-high resolution causal circuit mapping, and application to analysis of network dynamics. Program No. 106.7. *2010 Neuroscience Meeting Planner*. San Diego, CA: Society for Neuroscience, 2010. Online.
311. Amemori, K.-I., Amemori, S., and Graybiel, A.M. (2011) Microstimulation of the macaque caudate nucleus induces changes in outcome evaluation for approach-avoidance decisions. Program No. 99.20. *2011 Neuroscience Meeting Planner*. Washington, DC: Society for Neuroscience, 2011. Online.

312. Amemori, S., Amemori, K.-I., and Graybiel, A.M. (2011) Effects of anxiolytic drug administration on macaque decision-making under approach-avoidance conflict. Program No. 99.18. *2011 Neuroscience Meeting Planner*. Washington, DC: Society for Neuroscience, 2011. Online.
313. Atallah, H.E., Howe, M.W., and Graybiel, A.M. (2011) Interaction between projection neurons and interneurons in the ventromedial striatum during learning: Combining tetrode recording and optogenetics. Program No. 99.24. *2011 Neuroscience Meeting Planner*. Washington, DC: Society for Neuroscience, 2011. Online.
314. Burguiere, E., Feng, G., and Graybiel, A.M. (2011) A new conditioning task to study neuronal activity related to compulsive grooming. Program No. 99.21. *2011 Neuroscience Meeting Planner*. Washington, DC: Society for Neuroscience, 2011. Online.
315. Feingold, J., Gibson, D.J., and Graybiel, A.M. (2011) Brief episodes of beta activity in frontal cortex and striatum. Program No. 99.22. *2011 Neuroscience Meeting Planner*. Washington, DC: Society for Neuroscience, 2011. Online.
316. Gibb, L.G., Amemori, K.-I., and Graybiel, A.M. (2011) The striatum as a context-sensitive modular reinforcement learning system adaptable to changing environments. Program No. 99.19. *2011 Neuroscience Meeting Planner*. Washington, DC: Society for Neuroscience, 2011. Online.
317. Hernandez, L.F., Kubota, Y., Hu, D., and Graybiel, A.M. (2011) Selective effects of dopamine depletion on neuronal subpopulations in the sensorimotor striatum during procedural learning. Program No. 199.17. *2011 Neuroscience Meeting Planner*. Washington, DC: Society for Neuroscience, 2011. Online.
318. Howe, M.W., Atallah, H.E., and Graybiel, A.M. (2011) Synchrony of fast spiking interneurons occurs during beta bursts in the nucleus accumbens and emerges with learning. Program No. 99.23. *2011 Neuroscience Meeting Planner*. Washington, DC: Society for Neuroscience, 2011. Online.
319. Schreiweis, C., Burguiere, E., Bornschein, U., Goyal, S., Hevers, W., Mundry, R., Enard, W., and Graybiel, A.M. (2011) Humanized Foxp2 alters learning in differently balanced cortico-basal ganglia circuits. Program No. 100.08. *2011 Neuroscience Meeting Planner*. Washington, DC: Society for Neuroscience, 2011. Online.
320. Smith, K.S. and Graybiel, A.M. (2011) Firing dynamics in prefrontal cortical and striatal sites coordinately promote habitual behavior. Program No. 99.17. *2011 Neuroscience Meeting Planner*. Washington, DC: Society for Neuroscience, 2011. Online.
321. Graybiel, A.M. (2011) The basal ganglia: binding values to action. Presidential Lecture. *2011 Neuroscience Meeting Planner*. Washington, DC: Society for Neuroscience, 2011. Online.
322. Burguiere, E., Feng, G., and Graybiel, A.M. (2012) Optogenetic stimulation of orbitofrontal cortex alleviates compulsive behavior in Sapap3 mutant mouse. Program No. 273.01. *2012 Neuroscience Meeting Planner*. New Orleans, LA: Society for Neuroscience, 2012. Online.
323. Hernandez, L.F., Kubota, Y., Hu, D., Lemaire, N., Howe, M.W., and Graybiel, A.M. (2012) Effects of dopamine depletion and L-DOPA administration on striatal activity are highly task-modulated during maze learning and performance. Program No. 273.02. *2012 Neuroscience Meeting Planner*. New Orleans, LA: Society for Neuroscience, 2012. Online.
324. Atallah, H.E. and Graybiel, A.M. (2012) Optogenetic identification and manipulation of striatal cholinergic interneurons: implications for function. Program No. 273.03. *2012 Neuroscience Meeting Planner*. New Orleans, LA: Society for Neuroscience, 2012. Online.
325. Amemori, S., Amemori, K.-I., and Graybiel, A.M. (2012) Microstimulation of macaque subgenual anterior cingulate cortex alters approach-avoidance decision-making. Program No. 273.04. *2012 Neuroscience Meeting Planner*. New Orleans, LA: Society for Neuroscience, 2012. Online.
326. Amemori, K.-I., Amemori, S., and Graybiel, A.M. (2012) Functional clustering of neurons in primate caudate nucleus related to outcome evaluation for approach-avoidance decision-making. Program No. 273.05. *2012 Neuroscience Meeting Planner*. New Orleans, LA: Society for Neuroscience, 2012. Online.
327. Thorn, C.A. and Graybiel, A.M. (2012) Interneuron and field potential activities in sensorimotor and associative striatum during learning. Program No. 273.06. *2012 Neuroscience Meeting Planner*. New Orleans, LA: Society for Neuroscience, 2012. Online.
328. Smith, K.S., Virkud, A., Deisseroth, K., and Graybiel, A.M. (2012) Optogenetic inhibition of infralimbic cortex both blocks and reinstates habits. Program No. 273.07. *2012 Neuroscience Meeting Planner*. New Orleans, LA: Society for Neuroscience, 2012. Online.

329. Lemaire, N., Hernandez, L.F., Hu, D., Kubota, Y., Howe, M.W., and Graybiel, A.M. (2012) Effects of local dopamine depletion on LFP oscillations in dorsolateral striatum are task and learning-dependent and are partially reversed by levodopa administration. Program No. 273.08. *2012 Neuroscience Meeting Planner*. New Orleans, LA: Society for Neuroscience, 2012. Online.
330. Schreiweis, C., Enard, W., and Graybiel, A.M. (2012) Altered response to d-amphetamine treatment in mice with humanized Foxp2. Program No. 273.09. *2012 Neuroscience Meeting Planner*. New Orleans, LA: Society for Neuroscience, 2012. Online.
331. Correia, S., Graybiel, A.M., and Goosens, K.A. (2012) Reward learning prevents spontaneous recovery of fear. Program No. 606.05. *2012 Neuroscience Meeting Planner*. New Orleans, LA: Society for Neuroscience, 2012. Online.
332. Graybiel, A.M. and Amemori, K.-I. (2013) Control of primate's benefit-cost ratio by manipulating localized circuits in the frontostriatal network. Program No. 18.02. *2013 Neuroscience Meeting Planner*. San Diego, CA: Society for Neuroscience, 2013. Online.
333. Crittenden, J.R., Lacey, C.J., Feng, G., and Graybiel, A.M. (2013) Cholinergic interneurons differentially affect spiking in direct and indirect striatal pathways through M1 acetylcholine receptor and CalDAG-GEFI signaling. Program No. 92.01. *2013 Neuroscience Meeting Planner*. San Diego, CA: Society for Neuroscience, 2013. Online.
334. Smith, K.S. and Graybiel, A.M. (2013) Dynamics of "reward" activity in the sensorimotor striatum during learning and habit formation. Program No. 92.02. *2013 Neuroscience Meeting Planner*. San Diego, CA: Society for Neuroscience, 2013. Online.
335. Amemori, K.-I., Amemori, S., and Graybiel, A.M. (2013) Primate dorsolateral prefrontal and anterior cingulate neurons are differentially recruited during decision-making under approach-avoidance conflict. Program No. 92.03. *2013 Neuroscience Meeting Planner*. San Diego, CA: Society for Neuroscience, 2013. Online.
336. Correia, S., Graybiel, A.M., and Goosens, K.A. (2013) Recruitment of an amygdala-accumbens circuit promotes the persistence of fear extinction. Program No. 486.02. *2013 Neuroscience Meeting Planner*. San Diego, CA: Society for Neuroscience, 2013. Online.
337. Friedman, A., Gibb, L.G., Keselman, M.D., and Graybiel, A.M. (2013) Novel mathematical approach to fully unsupervised spike-sorting validated for striatal and cortical neurons. Part I: Enhancing signal-to-noise ratio and evaluating separability. Program No. 680.10. *2013 Neuroscience Meeting Planner*. San Diego, CA: Society for Neuroscience, 2013. Online.
338. Gibb, L.G., Friedman, A., Keselman, M.D., and Graybiel, A.M. (2013) Novel mathematical approach to fully unsupervised spike-sorting validated for striatal and cortical neurons. Part II: Achieving unimodality and evaluating cluster quality. Program No. 680.11. *2013 Neuroscience Meeting Planner*. San Diego, CA: Society for Neuroscience, 2013. Online.
339. Amemori, S., Amemori, K.-I., Gibson, D.J., and Graybiel, A.M. (2013) Low-dose NMDA antagonist treatment induces frequency-specific changes in LFP across primate cortico-striatal circuits during approach-avoidance decision-making. Program No. 858.21. *2013 Neuroscience Meeting Planner*. San Diego, CA: Society for Neuroscience, 2013. Online.
340. Desrochers, T.M., Amemori, K.-I., and Graybiel, A.M. (2014) Neural responses in striatum related to cost and outcome can drive unsupervised learning in the macaque. Program No. 342.01. *2014 Neuroscience Meeting Planner*. Washington, DC: Society for Neuroscience, 2014. Online.
341. Crittenden, J.R., Yildirim, F., Bowden, H.A., Gipson, T.A., Ng, C.W., Fraenkel, E., Housman, D.E., and Graybiel, A.M. (2014) CalDAG-GEFI and CalDAG-GEFII are down-regulated in the R6/2 Huntington's disease mouse model and show reduced H3K4 trimethylation in a pattern typical of dysregulated neuronal genes. Program No. 795.12. *2014 Neuroscience Meeting Planner*. Washington, DC: Society for Neuroscience, 2014. Online.
342. Lemaire, N. and Graybiel, A. (2014) Representation of habitual action sequences in the sensorimotor corticostriatal circuit. Program No. 843.17. *2014 Neuroscience Meeting Planner*. Washington, DC: Society for Neuroscience, 2014. Online.
343. Yildirim, F., Crittenden, J.R., Bowden, H.A., Graybiel, A.M., Fraenkel, E., and Housman, D.E. (2014) Comparative genome-wide transcription analysis in mouse models of Huntington's disease and drug abuse. The Hereditary Disease Foundation Milton Wexler Celebration Meeting, Cambridge, MA.

344. Crittenden, J.R., Lacey, C.J., Thomsen, M., Weng, F.J., Caine, S.B., Line, Y., Feng, G., and Graybiel, A.M. (2014) Cholinergic interneurons modulate striatal neuron activation and behavior through M1 acetylcholine receptor and CalDAG-GEFI signaling. Basal Ganglia Gordon Research Conference, Ventura, CA.
345. Schwerdt, H.N., Shimazu, H., Amemori, K.-I., Hong, S., Sy, J.C., Spencer, K.C., Tierney, P.L., Yang, Y., Yerramreddy, H., Dagdeviren, C., Ramadi, K., Langer, R.S., Cima, M.J., and Graybiel, A.M. (2015) Fast-scan cyclic voltammetric measurements of stimulation-induced dopamine release with chronically implanted carbon fibers in awake non-human primate. Program No. 266.03. *2015 Neuroscience Meeting Planner*. Chicago, IL: Society for Neuroscience, 2015. Online.
346. Correia, S., Graybiel, A.M., and Goosens, K.A. (2015) A circuit connecting the amygdala and ventral striatum regulates fear extinction. Program No. 440.15. *2015 Neuroscience Meeting Planner*. Chicago, IL: Society for Neuroscience, 2015. Online.
347. Martiros, N. and Graybiel, A.M. (2015) Representation of learned action sequences in the dorsolateral corticostriatal circuit. Program No. 633.16. *2015 Neuroscience Meeting Planner*. Chicago, IL: Society for Neuroscience, 2015. Online.
348. Gibb, L.G., Friedman, A., Homma, D., Amemori, K.-I., Rubin, S.J., Hood, A.S., Riad, M.H., and Graybiel, A.M. (2015) A medial prefrontal-striosome circuit is selectively engaged by cost-benefit conflict decision-making. Program No. 703.18. *2015 Neuroscience Meeting Planner*. Chicago, IL: Society for Neuroscience, 2015. Online.
349. Friedman, A., Homma, D., Gibb, L.G., Amemori, K.-I., Rubin, S.J., Hood, A.S., Riad, M.H., and Graybiel, A.M. (2015) Striatal high-firing interneurons mediate inhibitory prefrontal-striosomal signaling during cost-benefit conflict decision-making. Program No. 703.19. *2015 Neuroscience Meeting Planner*. Chicago, IL: Society for Neuroscience, 2015. Online.
350. Homma, D., Friedman, A., Gibb, L.G., Amemori, K.-I., Rubin, S.J., Hood, A.S., Riad, M.H., and Graybiel, A.M. (2015) Compartmental selectivity of a prefronto-striosomal pathway controlling decision-making under motivational conflict. Program No. 703.20. *2015 Neuroscience Meeting Planner*. Chicago, IL: Society for Neuroscience, 2015. Online.
351. Amemori, K.-I., Amemori, S., Gibson, D.J., and Graybiel, A.M. (2015) Properties of striatal beta oscillation at sites identified by microstimulation as controlling approach-avoidance choice behavior. Program No. 703.21. *2015 Neuroscience Meeting Planner*. Chicago, IL: Society for Neuroscience, 2015. Online.
352. Amemori, K.-I., Amemori, S., Gibson, D.J., and Graybiel, A.M. (2016) Striatal beta-band oscillations associated with long-lasting pessimistic mood induced by intrastriatal microstimulation. Program No. 168.10. *2016 Neuroscience Meeting Planner*. San Diego, CA: Society for Neuroscience, 2016. Online.
353. Crittenden, J.R., Riad, M.H., Tillberg, P.W., Shima, Y., Housman, D.E., Nelson, S.B., Boyden, E.S., and Graybiel, A.M. (2016) Striosome-dendron bouquet formations: a unique striatonigral circuit connection engaging dopamine-containing neurons and their ventrally extending dendrites. Program No. 245.08. *2016 Neuroscience Meeting Planner*. San Diego, CA: Society for Neuroscience, 2016. Online.
354. Hong, S., Amemori, S., Amemori, K.-I., and Graybiel, A.M. (2016) Striosomes may control dopamine activity via disynaptic projections to macaque lateral habenula. Program No. 258.17. *2016 Neuroscience Meeting Planner*. San Diego, CA: Society for Neuroscience, 2016. Online.
355. Gibb, L.G., Friedman, A., Slocum, J.F., Tyulmankov, D., Altshuler, A., Ruangwises, S., Shi, Q., Toro Arana, S.E., Beck, D.W., Sholes, J.E.C., and Graybiel, A.M. (2016) Identifying interactions in neural circuit simulations and other data using non-linear multi-dimensional hidden-state models. Program No. 470.14. *2016 Neuroscience Meeting Planner*. San Diego, CA: Society for Neuroscience, 2016. Online.
356. Friedman, A., Slocum, J.F., Tyulmankov, D., Gibb, L.G., Altshuler, A., Ruangwises, S., Shi, Q., Toro Arana, S.E., Beck, D.W., Sholes, J.E.C., and Graybiel, A.M. (2016) Non-linear multi-dimensional hidden state models for the analysis of neural circuits. Program No. 470.15. *2016 Neuroscience Meeting Planner*. San Diego, CA: Society for Neuroscience, 2016. Online.
357. Schwerdt, H.N., Kim, M., Homma, D., Amemori, S., Yoshida, T., Shimazu, H., Langer, R.S., Graybiel, A.M., and Cima, M.J. (2016) Flexible microelectrode arrays for high-density subsecond dopamine recording. Program No. 752.08. *2016 Neuroscience Meeting Planner*. San Diego, CA: Society for Neuroscience, 2016. Online.

358. Shimazu, H., Schwerdt, H.N., Amemori, K.-I., Gibson, D.J., and Graybiel, A.M. (2017) Chemically induced striatal beta oscillations and the transient primate model of Parkinsonian symptoms. The XXII World Congress of Neurology, Kyoto, Japan.
359. Schwerdt, H.N., Shimazu, H., Amemori, K., Amemori, S., Hong, S., Yoshida, T., Langer, R., Cima, M.J., and Graybiel, A.M. (2017) Electrochemical recording of pharmacologically modulated dopamine from sensors chronically implanted in striatum of awake non-human primates. Program No. 47.15. *2017 Neuroscience Meeting Planner*. Washington, DC: Society for Neuroscience, 2017. Online.
360. Gibb, L.G., Friedman, A., Homma, D., Bloem, B., Amemori, K.-I., Hu, D., Delcasso, S., Hood, A.S., Yang, J., Mikofalvy, K.A., Truong, T.F., Toro Arana, S.E., Beck, D.W., Nguyen, N., Voder Bruegge, R.H., Nelson, E.D., Goosens, K.A., and Graybiel, A.M. (2017) Hodgkin-Huxley models of excitatory-inhibitory balance in a cortico-striosomal circuit underlying aberrant cost-benefit decision-making caused by chronic stress. Program No. 320.12. *2017 Neuroscience Meeting Planner*. Washington, DC: Society for Neuroscience, 2017. Online.
361. Homma, D., Friedman, A., Bloem, B., Gibb, L.G., Amemori, K.-I., Hu, D., Delcasso, S., Hood, A.S., Yang, J., Mikofalvy, K.A., Truong, T.F., Toro Arana, S.E., Beck, D.W., Nguyen, N., Voder Bruegge, R.H., Nelson, E.D., Goosens, K.A., and Graybiel, A.M. (2017) Rescue and mimicking of chronic stress effects on cost-benefit decision-making by manipulation of a cortico-striosomal circuit. Program No. 320.13. *2017 Neuroscience Meeting Planner*. Washington, DC: Society for Neuroscience, 2017. Online.
362. Friedman, A., Homma, D., Bloem, B., Gibb, L.G., Amemori, K.-I., Hu, D., Delcasso, S., Hood, A.S., Yang, J., Mikofalvy, K.A., Truong, T.F., Toro Arana, S.E., Beck, D.W., Nguyen, N., Voder Bruegge, R.H., Nelson, E.D., Goosens, K.A., and Graybiel, A.M. (2017) A shift in the excitation-inhibition balance of a cortico-striosomal circuit underlies aberrant cost-benefit decision-making caused by chronic stress. Program No. 320.14. *2017 Neuroscience Meeting Planner*. Washington, DC: Society for Neuroscience, 2017. Online.
363. Crittenden, J.R., Kitsukawa, T., Bowden, H., Housman, D.E., and Graybiel, A.M. (2017) Deletion of the striatal matrix and striosome signaling molecules, CalDAG-GEFI and CalDAG-GEFII, mitigates the onset of abnormal motor responses to L-DOPA in a Parkinson's disease model mouse. Program No. 668.05. *2017 Neuroscience Meeting Planner*. Washington, DC: Society for Neuroscience, 2017. Online.
364. Hong, S., Amemori, S., Chung, E., Amemori, K., and Graybiel, A.M. (2017) Microstimulation-recording experiments demonstrate that striosomes in non-human primate control spike activity in the lateral habenula. Program No. 789.11. *2017 Neuroscience Meeting Planner*. Washington, DC: Society for Neuroscience, 2017. Online.
365. Bloem, B., Huda, R., Sur, M., and Graybiel, A.M. (2018) Two-photon imaging of the mouse striatum demonstrates distinct functions for striosomes and matrix in reinforcement learning. 2018 Basal Ganglia Gordon Research Conference, Ventura, CA.
366. Crittenden, J.R., Gallagher, B., Hobert, L., Feng, A., Graybiel, A.M., Lovinger, D.M., and Davis, M. I. (2018) Endocannabinoid receptor CB1 is abundantly expressed in the striosome-dendron bouquet, a specialized striatonigral connection. 2018 Basal Ganglia Gordon Research Conference, Ventura, CA.
367. Schwerdt, H.N., Kim, M.J., Zhang, E., Amemori, S., Yoshida, T., Langer, R., Cima, M.J., and Graybiel, A.M. (2018) Multi-site monitoring of subsecond dopamine neurochemical activity in rodents. 17th International Meeting on Monitoring Molecules in Neuroscience, Oxford, UK.
368. Amemori, K.-I., Amemori, S., Gibson, D.J., and Graybiel, A.M. (2018) Beta oscillations in the primate striatum predict repetitive negative decision-making states induced by microstimulation. Program No. 011.01. *2018 Neuroscience Meeting Planner*. San Diego, CA: Society for Neuroscience, 2018. Online.
369. Graybiel, A.M. (2018) The striatum and decision-making based on value. Program No. 182. *2018 Neuroscience Meeting Planner*. San Diego, CA: Society for Neuroscience, 2018. Online.
370. Pedersen, M.L., Ironside, M., McGrath, C.L., Amemori, K.-I., Kang, M., Graybiel, A.M., Frank, M.J., and Pizzagalli, D.A. (2018) Computational phenotyping of brain-behavioral relationships underlying approach-avoidance decision making in major depressive disorder. Program No. 320.18. *2018 Neuroscience Meeting Planner*. San Diego, CA: Society for Neuroscience, 2018. Online.
371. Crittenden, J.R., Gallagher, B.R., Ondik, M.M., Capponi, S., Blencowe, B.J., Timmers, M.H.T., and Graybiel, A.M. (2018) Microexon inclusion is associated with distinct expression patterns and subcellular localization of the disease gene TAF1. Program No. 378.01. *2018 Neuroscience Meeting Planner*. San Diego, CA: Society for Neuroscience, 2018. Online.

372. Bloem, B., Huda, R., Sur, M., and Graybiel, A.M. (2018) Two-photon imaging of striosomes and matrix in mice demonstrates overlapping and distinct functions in reinforcement learning. Program No. 453.09. *2018 Neuroscience Meeting Planner*. San Diego, CA: Society for Neuroscience, 2018. Online.
373. Schwerdt, H.N., Stanwicks, L., Amemori, K.-I., Shimazu, H., Yoshida, T., Amemori, S., Langer, R., Cima, M.J., and Graybiel, A.M. (2018) Electrochemical recording of striatal dopamine in non-human primates performing reward-biased tasks. Program No. 701.18. *2018 Neuroscience Meeting Planner*. San Diego, CA: Society for Neuroscience, 2018. Online.
374. Friedman, A., Hueske, E., Delcasso, S., Gibb, L.G., Lutwak, H., Toro Arana, S.E., Drammis, S.M., Rakocevic, L.I., Fajardo, J.D., Xiong, J.K., Siciliano, C.A., Hu, D., Carter, C.W., Nelson, E.D., and Graybiel, A.M. (2018) Novel computational approaches for signal extraction from striatal multi-color photometry recordings and evaluating high-throughput approach-avoidance learning applied to Huntington's disease mouse model. Program No. 758.26. *2018 Neuroscience Meeting Planner*. San Diego, CA: Society for Neuroscience, 2018. Online.
375. Hueske, E.A., Friedman, A., Delcasso, S., Gibb, L.G., Lutwak, H., Drammis, S.M., Rakocevic, L.I., Fajardo, J.D., Xiong, J.K., Siciliano, C.A., Hu, D., Carter, C., Nelson, E.D., and Graybiel, A.M. (2018) Evaluation of approach-avoidance learning in mouse model of Huntington's disease by a novel battery of cost-benefit decision-making tasks compatible with high-throughput imaging. Program No. 758.27. *2018 Neuroscience Meeting Planner*. San Diego, CA: Society for Neuroscience, 2018. Online.
376. Pizzagalli, D.A., Ironside, M., Amemori, K.-I., McGrath, C.L., Kang, M.S., Amemori, S., Dougherty, D., Frank, M.J., and Graybiel, A.M. (2019). Human and non-human primate investigations of approach-avoidance conflict: Relevance to depression and anxiety disorders. The 74th Annual Meeting of the Society of Biological Psychiatry (SOBP), Chicago, IL, May 16-18, 2019.
377. Zhai, S., Crittenden, J.R., Wokosin, D., Cenci, M.A., Graybiel, A.M., and Surmeier, D. (2019) Levodopa-induced dyskinesia triggers bidirectional changes in striatal connectivity and excitability. Program No. 131.10. *2019 Neuroscience Meeting Planner*. Chicago, IL: Society for Neuroscience, 2019. Online.
378. Bloem, B., Huda, R., Sur, M., and Graybiel, A.M. (2019) Striosome and matrix coding in a probabilistic decision-making task. Program No. 146.03. *2019 Neuroscience Meeting Planner*. Chicago, IL: Society for Neuroscience, 2019. Online.
379. Amemori, K.-I., Amemori, S., Gibson, D.J., and Graybiel, A.M. (2019) Striatal beta oscillation and neuronal activity in the primate caudate nucleus differentially represent valence and arousal under approach-avoidance conflict. Program No. 505.06. *2019 Neuroscience Meeting Planner*. Chicago, IL: Society for Neuroscience, 2019. Online.
380. Papageorgiou, G.K., Amemori, K.-I., Schwerdt, H.N., Gibson, D.J., and Graybiel, A.M. (2019) Distinct roles of the pACC and cOFC in cost-benefit decision-making. Program No. 514.14. *2019 Neuroscience Meeting Planner*. Chicago, IL: Society for Neuroscience, 2019. Online.
381. Gibb, L.G., Hu, D., Friedman, A., Bloem, B., Gardner, A., O'Neill, K., Xiong, J.K., and Graybiel, A.M. (2019) Flexible and inflexible T-maze decision-making and neural coding of cost and benefit in wild-type and Huntington's disease model mice. Program No. 565.13. *2019 Neuroscience Meeting Planner*. Chicago, IL: Society for Neuroscience, 2019. Online.
382. Morigaki, R., Lee, J.H., Yoshida, T., Wüthrich, C., and Graybiel, A.M. (2019) Mu opioid receptors are strongly upregulated in the Q175 mouse model of Huntington's disease. Program No. 565.14. *2019 Neuroscience Meeting Planner*. Chicago, IL: Society for Neuroscience, 2019. Online.
383. Matsushima, A. and Graybiel, A.M. (2019) Developmental organization of striosomes and striosome-related circuits. Program No. 565.15. *2019 Neuroscience Meeting Planner*. Chicago, IL: Society for Neuroscience, 2019. Online.
384. Kim, M.J. and Graybiel, A.M. (2019) Huntington's disease model Q175 mice exhibit deficits in adaptation of reward licking response in a visual cue-reward learning task. Program No. 565.16. *2019 Neuroscience Meeting Planner*. Chicago, IL: Society for Neuroscience, 2019. Online.
385. Schwerdt, H.N., Amemori, K.-I., Gibson, D.J., Stanwicks, L., Yoshida, T., Amemori, S., Langer, R., Cima, M.J., and Graybiel, A.M. (2019) Synchronous recording of dopamine neurochemical and striatal electrical activity in non-human primates. Program No. 796.22. *2019 Neuroscience Meeting Planner*. Chicago, IL: Society for Neuroscience, 2019. Online.

386. Schwerdt, H.N., Gibson, D.J., Amemori, K., Stanwicks, L.L., Yoshida, T., Cima, M.J., and Graybiel, A.M. (2021) Chronic multi-modal monitoring of neural activity in rodents and primates. SPIE Conference on Integrated Sensors for Biological and Neural Sensing (virtual event), March 6-7, 2021.
387. Schwerdt, H.N., Amemori, K., Gibson, D.J., Stanwicks, L.L., Yoshida, T., Cima, M.J., and Graybiel, A.M. (2021) Multi-modal systems for chronic subsecond monitoring of dopamine and oscillatory neural activity. Pittcon 2021 (virtual event), March 8-12, 2021.
388. Hirokane, K., Nakamura, T., Kubota, Y., Dan, H., Yagi, T., Graybiel, A.M., and Kitsukawa, T. (2022) Striatal neurons encode rhythm parameters of mice running in complex stepping. Program No. 055.05. *2022 Neuroscience Meeting Planner*. San Diego, CA: Society for Neuroscience, 2022. Online.
389. Matsushima, A., Pineda, S.S., Crittenden, J.R., Lee, H., Galani, K., Mantero, J., Kellis, M., Heiman, M., and Graybiel, A.M. (2022) Huntington's disease produces multiplexed transcriptional vulnerabilities of striatal D1-D2 and striosome-matrix neurons. Program No. 533.17. *2022 Neuroscience Meeting Planner*. San Diego, CA: Society for Neuroscience, 2022. Online.
390. Amjad, U., Choi, J., Graybiel, A.M., and Schwerdt, H. (2022) Characterization of intertrial dopamine dynamics in monkey striatum. Program No. 690.05. *2022 Neuroscience Meeting Planner*. San Diego, CA: Society for Neuroscience, 2022. Online.
391. Matsushima, A., Pineda, S.S., Crittenden, J.R., Lee, H., Galani, K., Mantero, J., Kellis, M., Heiman, M., and Graybiel, A.M. (2022) Huntington's disease produces multiplexed transcriptional vulnerabilities of striatal D1-D2 and striosome-matrix neurons. Program No. 5157. SWEBAGS 2022, November 30, 2022. Online.
392. Lazaridis, I., Crittenden, J.R., Matsushima, A., Hueske, E., Skara, V., Meletis, K., and Graybiel, A.M. (2023) Toward an understanding of the striosome-matrix and direct-indirect pathway organization of the striatum. XIV Meeting of the International Basal Ganglia Society, Stockholm, Sweden, June 13-16, 2023.
393. Papageorgiou, G.K., Gibson, D.J., Amemori, K., Schwerdt, H.N., Wang, M.C., Sharma, J., and Graybiel, A.M. (2023) Orbitofrontal and anterior cingulate circuits in primates: complementary roles in cost-benefit decision-making and learning. Program No. PSTR040.06. *2023 Neuroscience Meeting Planner*. Washington DC: Society for Neuroscience, 2023. Online.
394. Matsushima, A., Weinberg, R.P., Orszag, T.M., Hueske, E., Mangal, N., Sullivan, H.A., Coven-Easter, S., Alberta, J., Yang, X., Wickersham, I.R., Housman, D.E., Huang, Z.J., and Graybiel, A.M. (2023) Cell-type specific targeting of striato-nigro-striatal circuits using CellREADR. Program No. PSTR154.12. *2023 Neuroscience Meeting Planner*. Washington DC: Society for Neuroscience, 2023. Online.
395. Lazaridis, I., Ahn, G., Hueske, E., Matsushima, A., Sur, M., and Graybiel, A.M. (2023) Striatal astrocytes in dopamine regulation: A new perspective on behavioral state transitions and interaction with striosomes. Program No. PSTR252.09. *2023 Neuroscience Meeting Planner*. Washington DC: Society for Neuroscience, 2023. Online.
396. Amemori, S., Graybiel, A.M., and Amemori, K. (2023) Reduced top-down influence in the primate fronto-cingulo-striatal network underlying negative bias in conflict decision-making. Program No. PSTR423.17. *2023 Neuroscience Meeting Planner*. Washington DC: Society for Neuroscience, 2023. Online.
397. Kim, M.J., Gibson, D.J., Hu, D., Mahar, A., Schofield, C., Sompolpong, P., Yoshida, T., Tran, K., and Graybiel, A.M. (2023) Dopamine responses in the dorsal striatum do not support the role of reward prediction error. Program No. PSTR424.03. *2023 Neuroscience Meeting Planner*. Washington DC: Society for Neuroscience, 2023. Online.
398. Amjad, U., Choi, J., Gibson, D.J., Graybiel, A.M., and Schwerdt, H.N. (2023) Extracting cellular spike activity from synchronous measurements of electrical and chemical neural signals. Program No. PSTR444.02. *2023 Neuroscience Meeting Planner*. Washington DC: Society for Neuroscience, 2023. Online.
399. Hueske, E., Hirokane, K., Mangal, N., Lazaridis, I., Azocar, J., Hu, D., Onuora, C., Bhagavatula, S., Kim, A., Yoshida, T., Loftus, J., Mahar, A., and Graybiel, A.M. (2024) Regulation of stereotypic behaviors by striato-dopamine circuit disruption and manipulation in ASD model mice. Program No. LBA005.014. *2024 Neuroscience Meeting Planner*. Chicago, IL: Society for Neuroscience, 2024. Online.
400. Hueske, E., Stine, C., Yoshida, T., Crittenden, J., Loftus, J., Gupta, A., Johnson, J., Achanta, A., Mahar, A., Hu, D., Azocar, J., Gray, R., Bruchas, M.R., and Graybiel, A.M. (2024) Developmental and adult striatal patterning of nociceptin ligand marks striosomal population with direct dopamine projections. Program No. PSTR463.18. *2024 Neuroscience Meeting Planner*. Chicago, IL: Society for Neuroscience, 2024. Online.

401. Papageorgiou, G.K., Gibson, D.J., Amemori, K.-I., Schwerdt, H., Wang, M., McMillan, V., Sharma, J., Upadhyay, U., and Graybiel, A.M. (2024) Cost-benefit decisionmaking and learning in primates: exploring the interconnected roles of orbitofrontal and anterior cingulate circuits. Program No. PSTR463.19. *2024 Neuroscience Meeting Planner*. Chicago, IL: Society for Neuroscience, 2024. Online.
402. Hirokane, K., Kubota, Y., Hu, D., Yagi, T., Graybiel, A.M., and Kitsukawa, T. (2024) Representation of rhythmic chunking in striatum of mice executing complex continuous movement sequences. Program No. PSTR463.20. *2024 Neuroscience Meeting Planner*. Chicago, IL: Society for Neuroscience, 2024. Online.
403. Lazaridis, I., Crittenden, J.R., Ahn, G., Hirokane, K., Yoshida, T., Skara, V., Meletis, K., Parvataneni, K., Ting, J.T., Hueske, E.A., Matsushima, A., and Graybiel, A.M. (2024) Striosomes target nigral dopamine-containing neurons via direct-D1 and indirect-D2 pathways paralleling classic direct-indirect basal ganglia systems. Program No. PSTR463.21. *2024 Neuroscience Meeting Planner*. Chicago, IL: Society for Neuroscience, 2024. Online.
404. Matsushima, A., Tran, K., Hu, D., Yoshida, T., Loftus, J., and Graybiel, A.M. (2024) Dynamics of dopamine release in substantia nigra in Pavlovian and instrumental learning. Program No. PSTR463.22. *2024 Neuroscience Meeting Planner*. Chicago, IL: Society for Neuroscience, 2024. Online.