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Personal Information

Date of Birth: 06/10/1951

City, State/Province, Country of Birth: Gothenburgh, Sweden

Education

Date 1983

Degree Docent

Institution Royal Institute of Technology, Stockholm, Sweden

Subject Theoretical Biophysics

Date 1980

Degree Ph.D.

Institution Royal Institute of Technology, Stockholm, Sweden

Subject Theoretical Physics

Date 1975

Degree M.S.

Institution Royal Institute of Technology, Stockholm, Sweden

Subject Chemistry

Appointments/Affiliations

2000-present Director Stockholm Bioinformatics Center Stockholm
Sweden

1994-Present Professor of Theoretical Chemistry Stockholm University
Stockholm Sweden

1991-1994 Group Leader Karolinska Institutet Center for Structural
Biochemistry, NOVUM Huddinge Sweden

1990 Visiting Professor Protein Engineering Research Institute Osaka Japan

1989-1994 Associate Professor Karolinska Institutet Center for Biotechnology
Stockholm Sweden

1987 Visiting Professor University of California, Los Angeles, Molecular Biology
Institute Los Angeles, CA United States

1982-1985 Science Correspondent Swedish National Radio Stockholm
Sweden

1981-1988 Assistant Professor Royal Institute of Technology, Department of
Theoretical Physics Stockholm Sweden

1975-1980 Assistant Teacher Royal Institute of Technology, Department of
Theoretical Physics Stockholm Sweden

Honors/Awards

2002 Distinguished Visitor Lecturer EMBL

2000 Elected Member Royal Swedish Academy of Engineering Sciences

1998 Elected Member Academia Europaea

1998 Bjorken Prize Uppsala University

1997 Arrhenius Medal Swedish Chemical Society
1997 Elected Member Royal Swedish Academy of Sciences
1995 Goran Gustafsson Prize Swedish Academy of Sciences
1994 Elected Member EMBO
1990 T. Svedberg Award Swedish Biochemical Society
1987 Scholarship Sweden-America Foundation
1984 Scholarship Knut and Alice Wallenberg Foundation
1980-1981 Post-Doctoral Scholarship University of Michigan Medical School,
Department of Microbiology and Immunology

Memberships

2004-present EMBO Member, EMBO Council
2003-present BioCity Turku Member, Scientific Advisory Board
2002-present Applied Bioinformatics Unit, Bergen University Chairman, Scientific
Advisory Committee
2001-2003 EMBO Member, Young Investigator Programme Selection Committee
2001-2003 Dagens Forskning Science Advisor
2000-Present EU-COST Program Swedish Representative
2000-Present Callistogen AG Member, Scientific Advisory Board
2000 Norwegian Research Council, Biotechnology Program Member,
International Review Board
2000 Helmholtz Foundation, Genomics Program Member, International Review
Board
2000 European Science Foundation Member, Working Group on Proteomics
1999-Present Manne Siegbahn Laboratory Board Member
1999-Present Stockholm University, Department of Biochemistry Vice
Chairman
1998-Present KTH, Center for Parallel Computing Board Member
1998-Present Nobel Committee for Chemistry Member
1998 Max Delbrück Center Member, International Review Board
1997-Present Journal of Molecular Biology Member, Editorial Board
1996-Present European Journal of Biochemistry Member, Advisory Board
1996-Present BBA Reviews on Biomembranes Member, Advisory Board
1996-1999 Swedish Natural Sciences Research Council Chairman, Information
Committee
1996-1999 Foundation for Strategic Research Member and Chairman,
Bioscience Group
1996-1998 EMBO Journal Member, Editorial Board
1995-1999 Swedish EMBnet Node Member, Steering Committee
1994-2003 FEBS Letters Editor
1994-1999 Swedish Academy of Sciences Secretary, National Committee for
Molecular Biology
1994-1996 Foundation for Strategic Research Member, Expert Group on
"General Bioscience"
1993-Present Molecular Membrane Biology Member, Editorial Board
1992-1999 KOMBI Member, Committee for Molecular Biology
1992-1998 Swedish Natural Sciences Research Council Member, Chemistry
Committee
1991-1995 Statens Kulturrads Fackbokskomitee Member
1989; 1994; 1995 Nobel Foundation Consultant, Various Committees

Field of Expertise & Research Interests:

Dr. von Heijne has worked mainly on problems related to protein sorting and membrane protein biogenesis and structure. The work includes both bioinformatics methods development (e.g. methods for prediction of signal peptides and other sorting signals as well as prediction of membrane protein topology) and experimental studies in *E. coli* and eukaryotic systems. The most important achievements include the discovery of the so-called "(-1,-3)-rule" (describes signal peptide cleavage sites) and the "positive inside" rule (describes membrane protein topology), and the development of widely used prediction methods such as TOPPRED, SignalP, and TMHMM. Research Project: Membrane protein assembly and structure.

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Grants:

Foundation for Strategic Research,
Swedish Research Council,
Swedish Cancer Foundation.

Publications:

1: Rapp M, Granseth E, Seppala S, von Heijne G. Identification and evolution of dual-topology membrane proteins. *Nat Struct Mol Biol.* 2006 Feb;13(2):112-6.

2: Villarejo A, Buren S, Larsson S, Dejardin A, Monne M, Rudhe C, Karlsson J, Jansson S, Lerouge P, Rolland N, von Heijne G, Grebe M, Bako L, Samuelsson G. Evidence for a protein transported through the secretory pathway en route to the higher plant chloroplast. *Nat Cell Biol.* 2005 Dec;7(12):1124-31.

3: White SH, von Heijne G. Do protein-lipid interactions determine the recognition of transmembrane helices at the ER translocon? *Biochem Soc Trans.* 2005 Nov;33(Pt 5):1012-5.

4: Freitas JA, Tobias DJ, von Heijne G, White SH. Interface connections of a transmembrane voltage sensor. *Proc Natl Acad Sci U S A.* 2005;102(42):15059-64.

5: Karamyshev AL, Kelleher DJ, Gilmore R, Johnson AE, von Heijne G, Nilsson I. Mapping the interaction of the STT3 subunit of the oligosaccharyl transferase complex with nascent polypeptide chains. *J Biol Chem.* 2005 Dec 9;280(49):40489-93.

6: von Heijne G. Helices on the move. *Nat Struct Mol Biol.* 2005 Oct;12(10):834-5.

7: Pasche B, Knobloch TJ, Bian Y, Liu J, Phukan S, Rosman D, Kaklamani V, Baddi L, Siddiqui FS, Frankel W, Prior TW, Schuller DE, Agrawal A, Lang J, Dolan ME, Vokes EE, Lane WS, Huang CC, Caldes T, Di Cristofano A, Hampel H, Nilsson I, von Heijne G, Fodde R, Murty VV, de la Chapelle A, Weghorst CM. Somatic acquisition and signaling of TGFBR1*6A in cancer. *JAMA.* 2005 Oct 5;294(13):1634-46.

8: Medigue C, Krin E, Pascal G, Barbe V, Bernsel A, Bertin PN, Cheung F, Cruveiller S, D'Amico S, Duilio A, Fang G, Feller G, Ho C, Mangenot S, Marino G, Nilsson J, Parrilli E, Rocha EP, Rouy Z, Sekowska A, Tutino ML, Vallenet D, von Heijne G, Danchin A. Coping with cold: the genome of the versatile marine Antarctica

bacterium *Pseudoalteromonas haloplanktis* TAC125. *Genome Res.* 2005 Oct;15(10):1325-35.

9: Luirink J, von Heijne G, Houben E, de Gier JW. Biogenesis of inner membrane proteins in *Escherichia coli*. *Annu Rev Microbiol.* 2005;59:329-55.

10: Granseth E, Daley DO, Rapp M, Melen K, von Heijne G. Experimentally constrained topology models for 51,208 bacterial inner membrane proteins. *J Mol Biol.* 2005 Sep 23;352(3):489-94.

11: Stenberg F, Chovanec P, Maslen SL, Robinson CV, Ilag LL, von Heijne G, Daley DO. Protein complexes of the *Escherichia coli* cell envelope. *J Biol Chem.* 2005 Oct 14;280(41):34409-19.

12: von Heijne G. No abstract Microbiology. Translocation of anthrax toxin: lord of the rings. *Science.* 2005 Jul 29;309(5735):709-10.

13: Laudon H, Hansson EM, Melen K, Bergman A, Farmery MR, Winblad B, Lendahl U, von Heijne G, Naslund J. A nine-transmembrane domain topology for presenilin 1. *J Biol Chem.* 2005 Oct 21;280(42):35352-60.

14: White SH, von Heijne G. Transmembrane helices before, during, and after insertion. *Curr Opin Struct Biol.* 2005 Aug;15(4):378-86.

15: Nilsson J, Persson B, von Heijne G. Comparative analysis of amino acid distributions in integral membrane proteins from 107 genomes. *Proteins.* 2005 Sep 1;60(4):606-16.

16: Bernsel A, Von Heijne G. Improved membrane protein topology prediction by domain assignments. *Protein Sci.* 2005 Jul;14(7):1723-8.

17: Daley DO, Rapp M, Granseth E, Melen K, Drew D, von Heijne G. Global topology analysis of the *Escherichia coli* inner membrane proteome. *Science.* 2005 May 27;308(5726):1321-3.

18: Kim H, von Heijne G, Nilsson I. Membrane topology of the STT3 subunit of the oligosaccharyl transferase complex. *J Biol Chem.* 2005 May 27;280(21):20261-7.

19: Tie JK, Nicchitta C, von Heijne G, Stafford DW. Membrane topology mapping of vitamin K epoxide reductase by in vitro translation/cotranslocation. *J Biol Chem.* 2005 Apr 22;280(16):16410-6.

20: Hessa T, White SH, von Heijne G. Membrane insertion of a potassium-channel voltage sensor. *Science.* 2005 Mar 4;307(5714):1427. Epub 2005 Jan 27. Erratum in: *Science.* 2005 Jun 17;308(5729):1743.

21: Ding B, Kull B, Liu Z, Mottagui-Tabar S, Thonberg H, Gu HF, Brookes AJ, Grundemar L, Karlsson C, Hamsten A, Arner P, Ostenson CG, Efendic S, Monne M, von Heijne G, Eriksson P, Wahlestedt C. Human neuropeptide Y signal peptide gain-

of-function polymorphism is associated with increased body mass index: possible mode of function. *Regul Pept.* 2005 Apr 15;127(1-3):45-53.

22: Hessa T, Kim H, Bihlmaier K, Lundin C, Boekel J, Andersson H, Nilsson I, White SH, von Heijne G. Recognition of transmembrane helices by the endoplasmic reticulum translocon. *Nature.* 2005 Jan 27;433(7024):377-81.

23: Granseth E, von Heijne G, Elofsson A. A study of the membrane-water interface region of membrane proteins. *J Mol Biol.* 2005 Feb 11;346(1):377-85.

24: Monne M, Hessa T, Thissen L, von Heijne G. Competition between neighboring topogenic signals during membrane protein insertion into the ER. *FEBS J.* 2005 Jan;272(1):28-36.

25: Kerje S, Sharma P, Gunnarsson U, Kim H, Bagchi S, Fredriksson R, Schutz K, Jensen P, von Heijne G, Okimoto R, Andersson L. The Dominant white, Dun and Smoky color variants in chicken are associated with insertion/deletion polymorphisms in the PMEL17 gene. *Genetics.* 2004 Nov;168(3):1507-18.

26: White SH, von Heijne G. The machinery of membrane protein assembly. *Curr Opin Struct Biol.* 2004 Aug;14(4):397-404.

27: Bendtsen JD, Nielsen H, von Heijne G, Brunak S. Improved prediction of signal peptides: SignalP 3.0. *J Mol Biol.* 2004 Jul 16;340(4):783-95.

28: Bendtsen JD, Jensen LJ, Blom N, Von Heijne G, Brunak S. Feature-based prediction of non-classical and leaderless protein secretion. *Protein Eng Des Sel.* 2004 Apr;17(4):349-56.

29: Rapp M, Drew D, Daley DO, Nilsson J, Carvalho T, Melen K, De Gier JW, Von Heijne G. Experimentally based topology models for E. coli inner membrane proteins. *Protein Sci.* 2004 Apr;13(4):937-45.

30: Stefansson A, Armulik A, Nilsson I, von Heijne G, Johansson S. Determination of N- and C-terminal borders of the transmembrane domain of integrin subunits. *J Biol Chem.* 2004 May 14;279(20):21200-5. Epub 2004 Mar 10.

31: Hermansson M, von Heijne G. Inter-helical hydrogen bond formation during membrane protein integration into the ER membrane. *J Mol Biol.* 2003 Dec 5;334(4):803-9.

32: Westerlund I, Von Heijne G, Emanuelsson O. LumenP--a neural network predictor for protein localization in the thylakoid lumen. *Protein Sci.* 2003 Oct;12(10):2360-6.

33: Andersson H, D'Antona AM, Kendall DA, Von Heijne G, Chin CN. Membrane assembly of the cannabinoid receptor 1: impact of a long N-terminal tail. *Mol Pharmacol.* 2003 Sep;64(3):570-7.

- 34: Juncker AS, Willenbrock H, Von Heijne G, Brunak S, Nielsen H, Krogh A. Prediction of lipoprotein signal peptides in Gram-negative bacteria. *Protein Sci.* 2003 Aug;12(8):1652-62.
- 35: Emanuelsson O, Elofsson A, von Heijne G, Cristobal S. In silico prediction of the peroxisomal proteome in fungi, plants and animals. *J Mol Biol.* 2003 Jul 4;330(2):443-56.
- 36: Kim H, Yan Q, Von Heijne G, Caputo GA, Lennarz WJ. Determination of the membrane topology of Ost4p and its subunit interactions in the oligosaccharyltransferase complex in *Saccharomyces cerevisiae*. *Proc Natl Acad Sci U S A.* 2003 Jun 24;100(13):7460-4.
- 37: Nilsson I, Johnson AE, von Heijne G. How hydrophobic is alanine? *J Biol Chem.* 2003 Aug 8;278(32):29389-93.
- 38: Nilsson I, Kelleher DJ, Miao Y, Shao Y, Kreibich G, Gilmore R, von Heijne G, Johnson AE. Photocross-linking of nascent chains to the STT3 subunit of the oligosaccharyltransferase complex. *J Cell Biol.* 2003 May 26;161(4):715-25.
- 39: Lundin M, Monne M, Widell A, Von Heijne G, Persson MA. Topology of the membrane-associated hepatitis C virus protein NS4B. *J Virol.* 2003;77(9):5428-38.
- 40: Melen K, Krogh A, von Heijne G. Reliability measures for membrane protein topology prediction algorithms. *J Mol Biol.* 2003 Mar 28;327(3):735-44.
- 41: Von Heijne G. Membrane protein assembly in vivo. *Adv Protein Chem.* 2003;63:1-18.
- 42: Hessa T, Monne M, von Heijne G. Stop-transfer efficiency of marginally hydrophobic segments depends on the length of the carboxy-terminal tail. *EMBO Rep.* 2003 Feb;4(2):178-83.
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- 44: Nilsson J, Persson B, Von Heijne G. Prediction of partial membrane protein topologies using a consensus approach. *Protein Sci.* 2002 Dec;11(12):2974-80.
- 45: Chin CN, von Heijne G, de Gier JW. Membrane proteins: shaping up. *Trends Biochem Sci.* 2002 May;27(5):231-4.
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- 51: Drew D, Sjostrand D, Nilsson J, Urbig T, Chin CN, de Gier JW, von Heijne G. Rapid topology mapping of *Escherichia coli* inner-membrane proteins by prediction and PhoA/GFP fusion analysis. *Proc Natl Acad Sci U S A*. 2002 Mar 5;99(5):2690-5.
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- 53: Peltier JB, Emanuelsson O, Kalume DE, Ytterberg J, Friso G, Rudella A, Liberles DA, Soderberg L, Roepstorff P, von Heijne G, van Wijk KJ. Central functions of the lumenal and peripheral thylakoid proteome of *Arabidopsis* determined by experimentation and genome-wide prediction. *Plant Cell*. 2002 Jan;14(1):211-36.
- 54: Emanuelsson O, von Heijne G. Prediction of organellar targeting signals. *Biochim Biophys Acta*. 2001 Dec 12;1541(1-2):114-9.
- 55: Hermansson M, Monne M, von Heijne G. Formation of helical hairpins during membrane protein integration into the endoplasmic reticulum membrane. Role of the N and C-terminal flanking regions. *J Mol Biol*. 2001 Nov 9;313(5):1171-9.
- 56: Drew DE, von Heijne G, Nordlund P, de Gier JW. Green fluorescent protein as an indicator to monitor membrane protein overexpression in *Escherichia coli*. *FEBS Lett*. 2001 Oct 26;507(2):220-4.
- 57: Nilsson I, Ohvo-Rekila H, Slotte JP, Johnson AE, von Heijne G. Inhibition of protein translocation across the endoplasmic reticulum membrane by sterols. *J Biol Chem*. 2001 Nov 9;276(45):41748-54.
- 58: Emanuelsson O, von Heijne G, Schneider G. Analysis and prediction of mitochondrial targeting peptides. *Methods Cell Biol*. 2001;65:175-87.
- 59: Monne M, von Heijne G. Effects of 'hydrophobic mismatch' on the location of transmembrane helices in the ER membrane. *FEBS Lett*. 2001;496(2-3):96-100.
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- 62: von Heijne G. Recent advances in the understanding of membrane protein assembly and structure. *Q Rev Biophys.* 1999 Nov;32(4):285-307.
- 63: Krogh A, Larsson B, von Heijne G, Sonnhammer EL. Predicting transmembrane protein topology with a hidden Markov model: application to complete genomes. *J Mol Biol.* 2001 Jan 19;305(3):567-80.
- 64: Nilsson J, Persson B, von Heijne G. Consensus predictions of membrane protein topology. *FEBS Lett.* 2000 Dec 15;486(3):267-9.
- 65: Chin CN, von Heijne G. Charge pair interactions in a model transmembrane helix in the ER membrane. *J Mol Biol.* 2000 Oct 13;303(1):1-5.
- 66: Killian JA, von Heijne G. How proteins adapt to a membrane-water interface. *Trends Biochem Sci.* 2000 Sep;25(9):429-34.
- 67: Saaf A, Hermansson M, von Heijne G. Formation of cytoplasmic turns between two closely spaced transmembrane helices during membrane protein integration into the ER membrane. *J Mol Biol.* 2000 Aug 4;301(1):191-7.
- 68: Emanuelsson O, Nielsen H, Brunak S, von Heijne G. Predicting subcellular localization of proteins based on their N-terminal amino acid sequence. *J Mol Biol.* 2000 Jul 21;300(4):1005-16.
- 69: Hasler U, Greasley PJ, von Heijne G, Geering K. Determinants of topogenesis and glycosylation of type II membrane proteins. Analysis of Na,K-ATPase beta 1 AND beta 3 subunits by glycosylation mapping. *J Biol Chem.* 2000 Sep 15;275(37):29011-22.
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- 73: Armulik A, Nilsson I, von Heijne G, Johansson S. Determination of the border between the transmembrane and cytoplasmic domains of human integrin subunits.

J Biol Chem. 1999 Dec 24;274(52):37030-4.

74: Devoto A, Piffanelli P, Nilsson I, Wallin E, Panstruga R, von Heijne G, Schulze-Lefert P. Topology, subcellular localization, and sequence diversity of the Mlo family in plants. J Biol Chem. 1999 Dec 3;274(49):34993-5004.

75: Monne M, Nilsson I, Elofsson A, von Heijne G. Turns in transmembrane helices: determination of the minimal length of a "helical hairpin" and derivation of a fine-grained turn propensity scale. J Mol Biol. 1999 Nov 5;293(4):807-14.

76: von Heijne G. A Day in the Life of Dr K. or How I Learned to Stop Worrying and Love Lysozyme: a tragedy in six acts. J Mol Biol. 1999 Oct 22;293(2):367-79.

77: Monne M, Gafvelin G, Nilsson R, von Heijne G. N-tail translocation in a eukaryotic polytopic membrane protein: synergy between neighboring transmembrane segments. Eur J Biochem. 1999 Jul;263(1):264-9.

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79: Fredriksson A, Johnstrom P, Thorell JO, von Heijne G, Hassan M, Eksborg S, Kogner P, Borgstrom P, Ingvar M, Stone-Elander S. In vivo evaluation of the biodistribution of ¹¹C-labeled PD153035 in rats without and with neuroblastoma implants. Life Sci. 1999;65(2):165-74.

80: Saaf A, Johansson M, Wallin E, von Heijne G. Divergent evolution of membrane protein topology: the Escherichia coli RnfA and RnfE homologues. Proc Natl Acad Sci U S A. 1999 Jul 20;96(15):8540-4.

81: Cristobal S, Scotti P, Luirink J, von Heijne G, de Gier JW. The signal recognition particle-targeting pathway does not necessarily deliver proteins to the sec-translocase in Escherichia coli. J Biol Chem. 1999 Jul 16;274(29):20068-70.

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- 89: Nilsson I, von Heijne G. Breaking the camel's back: proline-induced turns in a model transmembrane helix. *J Mol Biol.* 1998 Dec 11;284(4):1185-9.
- 90: Monne M, Nilsson I, Johansson M, Elmhed N, von Heijne G. Positively and negatively charged residues have different effects on the position in the membrane of a model transmembrane helix. *J Mol Biol.* 1998 Dec 11;284(4):1177-83.
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- 93: Ota K, Sakaguchi M, von Heijne G, Hamasaki N, Mihara K. Forced transmembrane orientation of hydrophilic polypeptide segments in multispanning membrane proteins. *Mol Cell.* 1998 Oct;2(4):495-503.
- 94: Saaf A, Monne M, de Gier JW, von Heijne G. Membrane topology of the 60-kDa Oxa1p homologue from *Escherichia coli*. *J Biol Chem.* 1998;273(46):30415-8.
- 95: von Heijne G. Structural aspects of transmembrane alpha-helices. *Acta Physiol Scand Suppl.* 1998 Aug;643:17-9.
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