

VI. References

- Adam, S. A. (2001). The nuclear pore complex. *Genome Biol* 2, REVIEWS0007.
- Akey, C. W. & Radermacher, M. (1993). Architecture of the *Xenopus* nuclear pore complex revealed by three-dimensional cryo-electron microscopy. *J Cell Biol* 122, 1-19.
- Allen, N. P., Huang, L., Burlingame, A. & Rexach, M. (2001). Proteomic analysis of nucleoporin interacting proteins. *J Biol Chem* 276, 29268-74.
- Bachi, A., Braun, I. C., Rodrigues, J. P., Pante, N., Ribbeck, K., von Kobbe, C., Kutay, U., Wilm, M., Gorlich, D., Carmo-Fonseca, M. & Izaurralde, E. (2000). The C-terminal domain of TAP interacts with the nuclear pore complex and promotes export of specific CTE-bearing RNA substrates. *Rna* 6, 136-58.
- Baker, K. E. & Parker, R. (2004). Nonsense-mediated mRNA decay: terminating erroneous gene expression. *Curr Opin Cell Biol* 16, 293-9.
- Bartels, C., Xia, T., Billeter, M., Guntert, P. and Wuthrich, K. (1995). The program XEASY for computer-supported NMR spectral analysis of biological macromolecules. *J Biol NMR* 6, 1-10.
- Battiste, J. L., Mao, H., Rao, N. S., Tan, R., Muhandiram, D. R., Kay, L. E., Frankel, A. D. & Williamson, J. R. (1996). Alpha helix-RNA major groove recognition in an HIV-1 rev peptide-RRE RNA complex. *Science* 273, 1547-51.
- Bayliss, R., Corbett, A. H. & Stewart, M. (2000). The molecular mechanism of transport of macromolecules through nuclear pore complexes. *Traffic* 1, 448-56.
- Bayliss, R., Littlewood, T., Strawn, L. A., Wenthe, S. R. & Stewart, M. (2002a). GLFG and FxFG nucleoporins bind to overlapping sites on importin-beta. *J Biol Chem* 277, 50597-606.
- Bayliss, R., Leung, S. W., Baker, R. P., Quimby, B. B., Corbett, A. H. & Stewart, M. (2002b). Structural basis for the interaction between NTF2 and nucleoporin FxFG repeats. *Embo J* 21, 2843-53.
- Bear, J., Tan, W., Zolotukhin, A. S., Taberner, C., Hudson, E. A. & Felber, B. K. (1999). Identification of novel import and export signals of human TAP, the protein that binds to the constitutive transport element of the type D retrovirus mRNAs. *Mol Cell Biol* 19, 6306-17.
- Bischoff, F. R., Klebe, C., Kretschmer, J., Wittinghofer, A. & Ponstingl, H. (1994). RanGAP1 induces GTPase activity of nuclear Ras-related Ran. *Proc Natl Acad Sci USA* 91, 2587-91.
- Bischoff, F. R., Krebber, H., Smirnova, E., Dong, W. & Ponstingl, H. (1995). Co-activation of RanGTPase and inhibition of GTP dissociation by Ran-GTP binding protein RanBP1. *Embo J* 14, 705-15.
- Bischoff, F. R. & Ponstingl, H. (1991). Catalysis of guanine nucleotide exchange on Ran by the mitotic regulator RCC1. *Nature* 354, 80-2.
- Braun, I. C., Herold, A., Rode, M. & Izaurralde, E. (2002). Nuclear export of mRNA by TAP/NXF1 requires two nucleoporin-binding sites but not p15. *Mol Cell Biol* 22, 5405-18.
- Braun, I. C., Rohrbach, E., Schmitt, C. & Izaurralde, E. (1999). TAP binds to the constitutive transport element (CTE) through a novel RNA-binding motif that is sufficient to promote CTE-dependent RNA export from the nucleus. *Embo J* 18, 1953-65.

- Bruhn, L., Munnerlyn, A. & Grosschedl, R. (1997). ALY, a context-dependent coactivator of LEF-1 and AML-1, is required for TCRalpha enhancer function. *Genes Dev* 11, 640-53.
- Brunger, A. T., Adams, P. D., Clore, G. M., DeLano, W. L., Gros, P., Grosse-Kunstleve, R. W., Jiang, J. S., Kuszewski, J., Nilges, M., Pannu, N. S., Read, R. J., Rice, L. M., Simonson, T. & Warren, G. L. (1998). Crystallography & NMR system: A new software suite for macromolecular structure determination. *Acta Crystallogr D Biol Crystallogr* 54 (Pt 5), 905-21.
- Bullock, T. L., Clarkson, W. D., Kent, H. M. & Stewart, M. (1996). The 1.6 angstroms resolution crystal structure of nuclear transport factor 2 (NTF2). *J Mol Biol* 260, 422-31.
- Burd, C. G. & Dreyfuss, G. (1994). Conserved structures and diversity of functions of RNA-binding proteins. *Science* 265, 615-21.
- Chook, Y. M. & Blobel, G. (1999). Structure of the nuclear transport complex karyopherin-beta2-Ran x GppNHp. *Nature* 399, 230-7.
- Chook, Y. M., Cingolani, G., Conti, E., Stewart, M., Vetter, I. & Wittinghofer, A. (1999). Pictures in cell biology. Structures of nuclear-transport components. *Trends Cell Biol* 9, 310-1.
- Cingolani, G., Petosa, C., Weis, K. & Muller, C. W. (1999). Structure of importin-beta bound to the IBB domain of importin-alpha. *Nature* 399, 221-9.
- Clarkson, J. & Campbell, I. D. (2003). Studies of protein-ligand interactions by NMR. *Biochem Soc Trans* 31, 1006-9.
- Clouse, K. N., Luo, M. J., Zhou, Z. & Reed, R. (2001). A Ran-independent pathway for export of spliced mRNA. *Nat Cell Biol* 3, 97-9.
- Coburn, G. A., Wiegand, H. L., Kang, Y., Ho, D. N., Georgiadis, M. M. & Cullen, B. R. (2001). Using viral species specificity to define a critical protein/RNA interaction surface. *Genes Dev* 15, 1194-205.
- Conti, E. & Izaurralde, E. (2001). Nucleocytoplasmic transport enters the atomic age. *Curr Opin Cell Biol* 13, 310-9.
- Coutavas, E., Ren, M., Oppenheim, J. D., D'Eustachio, P. & Rush, M. G. (1993). Characterization of proteins that interact with the cell-cycle regulatory protein Ran/TC4. *Nature* 366, 585-7.
- Cronshaw, J. M., Krutchinsky, A. N., Zhang, W., Chait, B. T. & Matunis, M. J. (2002). Proteomic analysis of the mammalian nuclear pore complex. *J Cell Biol* 158, 915-27.
- Cullen, B. R. (1998). Retroviruses as model systems for the study of nuclear RNA export pathways. *Virology* 249, 203-10.
- Cullen, B. R. (2000). Nuclear RNA export pathways. *Mol Cell Biol* 20, 4181-7.
- Damelin, M. & Silver, P. A. (2000). Mapping interactions between nuclear transport factors in living cells reveals pathways through the nuclear pore complex. *Mol Cell* 5, 133-40.
- Delaglio, F., Grzesiek, S., Vuister, G. W., Zhu, G., Pfeifer, J. & Bax, A. (1995). NMRPipe: a multidimensional spectral processing system based on UNIX pipes. *J Biomol NMR* 6, 277-93.
- Dingwall, C. & Laskey, R. A. (1991). Nuclear targeting sequences--a consensus? *Trends Biochem Sci* 16, 478-81.
- Dreyfuss, G., Kim, V. N. & Kataoka, N. (2002). Messenger-RNA-binding proteins and the messages they carry. *Nat Rev Mol Cell Biol* 3, 195-205.
- Erkmann, J. A. & Kutay, U. (2004). Nuclear export of mRNA: from the site of transcription to the cytoplasm. *Exp Cell Res* 296, 12-20.

- Ernst(a), R. K., Bray, M., Rekosh, D. & Hammarskjold, M. L. (1997). A structured retroviral RNA element that mediates nucleocytoplasmic export of intron-containing RNA. *Mol Cell Biol* 17, 135-44.
- Ernst(b), R. K., Bray, M., Rekosh, D. & Hammarskjold, M. L. (1997). Secondary structure and mutational analysis of the Mason-Pfizer monkey virus RNA constitutive transport element. *Rna* 3, 210-22.
- Fribourg, S., Braun, I. C., Izaurralde, E. & Conti, E. (2001). Structural basis for the recognition of a nucleoporin FG repeat by the NTF2-like domain of the TAP/p15 mRNA nuclear export factor. *Mol Cell* 8, 645-56.
- Fribourg, S. & Conti, E. (2003). Structural similarity in the absence of sequence homology of the messenger RNA export factors Mtr2 and p15. *EMBO Rep* 4, 699-703.
- Fribourg, S., Gatfield, D., Izaurralde, E. & Conti, E. (2003). A novel mode of RBD-protein recognition in the Y14-Mago complex. *Nat Struct Biol* 10, 433-9.
- Fried, H. & Kutay, U. (2003). Nucleocytoplasmic transport: taking an inventory. *Cell Mol Life Sci* 60, 1659-88.
- Fritsch, I. Edwards, F. II. Maniatis, T. (1989). Molecular cloning. I, 6.37.
- Fukuhara, N., Fernandez, E., Ebert, J., Conti, E. & Svergun, D. (2004). Conformational variability of nucleo-cytoplasmic transport factors. *J Biol Chem* 279, 2176-81.
- Gatfield, D. & Izaurralde, E. (2002). REF1/Aly and the additional exon junction complex proteins are dispensable for nuclear mRNA export. *J Cell Biol* 159, 579-88.
- Gilbert, W. & Guthrie, C. (2004). The Glc7p nuclear phosphatase promotes mRNA export by facilitating association of Mex67p with mRNA. *Mol Cell* 13, 201-12.
- Goldberg, M. W. & Allen, T. D. (1993). The nuclear pore complex: three-dimensional surface structure revealed by field emission, in-lens scanning electron microscopy, with underlying structure uncovered by proteolysis. *J Cell Sci* 106 (Pt 1), 261-74.
- Gorlich, D., Dabrowski, M., Bischoff, F. R., Kutay, U., Bork, P., Hartmann, E., Prehn, S. & Izaurralde, E. (1997). A novel class of RanGTP binding proteins. *J Cell Biol* 138, 65-80.
- Gorlich, D. & Kutay, U. (1999). Transport between the cell nucleus and the cytoplasm. *Annu Rev Cell Dev Biol* 15, 607-60.
- Grant, R. P., Hurt, E., Neuhaus, D. & Stewart, M. (2002). Structure of the C-terminal FG-nucleoporin binding domain of Tap/NXF1. *Nat Struct Biol* 9, 247-51.
- Grant, R. P., Neuhaus, D. & Stewart, M. (2003). Structural basis for the interaction between the Tap/NXF1 UBA domain and FG nucleoporins at 1A resolution. *J Mol Biol* 326, 849-58.
- Gruter, P., Taberner, C., von Kobbe, C., Schmitt, C., Saavedra, C., Bachi, A., Wilm, M., Felber, B. K. & Izaurralde, E. (1998). TAP, the human homolog of Mex67p, mediates CTE-dependent RNA export from the nucleus. *Mol Cell* 1, 649-59.
- Guzik, B. W., Levesque, L., Prasad, S., Bor, Y. C., Black, B. E., Paschal, B. M., Rekosh, D. & Hammarskjold, M. L. (2001). NXT1 (p15) is a crucial cellular cofactor in TAP-dependent export of intron-containing RNA in mammalian cells. *Mol Cell Biol* 21, 2545-54.
- Herold, A., Klymenko, T. & Izaurralde, E. (2001). NXF1/p15 heterodimers are essential for mRNA nuclear export in Drosophila. *Rna* 7, 1768-80.
- Herold, A., Suyama, M., Rodrigues, J. P., Braun, I. C., Kutay, U., Carmo-Fonseca, M., Bork, P. & Izaurralde, E. (2000). TAP (NXF1) belongs to a multigene family of

- putative RNA export factors with a conserved modular architecture. *Mol Cell Biol* 20, 8996-9008.
- Hieronymus, H. & Silver, P. A. (2003). Genome-wide analysis of RNA-protein interactions illustrates specificity of the mRNA export machinery. *Nat Genet* 33, 155-61.
- Huang, Y., Gattoni, R., Stevenin, J. & Steitz, J. A. (2003). SR splicing factors serve as adapter proteins for TAP-dependent mRNA export. *Mol Cell* 11, 837-43.
- Huang, Y., Yario, T. A. & Steitz, J. A. (2004). A molecular link between SR protein dephosphorylation and mRNA export. *Proc Natl Acad Sci U S A* 101, 9666-70.
- Izaurralde, E., Kutay, U., von Kobbe, C., Mattaj, I. W., Gorlich, D. (1997). The asymmetric distribution of the constituents of the Ran system is essential for transport into and out of the nucleus. *Embo J* 16, 6535-47.
- Kang, Y., Bogerd, H. P., Yang, J. & Cullen, B. R. (1999). Analysis of the RNA binding specificity of the human tap protein, a constitutive transport element-specific nuclear RNA export factor. *Virology* 262, 200-9.
- Kang, Y. & Cullen, B. R. (1999). The human Tap protein is a nuclear mRNA export factor that contains novel RNA-binding and nucleocytoplasmic transport sequences. *Genes Dev* 13, 1126-39.
- Katahira, J., Strasser, K., Podtelejnikov, A., Mann, M., Jung, J. U. & Hurt, E. (1999). The Mex67p-mediated nuclear mRNA export pathway is conserved from yeast to human. *Embo J* 18, 2593-609.
- Kielkopf, C. L., Rodionova, N. A., Green, M. R. & Burley, S. K. (2001). A novel peptide recognition mode revealed by the X-ray structure of a core U2AF35/U2AF65 heterodimer. *Cell* 106, 595-605.
- Kleywegt, G. J. & Jones, T. A. (1999). Software for handling macromolecular envelopes. *Acta Crystallogr D Biol Crystallogr* 55 (Pt 4), 941-4.
- Koch, M. H., Vachette, P. & Svergun, D. I. (2003). Small-angle scattering: a view on the properties, structures and structural changes of biological macromolecules in solution. *Q Rev Biophys* 36, 147-227.
- Kutay, U., Izaurralde, E., Bischoff, F. R., Mattaj, I. W. & Gorlich, D. (1997). Dominant-negative mutants of importin-beta block multiple pathways of import and export through the nuclear pore complex. *Embo J* 16, 1153-63.
- Lai, M. C. & Tarn, W. Y. (2004). Hypophosphorylated ASF/SF2 Binds TAP and Is Present in Messenger Ribonucleoproteins. *J Biol Chem* 279, 31745-9.
- Le Hir, H., Izaurralde, E., Maquat, L. E. & Moore, M. J. (2000a). The spliceosome deposits multiple proteins 20-24 nucleotides upstream of mRNA exon-exon junctions. *Embo J* 19, 6860-9.
- Le Hir, H., Moore, M. J. & Maquat, L. E. (2000b). Pre-mRNA splicing alters mRNP composition: evidence for stable association of proteins at exon-exon junctions. *Genes Dev* 14, 1098-108.
- Leslie, A. G. W. (1992). Recent changes to the MOSFLM package for processing film and image plate data. *Joint CCP4+ESF-EAMCB Newsletter on Protein Crystallography* 26.
- Levesque, L., Guzik, B., Guan, T., Coyle, J., Black, B. E., Rekosh, D., Hammarskjold, M. L. & Paschal, B. M. (2001). RNA export mediated by tap involves NXT1-dependent interactions with the nuclear pore complex. *J Biol Chem* 276, 44953-62.
- Liker, E., Fernandez, E., Izaurralde, E. & Conti, E. (2000). The structure of the mRNA export factor TAP reveals a cis arrangement of a non-canonical RNP domain and an LRR domain. *Embo J* 19, 5587-98.

- Linder, P. & Stutz, F. (2001). mRNA export: travelling with DEAD box proteins. *Curr Biol* 11, R961-3.
- Luo, M. L., Zhou, Z., Magni, K., Christoforides, C., Rappsilber, J., Mann, M. & Reed, R. (2001). Pre-mRNA splicing and mRNA export linked by direct interactions between UAP56 and Aly. *Nature* 413, 644-7.
- Maniatis, T. & Reed, R. (2002). An extensive network of coupling among gene expression machines. *Nature* 416, 499-506.
- Mazza, C., Ohno, M., Segref, A., Mattaj, I. W. & Cusack, S. (2001). Crystal structure of the human nuclear cap binding complex. *Mol Cell* 8, 383-96.
- Mitchell, P. & Tollervey, D. (2001). mRNA turnover. *Curr Opin Cell Biol* 13, 320-5.
- Morrison, J., Yang, J. C., Stewart, M. & Neuhaus, D. (2003). Solution NMR study of the interaction between NTF2 and nucleoporin FxFG repeats. *J Mol Biol* 333, 587-603.
- Nachury, M. V. & Weis, K. (1999). The direction of transport through the nuclear pore can be inverted. *Proc Natl Acad Sci U S A* 96, 9622-7.
- Nakielny, S. & Dreyfuss, G. (1999). Transport of proteins and RNAs in and out of the nucleus. *Cell* 99, 677-90.
- Navaza, J. (2001). Implementation of molecular replacement in AMoRe. *Acta Crystallogr D Biol Crystallogr* 57, 1367-72.
- Neugebauer, K. M. (2002). On the importance of being co-transcriptional. *J Cell Sci* 115, 3865-71.
- Nicholls, A., Sharp, K. A. & Honig, B. (1991). Protein folding and association: insights from the interfacial and thermodynamic properties of hydrocarbons. *Proteins* 11, 281-96.
- Nott, A., Le Hir, H. & Moore, M. J. (2004). Splicing enhances translation in mammalian cells: an additional function of the exon junction complex. *Genes Dev* 18, 210-22.
- Orphanides, G. & Reinberg, D. (2002). A unified theory of gene expression. *Cell* 108, 439-51.
- Parks, T. D., Leuther, K. K., Howard, E. D., Johnston, S. A. & Dougherty, W. G. (1994). Release of proteins and peptides from fusion proteins using a recombinant plant virus proteinase. *Anal Biochem* 216, 413-7.
- Pasquinelli, A. E., Ernst, R. K., Lund, E., Grimm, C., Zapp, M. L., Rekosh, D., Hammarskjold, M. L. & Dahlberg, J. E. (1997). The constitutive transport element (CTE) of Mason-Pfizer monkey virus (MPMV) accesses a cellular mRNA export pathway. *Embo J* 16, 7500-10.
- Perez-Alvarado, G. C., Martinez-Yamout, M., Allen, M. M., Grosschedl, R., Dyson, H. J. & Wright, P. E. (2003). Structure of the nuclear factor ALY: insights into post-transcriptional regulatory and mRNA nuclear export processes. *Biochemistry* 42, 7348-57.
- Pollard, V. W. & Malim, M. H. (1998). The HIV-1 Rev protein. *Annu Rev Microbiol* 52, 491-532.
- Portman, D. S., O'Connor, J. P. & Dreyfuss, G. (1997). YRA1, an essential *Saccharomyces cerevisiae* gene, encodes a novel nuclear protein with RNA annealing activity. *Rna* 3, 527-37.
- Price, S. R., Evans, P. R. & Nagai, K. (1998). Crystal structure of the spliceosomal U2B"-U2A' protein complex bound to a fragment of U2 small nuclear RNA. *Nature* 394, 645-50.
- Proudfoot, N. J., Furger, A. & Dye, M. J. (2002). Integrating mRNA processing with transcription. *Cell* 108, 501-12.

- Reichelt, R., Holzenburg, A., Buhle, E. L., Jr., Jarnik, M., Engel, A. & Aebi, U. (1990). Correlation between structure and mass distribution of the nuclear pore complex and of distinct pore complex components. *J Cell Biol* 110, 883-94.
- Ribbeck, K. & Gorlich, D. (2001). Kinetic analysis of translocation through nuclear pore complexes. *Embo J* 20, 1320-30.
- Ribbeck, K., Lipowsky, G., Kent, H. M., Stewart, M. & Gorlich, D. (1998). NTF2 mediates nuclear import of Ran. *Embo J* 17, 6587-98.
- Rodrigues, J. P., Rode, M., Gatfield, D., Blencowe, B. J., Carmo-Fonseca, M. & Izaurralde, E. (2001). REF proteins mediate the export of spliced and unspliced mRNAs from the nucleus. *Proc Natl Acad Sci U S A* 98, 1030-5.
- Rout, M. P., Aitchison, J. D., Suprpto, A., Hjertaas, K., Zhao, Y. & Chait, B. T. (2000). The yeast nuclear pore complex: composition, architecture, and transport mechanism. *J Cell Biol* 148, 635-51.
- Rout, M. P. & Blobel, G. (1993). Isolation of the yeast nuclear pore complex. *J Cell Biol* 123, 771-83.
- Saavedra, C., Felber, B. & Izaurralde, E. (1997). The simian retrovirus-1 constitutive transport element, unlike the HIV-1 RRE, uses factors required for cellular mRNA export. *Curr Biol* 7, 619-28.
- Sattler, M. S., J. Griesinger, C. (1999). Heteronuclear multidimensional NMR experiments for the structure determination of proteins in solution employing pulsed field gradients. *Progress in Nuclear Magnetic Resonance Spectroscopy* 34, 93-158.
- Seedorf, M., Damelin, M., Kahana, J., Taura, T. & Silver, P. A. (1999). Interactions between a nuclear transporter and a subset of nuclear pore complex proteins depend on Ran GTPase. *Mol Cell Biol* 19, 1547-57.
- Segref, A., Sharma, K., Doye, V., Hellwig, A., Huber, J., Luhrmann, R. & Hurt, E. (1997). Mex67p, a novel factor for nuclear mRNA export, binds to both poly(A)⁺ RNA and nuclear pores. *Embo J* 16, 3256-71.
- Selenko, P., Gregorovic, G., Sprangers, R., Stier, G., Rhani, Z., Kramer, A. & Sattler, M. (2003). Structural basis for the molecular recognition between human splicing factors U2AF65 and SF1/mBBP. *Mol Cell* 11, 965-76.
- Smith, C. W. J. (1998). *RNA:Protein Interactions A PRACTICAL APPROACH*. 1st edit. The Practical Approach Series (Hames, B. D., Ed.), 192, Oxford University Press, New York.
- Stewart, M., Kent, H. M. & McCoy, A. J. (1998). Structural basis for molecular recognition between nuclear transport factor 2 (NTF2) and the GDP-bound form of the Ras-family GTPase Ran. *J Mol Biol* 277, 635-46.
- Strasser, K. & Hurt, E. (2000). Yra1p, a conserved nuclear RNA-binding protein, interacts directly with Mex67p and is required for mRNA export. *Embo J* 19, 410-20.
- Strom, A. C. & Weis, K. (2001). Importin-beta-like nuclear transport receptors. *Genome Biol* 2, REVIEWS3008.
- Studier, F. W., Rosenberg, A. H., Dunn, J. J. & Dubendorff, J. W. (1990). Use of T7 RNA polymerase to direct expression of cloned genes. *Methods Enzymol* 185, 60-89.
- Stutz, F., Bachi, A., Doerks, T., Braun, I. C., Seraphin, B., Wilm, M., Bork, P. & Izaurralde, E. (2000). REF, an evolutionary conserved family of hnRNP-like proteins, interacts with TAP/Mex67p and participates in mRNA nuclear export. *Rna* 6, 638-50.

- Stutz, F. & Izaurralde, E. (2003). The interplay of nuclear mRNP assembly, mRNA surveillance and export. *Trends Cell Biol* 13, 319-27.
- Suyama, M., Doerks, T., Braun, I. C., Sattler, M., Izaurralde, E. & Bork, P. (2000). Prediction of structural domains of TAP reveals details of its interaction with p15 and nucleoporins. *EMBO Rep* 1, 53-8.
- Svergun, D. I. (1993). A direct indirect method of small-angle scattering data treatment. *J Appl Crystallogr* 26, 258-267.
- Svergun, D. I. (1999). Restoring low-resolution structure of biological macromolecules from solution scattering using simulated annealing. *Biophys J* 76, 2879-2886.
- Svergun, D. I. & Koch, M. H. (2002). Advances in structure analysis using small-angle scattering in solution. *Curr Opin Struct Biol* 12, 654-60.
- Svergun, D. I., Petoukhov, M. V. & Koch, M. H. (2001). Determination of domain structure of proteins from X-ray solution scattering. *Biophys J* 80, 2946-53.
- Svergun, D. I. S., A.V. Fiegin, L.A. (1988). Small-angle-scattering-data treatment by the regularization method. *Acta Cryst A* 44, 244-250.
- Takahashi, H., Nakanishi, T., Kami, K., Arata, Y. & Shimada, I. (2000). A novel NMR method for determining the interfaces of large protein-protein complexes. *Nat Struct Biol* 7, 220-3.
- Tan, W., Zolotukhin, A. S., Bear, J., Patenaude, D. J. & Felber, B. K. (2000). The mRNA export in *Caenorhabditis elegans* is mediated by Ce-NXF-1, an ortholog of human TAP/NXF and *Saccharomyces cerevisiae* Mex67p. *Rna* 6, 1762-72.
- Tang, H., Gaietta, G. M., Fischer, W. H., Ellisman, M. H. & Wong-Staal, F. (1997). A cellular cofactor for the constitutive transport element of type D retrovirus. *Science* 276, 1412-5.
- Tange, T. O., Nott, A. & Moore, M. J. (2004). The ever-increasing complexities of the exon junction complex. *Curr Opin Cell Biol* 16, 279-84.
- Tjandra, N. & Bax, A. (1997). Direct measurement of distances and angles in biomolecules by NMR in a dilute liquid crystalline medium. *Science* 278, 1111-4.
- Tugarinov, V., Hwang, P. M. & Kay, L. E. (2004). Nuclear magnetic resonance spectroscopy of high-molecular-weight proteins. *Annu Rev Biochem* 73, 107-46.
- Varani, G. & Nagai, K. (1998). RNA recognition by RNP proteins during RNA processing. *Annu Rev Biophys Biomol Struct* 27, 407-45.
- Varmus, H. (1988). Retroviruses. *Science* 240, 1427-35.
- Vinciguerra, P. & Stutz, F. (2004). mRNA export: an assembly line from genes to nuclear pores. *Curr Opin Cell Biol* 16, 285-92.
- Virbasius, C. M., Wagner, S. & Green, M. R. (1999). A human nuclear-localized chaperone that regulates dimerization, DNA binding, and transcriptional activity of bZIP proteins. *Mol Cell* 4, 219-28.
- Weis, K., Mattaj, I. W. & Lamond, A. I. (1995). Identification of hSRP1 alpha as a functional receptor for nuclear localization sequences. *Science* 268, 1049-53.
- Wiegand, H. L., Coburn, G. A., Zeng, Y., Kang, Y., Bogerd, H. P. & Cullen, B. R. (2002). Formation of Tap/NXT1 heterodimers activates Tap-dependent nuclear mRNA export by enhancing recruitment to nuclear pore complexes. *Mol Cell Biol* 22, 245-56.
- Wiegand, H. L., Lu, S. & Cullen, B. R. (2003). Exon junction complexes mediate the enhancing effect of splicing on mRNA expression. *Proc Natl Acad Sci U S A* 100, 11327-32.
- Wodrich, H. & Krausslich, H. G. (2001). Nucleocytoplasmic RNA transport in retroviral replication. *Results Probl Cell Differ* 34, 197-217.

- Wu, J., Matunis, M. J., Kraemer, D., Blobel, G. & Coutavas, E. (1995). Nup358, a cytoplasmically exposed nucleoporin with peptide repeats, Ran-GTP binding sites, zinc fingers, a cyclophilin A homologous domain, and a leucine-rich region. *J Biol Chem* 270, 14209-13.
- Yang, Q., Rout, M. P. & Akey, C. W. (1998). Three-dimensional architecture of the isolated yeast nuclear pore complex: functional and evolutionary implications. *Mol Cell* 1, 223-34.
- Yokoyama, N., Hayashi, N., Seki, T., Pante, N., Ohba, T., Nishii, K., Kuma, K., Hayashida, T., Miyata, T., Aebi, U. & et al. (1995). A giant nucleopore protein that binds Ran/TC4. *Nature* 376, 184-8.
- Yoon, D. W., Lee, H., Seol, W., DeMaria, M., Rosenzweig, M. & Jung, J. U. (1997). Tap: a novel cellular protein that interacts with tip of herpesvirus saimiri and induces lymphocyte aggregation. *Immunity* 6, 571-82.
- Zenklusen, D., Vinciguerra, P., Strahm, Y. & Stutz, F. (2001). The yeast hnRNP-Like proteins Yra1p and Yra2p participate in mRNA export through interaction with Mex67p. *Mol Cell Biol* 21, 4219-32.
- Zuiderweg, E. R. (2002). Mapping protein-protein interactions in solution by NMR spectroscopy. *Biochemistry* 41, 1-7.