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## Education and Research

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| 2002-present | Post-Doctoral Researcher with Professor Steven E. Brenner,<br>University of California, Berkeley. |
| 1998-2002 | Ph.D. in Biological Sciences with Dr. Cyrus Chothia, F.R.S.<br>MRC Laboratory of Molecular Biology, University of Cambridge, U.K.<br>Thesis: *Evolution of Protein Families: Genome Sequences and Three Dimensional Structures.* |
| 1995-1998* | B.Sc. (hons) Genetics.<br>The University of Manchester, School of Biological Sciences, U.K. |
| *1996-1997 | ERASMUS program (one semester spent studying in France as part of B.Sc.)<br>Université Paul Sabatier, Toulouse, France |

## Research Interests

Using genome sequence and structural genomic data to discover the functions of important proteins, and analyze protein families:

- For protein families directly or indirectly linked to medical disorders, we can perform structural, sequence and functional analyses to understand how mutation and/or evolution have altered the proteins and how this impacts different organisms.
- We can detect functionally and/or structurally important residues in proteins of clinical interest, by producing accurate structural alignments. These help (i) us to understand how a certain protein fold is maintained despite sequence divergence and (ii) give vital clues as to functionally and/or structurally important residues for that protein.
- Determining ancient evolutionary relationships between proteins based upon structure and sequence will permit a better understanding of molecular evolution.
- Deducing potential model organisms suitable for the study of proteins of medical import can be done by comparing protein repertoires within and between genomes and correlating these with known phylogenetic relationships.
- Key functional inferences about proteins can be made by assigning protein structures to genome sequences using remote homology detection methods.
- Many disease mechanisms will be better understood after extensive analyses of protein interactions.
- Given the vast amounts of sequence data and the lesser quantities of structure data there will remain many proteins for which we do not have three-dimensional structures. Therefore, the accurate prediction of protein structure from sequence will be of huge import in the future.

## Conferences and Presentations

"Functional and Evolutionary Insights by Systematic Analysis of Tubulin Sequences" A poster submitted to the Biophysical Society 48th Annual Meeting, Baltimore, USA, February 2004

"Functional and structural phylogenomics of the kinase superfamily" given at the 2003 PKR-Protein Phosphorylation Workshop, Pacific Grove, Asilomar, CA, USA, December 2003.

"The Nudix Hydrolase Family: Structural, Functional and Evolutionary Relationships." Poster given at the 16th West Coast Protein Crystallography Workshop, Pacific Grove, Asilomar, CA, USA, March 2003.

"A Phylogenetic Approach to Fold Prediction" Poster given at CASP5, Pacific Grove, Asilomar, CA, USA, December 2002

"Conservation in Protein Superfamilies of Little or No Sequence Identity ." Talk given at ESF workshop on Molecular Interactions, Verona, Italy. July 2002.

"The Identification of the Determinants of Protein Folds ("Key-Residues") Permits a Precise Assignment of Protein Structure and Homology to Genome Sequences." talk given to the groups of Eugene Koonin at NCBI, (Washington, USA), Mark Gerstein at Yale (New Haven, USA), Michael Levitt at Stanford and Steven Brenner at Berkeley (California, USA). May-June 2001.
"Cadherin Superfamily Proteins Within the Genomes of *Caenorhabditis elegans* and *Drosophila melanogaster*." Talk given at the MRC-LMB Annual Symposium. Cambridge, UK. Oct. 2000.

"Cadherin Superfamily Proteins Within the Genomes of *Caenorhabditis elegans* and *Drosophila melanogaster*." Poster given at Genes Proteins and Computers VI: "Bioinformatics and the Molecular Biologist." Chester, UK. April 2000.

## Scientific Publications

Wasantha Ranatunga*, **Emma E. Hill*,** Jana L. Mooster1, Elizabeth L. Holbrook1,3, Ursula Schulze-Gahmen1, WenLian Xu4, Maurice J. Bessman4, Steven E. Brenner1,2 and Stephen R. Holbrook (2003) "Structural Studies of the Nudix hydrolase DR1025 from Deinococcus radiodurans and Ligand Complexes" In press *The Journal of Molecular Biology*.
* These authors contributed equally to this work.

**Emma E. Hill**, Veronica Morea and Cyrus Chothia. (2002) "Sequence Conservation in Families Whose Members Have Little or no Sequence Similarity: The Four-Helical Cytokines and Cytochromes." *The Journal of Molecular Biology*. 322, (1), 205-233.
Recommended as a must read on Faculty of 1000 website: http://www.facultyof1000.com

**Emma Hill**, Ian D. Broadbent, Cyrus Chothia and Jonathan Pettitt. (2001). "The Cadherin Superfamily of Proteins in *Caenorhabditis elegans* and *Drosophila melanogaster*." *The Journal of Molecular Biology*. 305, (5), 1011-1024.
(See also: http://www.mrc-lmb.cam.ac.uk/genomes/Cadherins/cad_web_pages.html)

**Emma E. Hill**. (2001). "Evolution of Protein Families: Genome Sequences and Three Dimensional Structures." Thesis for The University of Cambridge degree of Doctor of Philosophy.

**Additional Information & Interests**

- Teaching experience: Supervisions given in Quantitative Biology to undergraduate students at Cambridge University. Private tuition given in English to French students and *vice versa*. Voluntary work giving English lessons in a French primary school.
- Oral and written fluency in French.
- Conversational German, Italian and Spanish(with some written knowledge).
- Awarded Pfizer prize for A-level Chemistry (1994).
- I have been involved with a charity in Romania to help handicapped people. This included going on trips there with groups of English school children and helping them to organise and realise holidays for the Romanian clients. Another aspect of my involvement was collecting old computers to be sent to Romania for use in a day centre for the clients.
- I enjoy outdoor pursuits. My favourites include water activities (scuba diving, wakeboarding, swimming) and trekking (I recently trekked around the Everest region in Nepal). I also like to take time to read and relax.

**References**

Dr Cyrus Chothia, F.R.S (Ph.D. advisor)
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