

References

- Abel R, Rybak J, Menzel R (2001) Structure and response patterns of olfactory interneurons in the honeybee, *Apis mellifera*. *J Comp Neurol* 437:363–383.
- Anton S, Ignell R, Hansson B (2002) Developmental changes in the structure and function of the central olfactory system in gregarious and solitary desert locusts. *Microsc Res Tech* 56.
- Arnold G, Masson C, Budharugsa S (1985) Comparative study of the antennal lobes and their afferent pathway in the worker bee and the drone *Apis mellifera*. *Cell Tissue Res* 242:593605.
- Aroniadou-Anderjaska V, Ennis M, MT S (1997) Glomerular synaptic responses to olfactory nerve input in rat olfactory bulb slices. *J Neurosci* 79.
- Aroniadou-Anderjaska V, Ennis M, MT S (1999) Current-source density analysis in the rat olfactory bulb: laminar distribution of kainate/ampa and nmda receptor-mediated currents. *J Neurophys* 81.
- Ashburner J (2000) Computational neuroanatomy. Ph.D. diss., University College, London.
- Ashburner J, Friston K (1999) *Toga, AW: Brain warping* San Diego: Academic Press.
- Bai X, Yu L, Liu Q, Zhang J, Lia A, Han D, Luo Q, Gong H (2006) A high-resolution anatomical rat atlas. *J Anat* 209.
- Balderrama N, Nunez J, Giurfa M, Torrealba J, EG A, Almeida L (1996) A deterrent response in honeybee (*Apis mellifera*) foragers: dependence on disturbance and season. *J Insect Physiol* 42:463–475.
- Balderrama N, Nunez J, Guerrieri F, Giurfa M (2002) Different functions of two alarm substances in the honeybee. *J Comp Physiol A Neuroethol Sens Neural Behav Physiol* 188:485–491.

- Bear M (1995) Mechanisms for a sliding synaptic modification threshold. *Neuron* 15:1–4.
- Bicker G (1999) Histochemistry of classical neurotransmitters in antennal lobes and mushroom bodies of the honeybee. *Micros Res Tech* 45.
- Bicker G, Kreissl S, Hofbauer H (1993) Monoclonal antibody labels olfactory and visual pathways in *Drosophila* and *Apis* brains. *J Comp Neurol* 335.
- Bischof H, Geiler E, Rollenhagen A (2002) Limitations of the sensitive period for sexual imprinting: neuroanatomical and behavioral experiments in the zebra finch (*Taeniopygia guttata*). *Behav Brain Res* 133:317–322.
- Black K, Snyder A, Koller J, Gado M, Perlmuter J (2001) Template images for nonhuman primate neuroimaging: 1. baboon. *Neuroimage* 14:736743.
- Brandt R, Rohlfing T, Rybak R, Krofczik S, Maye A, Westerhoff M, Hege C, Menzel R (2005) Three-dimensional average-shape atlas of the honeybee brain and its applications. *J Comp Neurol* 492:1–19.
- Brennan P, Keverne E (1997) Neural mechanisms of mammalian olfactory learning. *Prog Neurobiol* 51.
- Brunjes P, Frazier L (1986) Maturation and plasticity in the olfactory system of vertebrates. *Brain Research Rev* 11:1–45.
- Bucher D, Scholz M, Stetter M, Obermayer K, Pflueger H (2000) Correction methods for three-dimensional reconstructions from confocal images: I. tissue shrinking and axial scaling. *J Neurosci Methods* 100:135143.
- Cinelli A HK, Kauer J (1995) Salamander olfactory bulb neuronal activity observed by video rate, voltage-sensitive dye imaging. iii. spatial and temporal properties of responses evoked by odorant stimulation. *J Neurophysiol* 73.
- Daniel P, Burgess M, Derby C (1996) Responses of olfactory receptor neurons in the spiny lobster to binary mixtures are predictable using a noncompetitive model that incorporates excitatory and inhibitory transduction pathways. *J Comp Physiol A* 178.
- Deisig N, Giurfa M, Lachnit H, Sandoz J (2006) Neural representation of olfactory mixtures in the honeybee antennal lobe. *Eur J Neurosci* 24.

- Demski L, Dulka J (1984) Functional-anatomical studies on sperm release evoked by electrical stimulation of olfactory tract bundlets. *Science* 207:559–560.
- Derby C, Hutson M, Livermore B, Lynn W (1996) Generalization among related complex odorant mixtures and their components: Analysis of olfactory perception in the spiny lobster. *Physiol and Behav* 60.
- Development Core Team R (2005) *R: A language and environment for statistical computing* R Foundation for Statistical Computing ISBN 3-900051-07-0.
- Dhenain M, Ruffins S, Jacobs R (2001) Three-dimensional digital mouse atlas using high-resolution mri. *Dev Biol* 232:458470.
- Duchamp-Viret P, Duchamp A, Chaput M (2003) Single olfactory sensory neurons simultaneously integrate the components of an odour mixture. *Eur J Neurosci* 10.
- Dujardin (1850) Memoire sur le systeme nerveux des insects. *Ann Sci Nat Zool* 14:195206.
- Durst C, Eichmueller S, Menzel R (1994) Development and experience lead to increase volume of subcompartments of the honeybee mushroom body. *Behav and Neural Biology* 62:259263.
- Esslen J, Kaissling K (1976) Zahl und Verteilung antennaler Sensillen bei der Honigbiene (*Apis mellifera L.*). *Zoomorphol* 83.
- Evers J, Schmitt S, Sibilia M, Duch C (2005) Progress in functional neuroanatomy: precise automatic geometric reconstruction of neuronal morphology from confocal image stacks. *J Neurophysiol* 93:2331–2342.
- Fahrbach S (2006) Structure of the mushroom bodies of the insect brain. *Annu Rev Entomol* 51:209–232.
- Fahrbach S, Farris S, Sullivan J, GE R (2003) Limits on volume changes in the mushroom bodies of the honey bee brain. *J Neurobiol* 57:141151.
- Fahrbach S, Moore D, Capaldi E, Farris S, Robinson G (1998) Experience-expectant plasticity in the mushroom bodies of the honeybee. *Learn and Mem* 5:115123.

- Fahrbach S, Strande J, Robinson G (1995) Neurogenesis is absent in the brains of adult honey bees and does not explain behavioral neuroplasticity. *Neurosci Lett* 197:145148.
- Farris S, Abrams A, Strausfeld N (2004) Development and morphology of class ii kenyon cells in the mushroom bodies of the honey bee, *Apis mellifera*. *J Comp Neurol* 474:325339.
- Farris S, Robinson G, Fahrbach S (2001) Experience- and age-related outgrowth of intrinsic neurons in the mushroom bodies of the adult worker honeybee. *J Neurosci* 21:63956404.
- Flanagan D, Mercer A (1989) Morphology and response characteristics of neurones in the deutocerebrum of the brain in the honeybee *Apis mellifera*. *J Comp Physiol A* 164.
- Fonta C, Sun X, Masson C (1993) Morphology and spatial distribution of bee antennal lobe interneurones responsive to odours. *Chem Sense* 18:101119.
- Fortunato A, Maile R, Turillazzi S, Morgan E, Moneti G, Jones G, Pieraccini G (2001) Defensive role of secretion of ectal mandibular glands of the wasp *Polistes dominulus*. *J Chem Ecol* 27:569–579.
- Frambach I, Roessler W, Winkler M, Schuermann F (2004) F-actin at identified synapses in the mushroom body neuropile of the insect brain. *J Comp Neurol* 475:303314.
- Friedrich R, Korschning S (1997) Combinatorial and chemotopic odorant coding in the zebrafish olfactory bulb visualized by optical imaging. *Neuron* 18.
- Friedrich R, Korschning S (1998) Chemotopic, combinatorial, and noncombinatorial odorant representations in the olfactory bulb revealed using a voltage-sensitive axon tracer. *J Neurosci* 18.
- Friedrich R, Laurent G (2001) Dynamic optimization of odor representations by slow temporal patterning of mitral cell activity. *Science* 291.
- Friedrich R, Laurent G (2004) Dynamics of olfactory bulb input and output activity during odor stimulation in zebrafish. *J Neurophysiol* 91:2658–2669.

- Galizia C, Kimmerle B (2004) Physiological and morphological characterization of honeybee olfactory neurons combining electrophysiology, calcium imaging and confocal microscopy. *J Comp Physiol A* 190:21–38.
- Galizia C, McIlwrath S, Menzel R (1999) A digital three-dimensional atlas of the honeybee antennal lobe based on optical sections acquired by confocal microscopy. *Cell Tissue Res* 295:383394.
- Galizia C, Menzel R (2000) Odour perception in honeybees: coding information in glomerular patterns. *Curr Opin Neurobiol* 10:504510.
- Galizia C, Menzel R, Hoelldobler B (1999) Optical imaging of odor-evoked glomerular activity patterns in the antennal lobes of the ant *Camponotus rufipes*. *Naturwissenschaften* 86.
- Ganeshina O, Menzel R (2001) Gaba-immunoreactive neurons in the mushroom bodies of the honeybee: an electron microscopic study. *J Comp Neurol* 437:335349.
- Ganeshina O, Vorobyev M, Menzel R (2006) Synaptogenesis in the mushroom body calyx during metamorphosis in the honeybee *apis mellifera*: An electron microscopic study. *J Comp Neurol* 6:876–897.
- Gascuel J, Masson C (1991) A quantitative ultrastructural study of the honeybee antennal lobe. *Tissue Cell* 23.
- Giraudet P, Berthommier F, Chaput M (2002) Mitral cell temporal response patterns evoked by odor mixtures in the rat olfactory bulb. *J Neurophysiol* 88.
- Groh C, Tautz J, Roessler W (2004) Synaptic organization in the adult honey bee brain is influenced by brood-temperature control during pupal development. *PNAS* 101:42684273.
- Gronenberg W (2001) Subdivisions of hymenopteran mushroom body calyces by their afferent supply. *J Comp Neurol* 436:474–489.
- Gronenberg W, Hoelldobler B (2001) Morphologic representation of visual and antennal information in the ant brain. *J Comp Neurol* 412:229240.
- Guimond A, Meunier J, Thirion J (2000) Avarage brain models: a convergence study. *Comput Vis Image Understand* 77:192210.

- Gundersen H, Andersen B, Floe H (1983) Stimation of section thickness unbiased by cutting-deformation. *J Microscop* 131:3–4.
- Haddad D, Schaupp F, Brandt R, Manz G, Menzel R, Haase A (2004) Nmr imaging of the honeybee brain. *J Insect Sci* 4:1–7.
- Hamdani E, Kasumyan A, Doving K (2001) Is feeding behaviour in crucian carp mediated by the lateral olfactory tract? *Chem Senses* 26:1133–1138.
- Hansson B, Anton S (2000) Function and morphology of the antennal lobe: new developments. *Annu Rev Entomol* 45.
- Heisenberg M (1998) What do the mushroom bodies do for the insect brain? an introduction. *Learn Mem* 5:1–10.
- Howse P (1974) *Experimental analysis of insect behaviour*. Berlin: Springer.
- Hudson R (1993) Olfactory imprinting. *Curr Opin Neurobiol* 3.
- Ismail N, Robinson G, Fahrbach S (2005) Stimulation of muscarinic receptors mimics experience-dependent plasticity in the honey bee brain. *PNAS* 103:207211.
- Isogai S, Horiguchi M, Weinstein B (2001) The vascular anatomy of the developing zebrafish: an atlas of embryonic and early larval development. *Dev Biol* 230:278–301.
- Iwama A, Shibuya T (1998) Physiology and morphology of olfactory neurons associating with the protocerebral lobe of the honeybee brain. *J Insect Physiol* 44:11911204.
- Jefferis G, Marin E, Stocker R, Luo L (2001) Target neuron prespecification in the olfactory map of *Drosophila*. *Nature* 414.
- Joerges J, Kuettner A, Galizia C, Menzel R (1997) Representation of odours and odour mixtures visualized in the honeybee brain. *Nature* 387:285288.
- Keegans S, Billen J, Morgan E, Goekcen O (1993) Volatile glandular secretions of three species of new world army ants, *Eciton burchelli*, *Labidus coecus*, and *Labidus praedator*. *J Chem Ecol* 19:2705–2719.

- Kenyon F (1896) The brain of the bee a preliminary contribution to the morphology of the nervous system of the arthropoda. *J Comp Neurol* 6:134210.
- Kerr M, Belluscio L (2006) Olfactory experience accelerates glomerular refinement in the mammalian olfactory bulb. *Nature Neurosci* 9:484–486.
- Kirschner S, Kleineidam C, Zube C, J R, Gruenewald B, Roessler W (2006) Dual olfactory pathway in the honeybee, *Apis mellifera*. *J Comp Neurol* 499.
- Klagges B, Heimbeck G, Godenschwege T, Hofbauer A, Pflugfelder G, Reifegerste R, Reisch D, Schaupp M, Buchner S, Buchner E (1996) Invertebrate synapsins: a single gene codes for several isoforms in *Drosophila*. *J Neurosci* 16:31543165.
- Kolb B, Whishaw I (1998) Brain plasticity and behavior. *Annu Rev Psychol* 49:4364.
- Kosaka T, Kosaka K, Hama K, Wu J, Nagatsu I (1987) Differential effect of functional olfactory deprivation on the gabaergic and catecholaminergic traits in the rat main olfactory bulb. *Brain Res* 413.
- Kreissl S, Bicker G (1989) Histochemistry of acetylcholinesterase and immunocytochemistry of an acetylcholine receptor-like antigen in the brain of the honeybee. *J Comp Neurol* 286.
- Laissue P, Reiter C, Hiesinger P, Halter S, Fischbach K, RF S (1999) Three-dimensional reconstruction of the antennal lobe in *Drosophila melanogaster*. *J Comp Neurol* 405.
- Lam Y, Cohen L, Wachowiak M, Zochowski M (2000) Odors elicit three different oscillations in the turtle olfactory bulb. *J Neurosci* 20.
- Laurent G, Wehr M, Davidowitz H (1996) Encoding of olfactory information with oscillating neural assemblies. *Science* 265.
- Leitch B, Laurent G (1996) Gabaergic synapses in the antennal lobe and mushroom body of the locust olfactory system. *J Comp Neurol* 372.
- Leon M (1992) Neuroethology of olfactory preference. *J Neurobiol* 23.
- Lin D, Shea S, Katz L (2006) Representation of natural stimuli in the rodent main olfactory bulb. *Neuron* 50.

- Lindauer M (1952) Ein Beitrag zur Frage der Arbeitsteilung im Bienenstaat. *Zeitschrift für vergleichende Physiologie* 34:299–345.
- MacLeod K, Laurent G (1996) Distinct mechanisms for synchronization and temporal patterning of odor-encoding neural assemblies. *Science* 274.
- Martin R, Bowden D (2000) *Primate brain*. Elsevier Science.
- Mauelshagen J (1993) Neural correlates of olfactory learning in an identified neuron in the honey bee brain. *J Neurophysiol* 69:609625.
- Mazor O, Laurent G (2005) Transient dynamics versus fixed points in odor representations by locust antennal lobe projection neurons. *Neuron* 48:661–673.
- Meister M, Bonhoeffer T (2001) Tuning and topography in an odor map on the rat olfactory bulb. *J Neurosci* 21.
- Menzel R (1999) Memory dynamics in the honeybee. *J Comp Physiol A* 185:323–340.
- Menzel R, Durst C, Erber J, Eichmueller S, Hammer M, Hildebrandt H, Mauelshagen J, Mueller U, Rosenboom H, Rybak J, Schaefer S, Scheidler A (1994) *Neural basis of behavioral adaptations: Fortschritte der Zoologie*. Stuttgart: Gustav Fischer Verlag.
- Menzel R, Geiger K, Chittka L, Joerges J, Kunze J, Mueller U (1996) The knowledge base of bee navigation. *J Exp Biol* 199:141–146.
- Menzel R, Giurfa M (2001) Cognitive architecture of a mini-brain: the honeybee. *Trends Cogn Sci* 5:6271.
- Mobbs P (1982) The brain of the honeybee *Apis mellifera* i. the connections and spatial organization of the mushroom bodies. *Philos Trans R Soc Lond B Biol Sci* 298:309354.
- Mobbs P (1985) *Comprehensive insect physiology biochemistry and pharmacology*. Oxford: Pergamon Press.
- Mombaerts P, Wang F, Dulac C, Chao S, Nemes A, Mendelsohn M, Edmondson J, Axel R (1996) Visualizing an olfactory sensory map. *Cell* 87.

- Mori K, Yoshihara Y (1995) Molecular recognition and olfactory processing in the mammalian olfactory system. *Prog Neurobiol* 45.
- Mueller D, Abel R, Brandt R, Zoeckler M, Menzel R (2002) Differential parallel processing of olfactory information in the honeybee, *apis mellifera* l. *J Comp Physiol A* 188:359–370.
- Naegerl U, Eberhorn E, Cambridge S, Bonhoeffer T (2004) Bidirectional activity-dependent morphological plasticity in hippocampal neurons. *Neuron* 44:759–767.
- Nawrot M, Aertsen A, Rotter S (1999) Single-trial estimation of neuronal firing rates: From single-neuron spike trains to population activity. *J Neurosci* 94.
- Page E, Scheiner R, Erber J, Amdam G (2006) The development and evolution of division of labor and foraging specialization in a social insect (*Apis mellifera* L.). *Curr Top in Dev Biol* 74:253–286.
- Parzen E (1962) On estimation of a probability density function and mode. *Annals of Mathematical Statistics* 33:1065–1076.
- Pasternak J, Woolsey T (1987) On the selectivity of the golgi-cox method. *J Comp Neurol* 160:307–312.
- Phillips T, Jiang X, Burkholder W, Phillips J, Tran H (1993) Behavioral responses to food volatiles by two species of stored-product coleoptera, *Sitophilus oryzae* (curculionidae) and *Tribolium castaneum* (tenebrionidae). *J Chem Ecol* 19:723–734.
- Pichersky E, Gershenson J (2002) The formation and function of plant volatiles: perfumes for pollinator attraction and defense. *Curr Opin Plant Biol* 5:337–343.
- Reichmuth C, Becker S, Benz M, Debel K, Reisch D, Heimbeck G, Hofbauer A, Klagges B, Pflugfelder G, Buchner E (1995) The sap47 gene of *Drosophila melanogaster* codes for a novel conserved neuronal protein associated with synaptic terminals. *Brain Res Mol Brain Res* 32:4554.
- Rein K, Zoeckler M, Mader M, Gruebel C, Heisenberg M (2002) The *Drosophila* standard brain. *Curr Biol* 12:227231.

- Robinson G (2006) Regulation of honey bee age polyethism by juvenile hormone. *Behav Ecol Sociobiol* 20:329–338.
- Rodriguez A, Ehlenberger D, Kelliher K, Einstein M, Henderson S, Morrison J, Hof P, Wearne S (2003) Automated reconstruction of three-dimensional neuronal morphology from laser scanning microscopy images. *Methods* 30.
- Roesch G (1925) Untersuchungen ueber die arbeitsteilung im bienenstaat. *Universitaetsinstitute Rostock und Breslau* pp. 571–631.
- Roessler W, Kuduz J, Schuermann F, Schild D (2002) Aggregation of f-actin in olfactory glomeruli: a common feature of glomeruli across phyla. *Chem Senses* 27:803–810.
- Rohlfing T, Brandt R, Maurer C, Menzel R (2001) Bee brains, b-splines and computational democracy: generating an average shape atlas. *Proc Biom Image Anal* p. 187194.
- Rohlfing T, Brandt R, Maurer C, Menzel R (2004) Evaluation of atlas selection strategies for atlas-based image segmentation with application to confocal microscopy images of bee brains. *Neuroimage* 21:14281442.
- Rubin B, Katz L (1999) Optical imaging of odorant representations in the mammalian olfactory bulb. *Neuron* 23.
- Rybak J, Mauelshagen J (1994) *The PE-1 neuron of the honeybee an efferent pathway from the mushroom bodies to the protocerebral lobe*. Goettingen Neurobiology Report, Stuttgart: Georg Thieme.
- Rybak J, Menzel R (1993) Anatomy of the mushroom bodies in the honey bee brain: the neuronal connections of the alpha-lobe. *J Comp Neurol* 334:444465.
- Rybak J, Menzel R (1998) Integrative properties of the pe1-neuron, a unique mushroom body output neuron. *Learn Mem* 5:133145.
- Sachse S (2002) Odor processing in the honeybee antennal lobe Ph.D. diss., Freie Universitaet Berlin.

- Sachse S, Rappter A, Galizia C (1999) The spatial representation of chemical structures in the antennal lobe of honeybees: steps towards the olfactory code. *Eur J Neurosci* 11.
- Satou M, Fujita I, Ichikawa M, Yamaguchi K, Ueda K (1983) Field potential and intracellular potential studies of the olfactory bulb in carp: evidence for a functional separation of the olfactory bulb into lateral and medial subdivisions. *J Comp Physiol* 152A:319–333.
- Schaefer S, Bicker G, Ottersen O, Storm-Mathisen J (1988) Taurine-like immunoreactivity in the brain of the honeybee. *J Comp Neurol* 268.
- Schmitt S, Evers J, Duch C, Scholz M, Obermayer K (2004) New methods for the computer-assisted 3-d reconstruction of neurons from confocal image stacks. *Neuroimage* 23:12831298.
- Schroeter U, Menzel R (2003) A new ascending sensory tract to the calyces of the honeybee mushroom body, the subesophageal-calycal tract. *J Comp Neurol* 465:168178.
- Sederberg T, Parry S (1986) Free-form deformation and solid geometric models. *Comput Graphics* 20:151160.
- Seeley T (2002) When is self-organization used in biological systems ? *Biol Bull* 437:314–318.
- Shipley M, Ennis M (1996) Functional organization of olfactory system. *J Neurobiol* 30.
- Sorensen P, Hara T, Stacey N (1991) Sex pheromones selectively stimulate the medial olfactory tracts of male goldfish. *Brain Res* 558:343–347.
- Stacey N, Kyle A (1983) Effects of olfactory tract lesions on sexual and feeding behavior in the goldfish. *Physiol Behav* 30:621–628.
- Staubli U, Fraser D, Faraday R, Lynch G (1987) Olfaction and the “data” memory system in rats. *Behav Neurosci* 101:757–765.
- Stepanyants A, Hof P, Chklovskii D (2002) Geometry and structural plasticity of synaptic connectivity. *Neuron* 34:275–288.

- Stopfer M, Jayaraman V, Laurent G (2003) Intensity versus identity coding in an olfactory system. *Neuron* 39:991–1004.
- Strausfeld N (2002) Organization of the honey bee mushroom body: representation of the calyx within the vertical and gamma lobes. *J Comp Neurol* 450:433.
- Studholme C, Hill D, Hawkes D (1999) An overlap invariant entropy measure of 3d medical image alignment. *Pattern Recogn* 32:7186.
- Sun X, Fonta C, Masson C (1993) Distinct mechanisms for synchronization and temporal patterning of odor-encoding neural assemblies. *Chem Senses* 18.
- Sun X, Tolbert L, Hildebrand J (1997) Synaptic organization of the uniglomerular projection neurons of the antennal lobe of the moth *Manduca sexta*: A laser scanning confocal and electron microscopic study. *J Comp Neurol* 379:2–20.
- Suzuki H (1975) Antennal movements induced by odor and central projection of the antennal neurones in the honeybee. *J Insect Physiol* 21.
- Szyszka P, Ditzen M, Galkin A, Galizia C, Menzel R (2005) Sparsening and temporal sharpening of olfactory representations in the honeybee mushroom bodies. *J Neurophysiol* 94.
- Tabor R, Yaksi E, Weislogel J, Friedrich R (2004) Processing of odor mixtures in the zebrafish olfactory bulb. *J Neurosci* 24.
- Toga A, Thompson P (2001) Maps of the brain. *Anat Rec* 265:3753.
- Toga A, Thompson P, Mori S, Amuts K, Zilles K (2006) Towards multimodal atlases of the human brain. *Nat Rev Neurosci* 7.
- Uchida N, Takahashi J, Tanifuji M, Mori K (2000) Odor maps in the mammalian olfactory bulb: domain organization and odorant structural features. *Nat Neurosci* 3.
- Van Essen D (2002) Windows on the brain: the emerging role of atlases and databases in neuroscience. *Curr Opin Neurobiol* 12:574579.
- Von Frisch K (1967) *The dance language and orientation of bees*. Cambridge, MA: Harvard University Press.

- Vosshall J, Wong A, Axel R (2000) An olfactory sensory map in the fly brain. *Cell* 102.
- Wachowiak M, Cohen L (2001) Representation of odorants by receptor neuron input to the mouse olfactory bulb. *Neuron* 32.
- Wachowiak M, Cohen L, Zochowski M (2002) Distributed and concentration-invariant spatial representations of odorants by receptor neuron input to the turtle olfactory bulb. *J Neurophysiol* 87.
- Wachowiak M, Denk W, Friedrich R (2004) Functional organization of sensory input to the olfactory bulb glomerulus analyzed by two-photon calcium imaging. *PNAS* 101.
- Wellis D, Scott J, Harrison T (1989) Discrimination among odorants by single neurons of the rat olfactory bulb. *J Neurophysiol* 61.
- Weltzien F, Hoglund E, Hamdani E, Doving K (2003) Does the lateral bundle of the medial olfactory tract mediate reproductive behaviour in male crucian carp? *Chem Senses* 28:293–300.
- Wilson D, Kadohisa M, Fletcher M (2006) Cortical contributions to olfaction: Plasticity and perception. *Sem in Cell and Dev Biol* 17:462–470.
- Wilson D, Stevenson R (2003) Olfactory perceptual learning: the critical role of memory in odor discrimination. *Neurosci Behav Res* 27.
- Wilson R, Turner G, Laurent G (2004) Transformation of olfactory representations in the *Drosophila* antennal lobe. *Science* 303.
- Wiltrot C, Dogra S, Linster C (2003) Configurational and nonconfigurational interactions between odorants in binary mixtures. *Behav Neurosci* 117:236–245.
- Winston M (1987) The biology of the honey bee. Cambridge MA 101:42684273.
- Withers G, Fahrbach S, Ronginson G (2006) Effects of experience and juvenile hormone on the organization of the mushroom bodies of honey bees. *J Neurobiol* 26:130–144.

- Withers G, Fahrbach S, Robinson G (1993) Selective neuroanatomical plasticity and division of labour in the honeybee. *Nature* 364:238–240.
- Witthoeft W (1967) Absolute anzahl und verteilung der zellen im hirn der honigbiene. *Zool Morphol Tiere* 61:160184.
- Woo C, Leon M (1987) Sensitive period for neural and behavioral response development to learned odors. *Brain Res Dev* 36.
- Woo C, Leon M (1991) Increase in a focal population of juxtaglomerular cells in the olfactory bulb associated with early learning. *J Comp Neurol* 305.
- Yusuyama K, Meinertzhagen I, Schurmann F (2002) Synaptic organization of the mushroom body calyx in *Drosophila melanogaster*. *J Comp Neurol* 445:211–226.
- Zou Z, Horowitz L, Montmayeur J, Snapper S, Buck L (2001) Genetic tracing reveals a stereotyped sensory map in the olfactory cortex. *Nature* 414.
- Zuschratter W, Steffen T, Braun K, Herzog A, Michaelis B, Scheich H (1998) *Acquisition of multiple image stacks with a confocal laser scanning microscope*. Proceedings of three-dimensional and multidimensional image acquisition and processing.