

7. Literaturverzeichnis

Ache,B.W. (1994). Towards a common strategy for transducing olfactory information. *Semin Cell Biol* 5, 55-63.

Altschul,S.F., Gish,W., Miller,W., Myers,E.W., and Lipman,D.J. (1990). Basic local alignment search tool. *J Mol Biol* 215, 403-410.

Asai,H., Kasai,H., Matsuda,Y., Yamazaki,N., Nagawa,F., Sakano,H., and Tsuboi,A. (1996). Genomic structure and transcription of a murine odorant receptor gene: differential initiation of transcription in the olfactory and testicular cells. *Biochem Biophys Res Commun* 221, 240-247.

Axel,R. (1995). Die Entschlüsselung des Riechens. *Spektrum der Wissenschaft Dez* 1995, 72-78.

Bakalyar,H.A. and Reed,R.R. (1990). Identification of a specialized adenylyl cyclase that may mediate odorant detection. *Science* 250, 1403-1406.

Baltimore,D. (2001). Our genome unveiled. *Nature* 409, 814-816.

Barth,A.L., Dugas,J.C., and Ngai,J. (1997). Noncoordinate expression of odorant receptor genes tightly linked in the zebrafish genome. *Neuron* 19, 359-369.

Beauchamp,G.K. and Yamazaki,K. (1997). HLA and mate selection in humans: commentary. *Am J Hum Genet* 61, 494-496.

Beaudoing,E., Freier,S., Wyatt,J.R., Claverie,J.M., and Gautheret,D. (2000). Patterns of variant polyadenylation signal usage in human genes. *Genome Res* 10, 1001-1010.

Belluscio,L., Gold,G.H., Nemes,A., and Axel,R. (1998). Mice deficient in G(olf) are anosmic. *Neuron* 20, 69-81.

Ben-Arie,N., Lancet,D., Taylor,C., Khen,M., Walker,N., Ledbetter,D.H., Carrozzo,R., Patel,K., Sheer,D., and Lehrach,H. (1994). Olfactory receptor gene cluster on human chromosome 17: possible duplication of an ancestral receptor repertoire. *Hum Mol Genet* 3, 229-235.

Bennett,L.M., Brownlee,H.A., Hagavik,S., and Wiseman,R.W. (1999). Sequence analysis of the rat Brca1 homolog and its promoter region. *Mamm Genome* 10, 19-25.

Berliner,D.L., Monti-Bloch,L., Jennings-White,C., and Diaz-Sanchez,V. (1996). The functionality of the human vomeronasal organ (VNO): evidence for steroid receptors. *J Steroid Biochem Mol Biol* 58, 259-265.

- Blanpain,C., Lee,B., Vakili,J., Doranz,B.J., Govaerts,C., Migeotte,I., Sharron,M., Dupriez,V., Vassart,G., Doms,R.W., and Parmentier,M. (1999). Extracellular cysteines of CCR5 are required for chemokine binding, but dispensable for HIV-1 coreceptor activity. *J. Biol. Chem.* 274, 18902-18908.
- Bodmer,J.G., Marsh,S.G., Albert,E.D., Bodmer,W.F., Bontrop,R.E., Dupont,B., Erlich,H.A., Hansen,J.A., Mach,B., Mayr,W.R., Parham,P., Petersdorf,E.W., Sasazuki,T., Schreuder,G.M., Strominger,J.L., Svejgaard,A., and Terasaki,P.I. (1999). Nomenclature for factors of the HLA system, 1998. *Vox Sang* 77, 164-191.
- Boekhoff,I., Tareilus,E., Strotmann,J., and Breer,H. (1990). Rapid activation of alternative second messenger pathways in olfactory cilia from rats by different odorants. *EMBO J* 9, 2453-2458.
- Bradley,J., Li,J., Davidson,N., Lester,H.A., and Zinn,K. (1994). Heteromeric olfactory cyclic nucleotide-gated channels: a subunit that confers increased sensitivity to cAMP. *Proc Natl Acad Sci U S A* 91, 8890-8894.
- Brand-Arpon,V., Rouquier,S., Massa,H., de Jong,P.J., Ferraz,C., Ioannou,P.A., Demaille,J.G., Trask,B.J., and Giorgi,D. (1999). A genomic region encompassing a cluster of olfactory receptor genes and a myosin light chain kinase (MYLK) gene is duplicated on human chromosome regions 3q13-q21 and 3p13. *Genomics* 56, 98-110.
- Branscomb,A., Seger,J., and White,R.L. (2000). Evolution of odorant receptors expressed in mammalian testes. *Genetics* 156, 785-797.
- Briand,L., Nespolous,C., Perez,V., Remy,J.J., Huet,J.C., and Pernollet,J.C. (2000). Ligand-binding properties and structural characterization of a novel rat odorant-binding protein variant. *Eur J Biochem* 267, 3079-3089.
- Brown,R.E., Roser,B., and Singh,P.B. (1989). Class I and class II regions of the major histocompatibility complex both contribute to individual odors in congenic inbred strains of rats. *Behav Genet* 19, 659-674.
- Brunet,L.J., Gold,G.H., and Ngai,J. (1996). General anosmia caused by a targeted disruption of the mouse olfactory cyclic nucleotide-gated cation channel. *Neuron* 17, 681-693.
- Buck,L. and Axel,R. (1991). A novel multigene family may encode odorant receptors: a molecular basis for odor recognition. *Cell* 65, 175-187.
- Buck,L.B. (1996). Information coding in the vertebrate olfactory system. *Annu Rev Neurosci* 19, 517-544.
- Campbell,R.D. and Trowsdale,J. (1993). Map of the human MHC. *Immunol Today* 14, 349-352.
- Chess,A., Simon,I., Cedar,H., and Axel,R. (1994). Allelic inactivation regulates olfactory receptor gene expression. *Cell* 78 , 823-834.

- Church,G.M. and Gilbert,W. (1984). Genomic sequencing. *Proc Natl Acad Sci U S A* **81**, 1991-1995.
- Corpet,F. (1988). Multiple sequence alignment with hierarchical clustering. *Nucleic Acids Res* **16**, 10881-10890.
- Diehn,S.H., Chiu,W.L., De Rocher,E.J., and Green,P.J. (1998). Premature polyadenylation at multiple sites within a *Bacillus thuringiensis* toxin gene-coding region. *Plant Physiol* **117**, 1433-1443.
- Dionne,V.E. and Dubin,A.E. (1994). Transduction diversity in olfaction. *J Exp Biol* **194**, 1-21.
- Dixon,A.K., Richardson,P.J., Lee,K., Carter,N.P., and Freeman,T.C. (1998). Expression profiling of single cells using 3 prime end amplification (TPEA) PCR. *Nucleic Acids Res* **26**, 4426-4431.
- Dong,S., Lester,L., and Johnson,L.F. (2000). Transcriptional control elements and complex initiation pattern of the TATA-less bidirectional human thymidylate synthase promoter. *J Cell Biochem* **77**, 50-64.
- Doty,R.L. (1986). Odor-guided behavior in mammals. *Experientia* **42**, 257-271.
- Dreyer,W.J. (1998). The area code hypothesis revisited: olfactory receptors and other related transmembrane receptors may function as the last digits in a cell surface code for assembling embryos. *Proc Natl Acad Sci U S A* **95**, 9072-9077.
- Drutel,G., Arrang,J.M., Diaz,J., Wisnewsky,C., Schwartz,K., and Schwartz,J.C. (1995). Cloning of OL1, a putative olfactory receptor and its expression in the developing rat heart. *Receptors Channels* **3**, 33-40.
- Dryer,L. (2000). Evolution of odorant receptors. *Bioessays* **22**, 803-810.
- Dulac,C. and Axel,R. (1995). A novel family of genes encoding putative pheromone receptors in mammals. *Cell* **83**, 195-206.
- Ehlers,A., Beck,S., Forbes,S.A., Trowsdale,J., Volz,A., Younger,R., and Ziegler,A. (2000). MHC-Linked olfactory receptor loci exhibit polymorphism and contribute to extended HLA/OR-haplotypes. *Genome Res* **10**, 1968-1978.
- Fan,W., Liu,Y.C., Parimoo,S., and Weissman,S.M. (1995). Olfactory receptor-like genes are located in the human major histocompatibility complex. *Genomics* **27**, 119-123.
- Feinberg,A.P. and Vogelstein,B. (1984). "A technique for radiolabeling DNA restriction endonuclease fragments to high specific activity". Addendum. *Anal Biochem* **137**, 266-267.
- Friedrich,R.W. and Korschning,S.I. (1997). Combinatorial and chemotopic odorant coding in the zebrafish olfactory bulb visualized by optical imaging. *Neuron* **18**, 737-752.

Frings,S., Reuter,D., and Kleene,S.J. (2000). Neuronal Ca²⁺ -activated Cl⁻ channels--homing in on an elusive channel species. *Prog Neurobiol* 60, 247-289.

Fuchs,T., Glusman,G., Horn-Saban,S., Lancet,D., and Pilpel,Y. (2001). The human olfactory subgenome: from sequence to structure and evolution. *Hum. Genet.* 108, 1-13.

Gilad,Y., Segre,D., Skorecki,K., Nachman,M.W., Lancet,D., and Sharon,D. (2000). Dichotomy of single-nucleotide polymorphism haplotypes in olfactory receptor genes and pseudogenes. *Nat Genet* 26, 221-224.

Glusman,G., Clifton,S., Roe,B., and Lancet,D. (1996). Sequence analysis in the olfactory receptor gene cluster on human chromosome 17: recombinatorial events affecting receptor diversity. *Genomics* 37, 147-160.

Glusman,G., Sosinsky,A., Ben-Asher,E., Avidan,N., Sonkin,D., Bahar,A., Rosenthal,A., Clifton,S., Roe,B., Ferraz,C., Demaille,J., and Lancet,D. (2000). Sequence, Structure, and Evolution of a Complete Human Olfactory Receptor Gene Cluster. *Genomics* 63, 227-245.

Goto,T., Adjaye,J., Rodeck,C.H., and Monk,M. (1999). Identification of genes expressed in human primordial germ cells at the time of entry of the female germ line into meiosis. *Mol Hum Reprod* 5, 851-860.

Gruen,J.R., Nalabolu,S.R., Chu,T.W., Bowlus,C., Fan,W.F., Goei,V.L., Wei,H., Sivakamasundari,R., Liu,Y., Xu,H.X., Parimoo,S., Nallur,G., Ajioka,R., Shukla,H., Bray-Ward,P., Pan,J., and Weissman,S.M. (1996). A transcription map of the major histocompatibility complex (MHC) class I region. *Genomics* 36, 70-85.

Haffani,Y.Z., Overney,S., Yelle,S., Bellemare,G., and Belzile,F.J. (2000). Premature polyadenylation contributes to the poor expression of the *Bacillus thuringiensis cry3Ca1* gene in transgenic potato plants. *Mol Gen Genet* 264, 82-88.

Harada,H., Kimura,A., Dong,R.P., Xu,X.P., Bhatia,K., and Sasazuki,T. (1992). Sequencing and population analysis of four novel HLA-DPA1 alleles. *Hum. Immunol.* 35, 173-178.

Hedin,K.E., Duerson,K., and Clapham,D.E. (1993). Specificity of receptor-G protein interactions: searching for the structure behind the signal. *Cell Signal* 5, 505-518.

Heinrichs,H., Wernet,P., and Ziegler,A. (1980). Expression of major histocompatibility antigens on human thymocytes studied using monoclonal antibodies. *Immunogenetics* 11, 629-635.

Herrada,G. and Dulac,C. (1997). A novel family of putative pheromone receptors in mammals with a topographically organized and sexually dimorphic distribution. *Cell* 90, 763-773.

- Hoffmann,C., Moro,S., Nicholas,R.A., Harden,T.K., and Jacobson,K.A. (1999). The role of amino acids in extracellular loops of the human P2Y1 receptor in surface expression and activation processes. *J. Biol. Chem.* 274, 14639-14647.
- Honjo,T., Packman,S., Swan,D., Nau,M., and Leder,P. (1974). Organization of immunoglobulin genes: reiteration frequency of the mouse kappa chain constant region gene. *Proc. Natl. Acad. Sci U. S. A* 71, 3659-3663.
- Jacob,F. and Monod,J. (1961). Genetic regulatory mechanisms in the synthesis of proteins. *J Mol Biol* 3, 318-356.
- Janeway,C.A. and Travers,P. (1997). In *Immunologie*, (Heidelberg, Berlin, Oxford: Spektrum Akademischer Verlag GmbH).
- Jones,D.T. and Reed,R.R. (1989). Golf: an olfactory neuron specific-G protein involved in odorant signal transduction. *Science* 244, 790-795.
- Keverne,E.B. (1999). The vomeronasal organ. *Science* 286, 716-720.
- Kim,J., Bergmann,A., and Stubbs,L. (2000). Exon sharing of a novel human zinc-finger gene, ZIM2, and paternally expressed gene 3 (PEG3). *Genomics* 64, 114-118.
- Kleene,S.J., Gesteland,R.C., and Bryant,S.H. (1994). An electrophysiological survey of frog olfactory cilia. *J Exp Biol* 195, 307-328.
- Krautwurst,D., Yau,K.W., and Reed,R.R. (1998). Identification of ligands for olfactory receptors by functional expression of a receptor library. *Cell* 95, 917-926.
- Kumar,S. and Hedges,S.B. (1998). A molecular timescale for vertebrate evolution. *Nature* 392, 917-920.
- Lapidot,M., Pilpel,Y., Gilad,Y., Falcovitz,A., Sharon,D., Haaf,T., and Lancet,D. (2001). Mouse-Human Orthology Relationships in an Olfactory Receptor Gene Cluster. *Genomics* 71, 296-306.
- Le Gouill,C., Parent,J.L., Rola-Pleszczynski,M., and Stankova,J. (1997). Role of the Cys90, Cys95 and Cys173 residues in the structure and function of the human platelet-activating factor receptor. *FEBS Lett.* 402, 203-208.
- Lee,S.G. and Song,K. (2000). Identification and characterization of a bidirectional promoter from the intergenic region between the human DDX13 and RD genes. *Mol Cells* 10, 47-53.
- Leinders-Zufall,T., Lane,A.P., Puche,A.C., Ma,W., Novotny,M.V., Shipley,M.T., and Zufall,F. (2000). Ultrasensitive pheromone detection by mammalian vomeronasal neurons. *Nature* 405, 792-796.
- Li,N. and Seetharam,B. (1998). A 69-base pair fragment derived from human transcobalamin II promoter is sufficient for high bidirectional activity in the absence of a TATA box and an initiator

element in transfected cells. Role of an E box in transcriptional activity. *J Biol Chem* 273 , 28170-28177.

Liman,E.R. and Buck,L.B. (1994). A second subunit of the olfactory cyclic nucleotide-gated channel confers high sensitivity to cAMP. *Neuron* 13, 611-621.

Ling,K., Wang,P., Zhao,J., Wu,Y.L., Cheng,Z.J., Wu,G.X., Hu,W., Ma,L., and Pei,G. (1999). Five-transmembrane domains appear sufficient for a G protein-coupled receptor: functional five-transmembrane domain chemokine receptors. *Proc Natl Acad Sci U S A* 96, 7922-7927.

Malfroy,L., Roth,M.P., Carrington,M., Borot,N., Volz,A., Ziegler,A., and Coppin,H. (1997). Heterogeneity in rates of recombination in the 6-Mb region telomeric to the human major histocompatibility complex. *Genomics* 43, 226-231.

Malnic,B., Hirono,J., Sato,T., and Buck,L.B. (1999). Combinatorial receptor codes for odors. *Cell* 96, 713-723.

Matsunami,H. and Buck,L.B. (1997). A multigene family encoding a diverse array of putative pheromone receptors in mammals. *Cell* 90, 775-784.

Milinski,M. and Wedekind,C. (2001). Evidence for MHC-correlated perfume preferences in humans. *Behavioral Ecology* 12, 140-149.

Mironov,A.A., Fickett,J.W., and Gelfand,M.S. (1999). Frequent alternative splicing of human genes. *Genome Res* 9, 1288-1293.

Mombaerts,P. (1999a). Molecular biology of odorant receptors in vertebrates. *Annu Rev Neurosci* 22, 487-509.

Mombaerts,P. (1999b). Odorant receptor genes in humans. *Genetics of disease* ?, 315-320.

Mombaerts,P. (1999c). Seven-Transmembrane Proteins as Odorant and Chemosensory Receptors. *Science* 286, 707-711.

Mombaerts,P., Wang,F., Dulac,C., Chao,S.K., Nemes,A., Mendelsohn,M., Edmondson,J., and Axel,R. (1996). Visualizing an olfactory sensory map. *Cell* 87, 675-686.

Mullis,K., Falloona,F., Scharf,S., Saiki,R., Horn,G., and Erlich,H. (1986). Specific enzymatic amplification of DNA in vitro: the polymerase chain reaction. *Cold Spring Harb Symp Quant Biol* 51 Pt 1, 263-273.

Ngai,J., Chess,A., Dowling,M.M., Necles,N., Macagno,E.R., and Axel,R. (1993). Coding of olfactory information: topography of odorant receptor expression in the catfish olfactory epithelium. *Cell* 72, 667-680.

- O'Leary,D.D., Yates,P.A., and McLaughlin,T. (1999). Molecular development of sensory maps: representing sights and smells in the brain. *Cell* 96, 255-269.
- O'Shea,S.F., Chaure,P.T., Halsall,J.R., Olesnick,N.S., Leibbrandt,A., Connerton,I.F., and Casselton,L.A. (1998). A large pheromone and receptor gene complex determines multiple B mating type specificities in *Coprinus cinereus*. *Genetics* 148, 1081-1090.
- Okada,Y., Teeter,J.H., and Restrepo,D. (1994). Inositol 1,4,5-trisphosphate-gated conductance in isolated rat olfactory neurons. *J Neurophysiol* 71, 595-602.
- Orii,K.E., Orii,K.O., Souris,M., Orii,T., Kondo,N., Hashimoto,T., and Aoyama,T. (1999). Genes for the human mitochondrial trifunctional protein alpha- and beta-subunits are divergently transcribed from a common promoter region. *J Biol Chem* 274, 8077-8084.
- Pantages,E. and Dulac,C. (2000). A Novel Family of Candidate Pheromone Receptors in Mammals. *Neuron* 28, 835-845.
- Parmentier,M., Libert,F., Schurmans,S., Schiffmann,S., Lefort,A., Eggerickx,D., Ledent,C., Mollereau,C., Gerard,C., and Perret,J. (1992). Expression of members of the putative olfactory receptor gene family in mammalian germ cells. *Nature* 355, 453-455.
- Penn,D. and Potts,W. (1998a). How do major histocompatibility complex genes influence odor and mating preferences? *Adv Immunol* 69, 411-436.
- Penn,D. and Potts,W. (1998b). MHC-disassortative mating preferences reversed by cross-fostering. *Proc R Soc Lond B Biol Sci* 265, 1299-1306.
- Penn,D. and Potts,W.K. (1998c). Untrained mice discriminate MHC-determined odors. *Physiol Behav* 64, 235-243.
- Peters,H.C., Kammer,G., Volz,A., Kaupmann,K., Ziegler,A., Bettler,B., Epplen,J.T., Sander,T., and Riess,O. (1998). Mapping, genomic structure, and polymorphisms of the human GABABR1 receptor gene: evaluation of its involvement in idiopathic generalized epilepsy. *Neurogenetics* 2, 47-54.
- Pilpel,Y. and Lancet,D. (1999). The variable and conserved interfaces of modeled olfactory receptor proteins. *Protein Sci* 8, 969-977.
- Pilpel,Y., Sosinsky,A., and Lancet,D. (1998). Molecular biology of olfactory receptors. *Essays Biochem* 33, 93-104.
- Potts,W.K., Manning,C.J., and Wakeland,E.K. (1991). Mating patterns in seminatural populations of mice influenced by MHC genotype. *Nature* 352, 619-621.
- Potts,W.K. and Wakeland,E.K. (1993). Evolution of MHC genetic diversity: a tale of incest, pestilence and sexual preference. *Trends Genet* 9, 408-412.

- Qasba,P. and Reed,R.R. (1998). Tissue and zonal-specific expression of an olfactory receptor transgene. *J Neurosci* 18, 227-236.
- Rawson,N.E., Eberwine,J., Dotson,R., Jackson,J., Ulrich,P., and Restrepo,D. (2000). Expression of mRNAs encoding for two different olfactory receptors in a subset of olfactory receptor neurons. *J Neurochem* 75, 185-195.
- Ressler,K.J., Sullivan,S.L., and Buck,L.B. (1993). A zonal organization of odorant receptor gene expression in the olfactory epithelium. *Cell* 73, 597-609.
- Ressler,K.J., Sullivan,S.L., and Buck,L.B. (1994a). A molecular dissection of spatial patterning in the olfactory system. *Curr Opin Neurobiol* 4, 588-596.
- Ressler,K.J., Sullivan,S.L., and Buck,L.B. (1994b). Information coding in the olfactory system: evidence for a stereotyped and highly organized epitope map in the olfactory bulb. *Cell* 79, 1245-1255.
- Restrepo,D., Miyamoto,T., Bryant,B.P., and Teeter,J.H. (1990). Odor stimuli trigger influx of calcium into olfactory neurons of the channel catfish. *Science* 249, 1166-1168.
- Ronnett,G.V., Cho,H., Hester,L.D., Wood,S.F., and Snyder,S.H. (1993). Odorants differentially enhance phosphoinositide turnover and adenylyl cyclase in olfactory receptor neuronal cultures. *J Neurosci* 13, 1751-1758.
- Rouquier,S., Blancher,A., and Giorgi,D. (2000). The olfactory receptor gene repertoire in primates and mouse: evidence for reduction of the functional fraction in primates. *Proc Natl Acad Sci U S A* 97, 2870-2874.
- Rouquier,S., Friedman,C., Delettre,C., van den Engh,G., Blancher,A., Crouau-Roy,B., Trask,B.J., and Giorgi,D. (1998a). A gene recently inactivated in human defines a new olfactory receptor family in mammals. *Hum Mol Genet* 7, 1337-1345.
- Rouquier,S., Taviaux,S., Trask,B.J., Brand-Arpon,V., van den Engh,G., Demaille,J., and Giorgi,D. (1998b). Distribution of olfactory receptor genes in the human genome. *Nat Genet* 18, 243-250.
- Rülicke,T., Chapuisat,M., Homberger,F.R., Macas,E., and Wedekind,C. (1998). MHC-genotype of progeny influenced by parental infection. *Proc R Soc Lond B Biol Sci* 265, 711-716.
- Sanger,F., Nicklen,S., and Coulson,A.R. (1977). DNA sequencing with chain-terminating inhibitors. *Proc Natl Acad Sci U S A* 74, 5463-5467.
- Sato,T., Hirono,J., Tonoike,M., and Takebayashi,M. (1994). Tuning specificities to aliphatic odorants in mouse olfactory receptor neurons and their local distribution. *J Neurophysiol* 72, 2980-2989.
- Sayegh,C.E., Drury,G., and Ratcliffe,M.J. (1999). Efficient antibody diversification by gene conversion in vivo in the absence of selection for V(D)J-encoded determinants. *EMBO J* 18, 6319-6328.

- Schild,D. and Restrepo,D. (1998). Transduction mechanisms in vertebrate olfactory receptor cells. *Physiol Rev* 78, 429-466.
- Schülein,R., Rutz,C., and Rosenthal,W. (1996). Membrane targeting and determination of transmembrane topology of the human vasopressin V2 receptor. *J. Biol. Chem.* 271, 28844-28852.
- Scott,J.W., Wellis,D.P., Riggott,M.J., and Buonviso,N. (1993). Functional organization of the main olfactory bulb. *Microsc Res Tech* 24, 142-156.
- Sharon,D., Gilad,Y., Glusman,G., Khen,M., Lancet,D., and Kalush,F. (2000). Identification and characterization of coding single-nucleotide polymorphisms within a human olfactory receptor gene cluster. *Gene* 260, 87-94.
- Sharon,D., Glusman,G., Pilpel,Y., Khen,M., Gruetzner,F., Haaf,T., and Lancet,D. (1999). Primate Evolution of an Olfactory Receptor Cluster: Diversification by Gene Conversion and Recent Emergence of Pseudogenes. *Genomics* 61, 24-36.
- Singh,P.B., Brown,R.E., and Roser,B. (1987). MHC antigens in urine as olfactory recognition cues. *Nature* 327, 161-164.
- Skoufos,E. (1999). Conserved sequence motifs of olfactory receptor-like proteins may participate in upstream and downstream signal transduction. *Receptors Channels* 6, 401-413.
- Smith,G.P., Hood,L., and Fitch,W.M. (1971). Antibody diversity. *Annu. Rev. Biochem.* 40, 969-1012.
- Sosinsky,A., Glusman,G., and Lancet,D. (2000). The Genomic Structure of Human Olfactory Receptor Genes. *Genomics* 70, 49-61.
- Southern,E.M. (1975). Detection of specific sequences among DNA fragments separated by gel electrophoresis. *J Mol Biol* 98, 503-517.
- Sternweis,P.C. (1994). The active role of beta gamma in signal transduction. *Curr Opin Cell Biol* 6, 198-203.
- Strachan,T. and Raed,A.P. (1996). In *Molekulare Humangenetik*, (Heidelberg, Berlin, Oxford: Spektrum Akademischer Verlag).
- Strotmann,J., Wanner,I., Helfrich,T., Beck,A., Meinken,C., Kubick,S., and Breer,H. (1994). Olfactory neurones expressing distinct odorant receptor subtypes are spatially segregated in the nasal neuroepithelium. *Cell Tissue Res* 276, 429-438.
- Sullivan,S.L., Adamson,M.C., Ressler,K.J., Kozak,C.A., and Buck,L.B. (1996). The chromosomal distribution of mouse odorant receptor genes. *Proc Natl Acad Sci U S A* 93, 884-888.
- Tatsura,H., Nagao,H., Tamada,A., Sasaki,S., Kohri,K., and Mori,K. (2001). Developing germ cells in mouse testis express pheromone receptors. *FEBS Lett.* 488, 139-144.

The MHC sequencing consortium (1999). Complete sequence and gene map of a human major histocompatibility complex. The MHC sequencing consortium. *Nature* 401, 921-923.

Tonegawa,S., Steinberg,C., Dube,S., and Bernardini,A. (1974). Evidence for somatic generation of antibody diversity. *Proc. Natl. Acad. Sci U. S. A* 71, 4027-4031.

Touhara,K., Sengoku,S., Inaki,K., Tsuboi,A., Hirono,J., Sato,T., Sakano,H., and Haga,T. (1999). Functional identification and reconstitution of an odorant receptor in single olfactory neurons. *Proc Natl Acad Sci U S A* 96, 4040-4045.

Trask,B.J., Friedman,C., Martin-Gallardo,A., Rowen,L., Akinbami,C., Blankenship,J., Collins,C., Giorgi,D., Iadonato,S., Johnson,F., Kuo,W.L., Massa,H., Morrish,T., Naylor,S., Nguyen,O.T., Rouquier,S., Smith,T., Wong,D.J., Youngblom,J., and van den Engh,G. (1998a). Members of the olfactory receptor gene family are contained in large blocks of DNA duplicated polymorphically near the ends of human chromosomes. *Hum Mol Genet* 7, 13-26.

Trask,B.J., Massa,H., Brand-Arpon,V., Chan,K., Friedman,C., Nguyen,O.T., Eichler,E., van den Engh,G., Rouquier,S., Shizuya,H., and Giorgi,D. (1998b). Large multi-chromosomal duplications encompass many members of the olfactory receptor gene family in the human genome. *Hum Mol Genet* 7 , 2007-2020.

Tsuboi,A., Yoshihara,S., Yamazaki,N., Kasai,H., Asai-Tsuboi,H., Komatsu,M., Serizawa,S., Ishii,T., Matsuda,Y., Nagawa,F., and Sakano,H. (1999). Olfactory neurons expressing closely linked and homologous odorant receptor genes tend to project their axons to neighboring glomeruli on the olfactory bulb. *J Neurosci* 19, 8409-8418.

Van-Els,C.A., Zantvoort,E., Jacobs,N., Bakker,A., van Rood,J.J., and Goulmy,E. (1990). Graft-versus-host disease associated T helper cell responses specific for minor histocompatibility antigens are mainly restricted by HLA-DR molecules. *Bone-Marrow-Transplant*. 5, 365-372.

Vanderhaeghen,P., Schurmans,S., Vassart,G., and Parmentier,M. (1993). Olfactory receptors are displayed on dog mature sperm cells. *J Cell Biol* 123, 1441-1452.

Vanderhaeghen,P., Schurmans,S., Vassart,G., and Parmentier,M. (1997a). Molecular cloning and chromosomal mapping of olfactory receptor genes expressed in the male germ line: evidence for their wide distribution in the human genome. *Biochem Biophys Res Commun* 237, 283-287.

Vanderhaeghen,P., Schurmans,S., Vassart,G., and Parmentier,M. (1997b). Specific repertoire of olfactory receptor genes in the male germ cells of several mammalian species. *Genomics* 39, 239-246.

Vassar,R., Chao,S.K., Sitcheran,R., Nunez,J.M., Vosshall,L.B., and Axel,R. (1994). Topographic organization of sensory projections to the olfactory bulb. *Cell* 79, 981-991.

- Verma,A., Hirsch,D.J., Glatt,C.E., Ronnett,G.V., and Snyder,S.H. (1993). Carbon monoxide: a putative neural messenger. *Science* 259, 381-384.
- Volz,A., Fonatsch,C., and Ziegler,A. (1992). Regional mapping of the gene for autosomal dominant spinocerebellar ataxia (SCA1) by localizing the closely linked D6S89 locus to 6p24.2---p23.05. *Cytogenet Cell Genet* 60, 37-39.
- Walensky,L.D., Ruat,M., Bakin,R.E., Blackshaw,S., Ronnett,G.V., and Snyder,S.H. (1998). Two novel odorant receptor families expressed in spermatids undergo 5'- splicing. *J Biol Chem* 273, 9378-9387.
- Walker,W.H., Delfino,F.J., and Habener,J.F. (1999). RNA processing and the control of spermatogenesis. *Front Horm Res* 25, 34-58.
- Wang,F., Nemes,A., Mendelsohn,M., and Axel,R. (1998). Odorant receptors govern the formation of a precise topographic map. *Cell* 93, 47-60.
- Wedekind,C., Chapuisat,M., Macas,E., and Rulicke,T. (1996). Non-random fertilization in mice correlates with the MHC and something else. *Heredity* 77 (Pt 4), 400-409.
- Wedekind,C. and Füri,S. (1997). Body odour preferences in men and women: do they aim for specific MHC combinations or simply heterozygosity? *Proc R Soc Lond B Biol Sci* 264, 1471-1479.
- Wedekind,C., Seebeck,T., Bettens,F., and Paepke,A.J. (1995). MHC-dependent mate preferences in humans. *Proc R Soc Lond B Biol Sci* 260, 245-249.
- Wetzel,C.H., Oles,M., Wellerdieck,C., Kuczkowiak,M., Gisselmann,G., and Hatt,H. (1999). Specificity and sensitivity of a human olfactory receptor functionally expressed in human embryonic kidney 293 cells and *Xenopus Laevis* oocytes. *J Neurosci* 19, 7426-7433.
- Wysocki,C.J. (1989). Vomeronasal chemorecognition: its role in reproductive fitness and physiology. In *Neural Control of Reproductive Function* (ed. Liss, A. R.) pp. 545-566, New York.
- Yamazaki,K., Beauchamp,G.K., Matsuzaki,O., Kupniewski,D., Bard,J., Thomas,L., and Boyse,E.A. (1986). Influence of a genetic difference confined to mutation of H-2K on the incidence of pregnancy block in mice. *Proc Natl Acad Sci U S A* 83, 740-741.
- Yamazaki,K., Beauchamp,G.K., Singer,A., Bard,J., and Boyse,E.A. (1999). Odortypes: their origin and composition. *Proc Natl Acad Sci U S A* 96, 1522-1525.
- Yamazaki,K., Boyse,E.A., Mike,V., Thaler,H.T., Mathieson,B.J., Abbott,J., Boyse,J., Zayas,Z.A., and Thomas,L. (1976). Control of mating preferences in mice by genes in the major histocompatibility complex. *J Exp Med* 144, 1324-1335.

- Yamazaki,K., Yamaguchi,M., Baranoski,L., Bard,J., Boyse,E.A., and Thomas,L. (1979). Recognition among mice. Evidence from the use of a Y-maze differentially scented by congenic mice of different major histocompatibility types. *J Exp Med* 150, 755-760.
- Younger,R.M., Amadou,C., Bethel,G., Ehlers,A., Lindahl,K.F., Forbes,S., Horton,R., Milne,S., Mungall,A.J., Trowsdale,J., Volz,A., Ziegler,A., and Beck,S. (2001). Characterization of Clustered MHC-Linked Olfactory Receptor Genes in Human and Mouse. *Genome Res* 11, 519-530.
- Zeng,F.Y. and Wess,J. (1999). Identification and molecular characterization of m3 muscarinic receptor dimers. *J. Biol. Chem.* 274, 19487-19497.
- Zhao,H., Ivic,L., Otaki,J.M., Hashimoto,M., Mikoshiba,K., and Firestein,S. (1998). Functional expression of a mammalian odorant receptor. *Science* 279, 237-242.
- Ziegler,A. (1997). Biology of chromosome 6. *DNA Sequenz - The Journal of Sequencing and Mapping* 8, 189-201.
- Ziegler,A., Ehlers,A., Forbes,S., Trowsdale,J., Uchanska-Ziegler,B., Volz,A., Younger,R., and Beck,S. (2000a). Polymorphic Olfactory Receptor Genes and HLA Loci constitute extended Haplotypes. In Major Histocompatibility Complex - Evolution, Structure, and Function (ed. Kasahara, M.), pp.110-130. Springer-Verlag, Tokyo.
- Ziegler,A., Ehlers,A., Forbes,S., Trowsdale,J., Volz,A., Younger,R., and Beck,S. (2000b). Polymorphisms in olfactory receptor genes: a cautionary note. *Hum. Immunol.* 61, 1281-1284.
- Ziegler,A., Muller,C., Heinig,J., Radka,S.F., Kompf,J., and Fonatsch,C. (1985). Monosomy 6 in a human lymphoma line induced by selection with a monoclonal antibody. *Immunobiology* 169, 455-460.
- Zozulya,S., Echeverri,F., and Nguyen,T. (2001). The human olfactory receptor repertoire. *Genome Biol.* 2, RESEARCH0018.