

# Kim RUTHERFORD

## Software Development and Bioinformatics

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### Profile

I am a software developer and bioinformatician. For the last 20 years I have been helping biologists to capture, analyse and interpret genomic data.

### Skills and Experience

- Software development: web, desktop and server
- Database administration and maintenance
- Genome assembly, annotation and analysis
- Processing, management and analysis of next generation sequencing data
- Systems administration including software and database installation and configuration

### Work experience

- June 2010 – Present **Programmer** *S. pombe genome database (PomBase)*  
Department of Biochemistry, University of Cambridge
- Tasks* web and database programming  
system administration
- Major projects* [Canto](#) - a community curation tool  
[PomBase v2](#)
- Sept 2012 – Dec 2016 **Scientific Officer** (part time) *Gemmell Group*  
Department of Anatomy, University of Otago
- Tasks* bioinformatics support for the group  
genome and transcriptome assembly and analysis  
mentoring / training of group members in bioinformatics  
[tuatara](#) [genome project](#)
- Feb 2009 – June 2010 **Computer Associate** *Baulcombe Group*  
Department of Plant Sciences, University of Cambridge
- Tasks* bioinformatics support  
creation of a short read analysis pipeline
- Sept 2007 – Feb 2009 **Programmer** *modENCODE Data Coordination Center*  
Cambridge Systems Biology Centre
- Tasks* helped create the data warehouse for the modENCODE project:  
[modMine](#)
- Feb 2004 – Sept 2007 **Programmer** *FlyMine/InterMine group*  
Department of Genetics, University of Cambridge
- Tasks* Java programming for the [InterMine](#) project
- Oct 2001 – Feb 2004 **Principal Computer Programmer** *Pathogen Sequencing Unit*  
The Sanger Institute
- Tasks* programming and bioinformatics support
- Major projects* [Artemis](#) - a genome analysis and annotation tool  
[ACT](#) - a genome comparison viewer
- Apr 1999 – Oct 2001 **Senior Computer Programmer** *Pathogen Sequencing Unit*  
The Sanger Institute
- Sept 1998 – Apr 1999 **Computer Programmer** *Pathogen Sequencing Unit*  
The Sanger Institute

### Publications

[Google Scholar](#) [ORCID](#) [Europe PMC](#) [ResearcherID](#) [Scopus profile](#)

- Apr 2020 **Term Matrix: A novel Gene Ontology annotation quality control system based on ontology term co-annotation patterns**  
V. Wood *et al.*  
*bioRxiv preprint* [10.1101/2020.04.21.045195](#)
- Jan 2020 **Community curation in PomBase: enabling fission yeast experts to provide detailed, standardized, sharable annotation from research publications**  
A. Lock, M. Harris, K. Rutherford, J. Hayles, V. Wood  
*In press*
- Dec 2019 **The tuatara genome: insights into vertebrate evolution from the sole survivor of an ancient reptilian order**  
N. Gemmell, K. Rutherford, S. Prost, M. Tollis, D.J. Winter, J.R. Macey, D.L. Adelson, A. Suh, T. Bertozzi, J. Grau, C. Organ, P. Gardner, *et al.*  
*Under review (bioRxiv preprint)* [10.1101/867069](#)
- Nov 2019 **PHI-base: the pathogen-host interactions database**  
M. Urban, A. Cuzick, J. Seager, V. Wood, K. Rutherford, S. Yagwakote Venkatesh, N. De Silva, M. Carbajo Martinez, H. Pedro, A.D. Yates, K. Hassani-Pak, K.E. Hammond-Kosack  
*Nucleic Acids Research*. [10.1093/nar/gkz904](#)
- Mar 2019

- Molecular structure of sauropsid  $\beta$ -keratins from tuatara (*Sphenodon punctatus*)**  
D. Parry, R. Fraser, L. Alibardi, K. Rutherford, N. Gemmell  
*J. Struct. Biol.* 207, 21-28. [DOI: 10.1016/j.jsb.2019.04.008](#)
- Jan 2019 **PomBase 2018: user-driven reimplementations of the fission yeast database provides rapid and intuitive access to diverse, interconnected information**  
A. Lock, K. Rutherford, M.A. Harris, J. Hayles, S.G. Oliver, J. Bähler, V. Wood  
*Nucleic Acids Research*. [DOI: 10.1093/nar/gky961](#)
- Dec 2018 **Stress, novel sex genes and epigenetic reprogramming orchestrate socially-controlled sex change**  
E.V. Todd, O. Ortega-Recalde, H. Liu, M.S. Lamm, K.M. Rutherford, H. Cross, M.A. Black, O. Kardailsky, J.A. Graves, T.A. Hore, J.R. Godwin, N.J. Gemmell  
*Science Advances* Vol. 5, no. 7 [DOI: 10.1126/sciadv.aaw7006](#)
- Nov 2018 **Hidden in plain sight: What remains to be discovered in the eukaryotic proteome?**  
V. Wood, A. Lock, M. Harris, K. Rutherford, J. Bähler, S. Oliver  
*Open Biology*. [DOI: 10.1098/rsob.180241](#)
- Oct 2018 **RNAcentral: a hub of information for non-coding RNA sequences**  
The RNAcentral Consortium  
*Nucleic Acids Research*. [DOI: 10.1093/nar/gky1034](#)
- Oct 2018 **The Gene Ontology Resource: 20 years and still GOing strong**  
The Gene Ontology Consortium  
*Nucleic Acids Research*. [DOI: 10.1093/nar/gky1055](#)
- Aug 2018 **Evolutionary history of the podoplanin gene**  
J. Renart, D. San Mauro, A. Agorreta, K. Rutherford, N. J. Gemmell, M. Quintanill  
*Gene Reports*. [DOI: 10.1016/j.genrep.2018.08.005](#)
- Aug 2018 **Reduced representation sequencing detects only subtle regional structure in a heavily exploited and rapidly recolonizing marine mammal species**  
N. Dussex, H.R. Taylor, W.R. Stovall, K. Rutherford, K.G. Dodds, S.M. Clarke, N.J. Gemmell  
*Ecology and Evolution*. [DOI: 10.1002/ece3.4411](#)
- Apr 2018 **Adipose Transcriptome Analysis Provides Novel Insights into Molecular Regulation of Prolonged Fasting in Northern Elephant Seal Pups**  
B. Martinez, J. Khudyakov, K. Rutherford, D. Crocker, N. Gemmell, R. Ortiz  
*Physiological Genomics*. [DOI: 10.1152/physiolgenomics.00002.2018](#)
- Apr 2018 **De novo draft assembly of the *Botryllodes leachii* genome provides further insight into tunicate evolution**  
S. Blanchoud, K. Rutherford, L. Zondag, N. Gemmell, M. Wilson  
*Sci Rep.* 2018 Apr 3;8(1):5518. [DOI: 10.1038/s41598-018-23749-w](#)
- Feb 2018 **Genetic sex assignment in wild populations using GBS data: a statistical threshold approach**  
W. Stovall, H.R. Taylor, M. Black, S. Grosser, K. Rutherford, N.J. Gemmell  
*Molecular Ecology Resources*. [DOI: 10.1111/1755-0998.12767](#)
- Dec 2017 **Analysis of the genome of the New Zealand giant collembolan (*Holacanthella duospinosa*) sheds light on hexapod evolution**  
C. Wu, M.D. Jordan, R.D. Newcomb, N.J. Gemmell, S. Bank, K. Meusemann, P.K. Dearden, E.J. Duncan, S. Grosser, K. Rutherford, P.P. Gardner, R.N. Crowhurst, B. Steinwender, L.K. Tooman, M.I. Stevens, T.R. Buckley  
*BMC Genomics*. 2017 Oct 17;18(1):795. [DOI: 10.1186/s12864-017-4197-1](#)
- Dec 2017 **Identification of sex differences in zebrafish (*Danio rerio*) brains during early sexual differentiation and masculinisation using 17 $\alpha$ -methyltestosterone**  
S.L.J. Lee, J.A. Horsfield, M.A. Black, K.M. Rutherford, N.J. Gemmell  
*Biology of Reproduction*. [DOI: 10.1093/biolre/iox175](#)
- Nov 2017 **Female mimicry by sneaker males has a transcriptomic signature in both the brain and gonad in a sex changing fish**  
E.V. Todd, H. Liu, M.S. Lamm, J.T. Thomas, K. Rutherford, K.C. Thompson, J.R. Godwin, N.J. Gemmell  
*Molecular Biology and Evolution*. [DOI: 10.1093/molbev/msx293](#)
- July 2017 **Male-female relatedness at specific SNP-linkage groups influences cryptic female choice in Chinook salmon (*Oncorhynchus tshawytscha*)**  
C. Gessner, S.L. Johnson, P. Fisher, S. Clarke, K. Rutherford, J. Symonds, N.J. Gemmell  
*Proc. R. Soc. B* 2017 284 20170853; [DOI: 10.1098/rspb.2017.0853](#)
- July 2017 **Histological and transcriptomic effects of 17 $\alpha$ -methyltestosterone on zebrafish gonad development**  
S.L.J. Lee, J.A. Horsfield, M.A. Black, K. Rutherford, A. Fisher, N.J. Gemmell  
*BMC Genomics* (2017) 18:557 [DOI: 10.1186/s12864-017-3915-z](#)
- June 2017 **PomBase – the scientific resource for fission yeast**  
V. Wood, A. Lock, K. Rutherford, M.A. Harris  
*Methods in Molecular Biology* [DOI: 10.17863/CAM.12124](#)
- Jan 2017 **PHI-base: A new interface and further additions for the multi-species pathogen-host interactions database.**  
Urban, M., Alayne Cuzick, A., Rutherford, K., Irvine, A., Pedro, H., Pant, R., Sadanadan, V., Khamari, L., Billal, S., Mohanty S., and Hammond-Kosack, K.E.  
*Nucleic Acids Research* (2017) [DOI: 10.1093/nar/gkw1089](#)
- Nov 2016 **The Gene Ontology Consortium; Expansion of the Gene Ontology knowledgebase and resources.**  
The Gene Ontology Consortium  
*Nucleic Acids Res* 2017; 45 (D1): D331-D338. [DOI: 10.1093/nar/gkw1108](#)

- Feb 2016 **Uncovering the pathways underlying whole body regeneration in a chordate model, *Botryllodes leachi* using de novo transcriptome analysis**  
L. Zondag, K. Rutherford, N. Gemmell and M. Wilson  
*BMC Genomics* (2016) 17:114 [↗](#) [10.1186/s12864-016-2435-6](#)
- Nov 2015 **Large-scale transcriptome sequencing reveals novel expression patterns for key sex-related genes in a sex-changing fish**  
H. Liu, M. Lamm, K. Rutherford, M. Black, J. Godwin and N. Gemmell  
*Biology of Sex Differences* (2015) 6:26 [↗](#) [10.1186/s13293-015-0044-8](#)
- Jan 2015 **Gene Ontology Consortium: going forward**  
The Gene Ontology Consortium  
*Nucl. Acids Res.* (28 January 2015) 43 (D1): D1049-D1056. [↗](#) [10.1093/nar/gku1179](#)
- Dec 2014 **Molecular evolution of Dmrt1 accompanies change of sex-determining mechanisms in reptilia**  
D. E. Janes *et al.*  
*Biol Lett.* 2014 Dec; 10(12): 20140809. [↗](#) [10.1098/rsbl.2014.0809](#)
- Oct 2014 **PomBase 2015: updates to the fission yeast database**  
M. McDowall, M. Harris, A. Lock, K. Rutherford, D. Staines, J. Bähler, P. Kersey, S. Oliver and V. Wood  
*Nucl. Acids Res.* (2014) [↗](#) [10.1093/nar/gku1040](#)
- June 2014 **Improving functional annotation for industrial microbes: A case study with *Pichia pastoris***  
D. Dikicioglu, V. Wood, K. Rutherford, M. McDowall, S. Oliver  
*Trends in Biotechnology* (2014) [↗](#) [10.1016/j.tibtech.2014.05.003](#)
- Feb 2014 **Canto: An online tool for community literature curation**  
K. Rutherford, M. A. Harris, A. Lock, S. G. Oliver and V. Wood  
*Bioinformatics* (2014) [↗](#) [10.1093/bioinformatics/btu103](#)
- Jan 2013 **Gene ontology annotations and resources.**  
Gene Ontology Consortium  
*Nucleic Acids Res.* 2013 Jan;41(Database issue):D530-5. [↗](#) [10.1093/nar/gks1050](#)
- Sep 2012 **InterMine: a flexible data warehouse system for the integration and analysis of heterogeneous biological data**  
R.N. Smith, J. Aleksic, D. Butano, A. Carr, S. Contrino, F. Hu, M. Lyne, R. Lyne, A. Kalderimis, K. Rutherford, R. Stepan, J. Sullivan, M. Wakeling, X. Watkins, G. Micklem  
*Bioinformatics.* (2012) 28 (23):3163-3165. [↗](#) [10.1093/bioinformatics/bts577](#)
- Jan 2012 **modMine: flexible access to modENCODE data.**  
S. Contrino, R.N. Smith, D. Butano, A. Carr, F. Hu, R. Lyne, K. Rutherford, A. Kalderimis, J. Sullivan, S. Carbon, E.T. Kephart, P. Lloyd, E.O. Stinson, N.L. Washington, M.D. Perry, P. Ruzanov, Z. Zha, S.E. Lewis, L.D. Stein, G. Micklem  
*Nucleic Acids Res.* 2012 Jan;40(Database issue):D1082-8. [↗](#) [10.1093/nar/gkr921](#)
- Jan 2012 **PomBase: a comprehensive online resource for fission yeast.**  
V. Wood, M.A. Harris, M.D. McDowall, K. Rutherford, B.W. Vaughan, D.M. Staines, M. Aslett, A. Lock, J. Bähler, P.J. Kersey, S.G. Oliver  
*Nucleic Acids Res.* 2012 Jan;40(Database issue):D695-9. [↗](#) [10.1093/nar/gkr853](#)
- Nov 2011 **The Gene Ontology: enhancements for 2011.**  
Gene Ontology Consortium.  
*Nucleic Acids Res.* 2012 Jan;40(Database issue):D559-64. [↗](#) [10.1093/nar/gkr1028](#)
- Dec 2010 **Identification of Functional Elements and Regulatory Circuits by *Drosophila* modENCODE.**  
The modENCODE Consortium  
*Science.* 2010 Dec 24;330(6012):1787-97. [↗](#) [10.1126/science.1198374](#)
- Dec 2010 **Integrative Analysis of the *C. elegans* Genome by the modENCODE Project.**  
The modENCODE Consortium  
*Science.* 2010 Dec 24;330(6012):1775-87. [↗](#) [10.1126/science.1196914](#)
- July 2007 **FlyMine: an integrated database for *Drosophila* and *Anopheles* genomics.**  
R. Lyne *et al.*  
*Genome Biol.* 2007;8(7):R129. [↗](#) [10.1186/gb-2007-8-7-r129](#)
- Sep 2005 **WebACT - An online companion for the Artemis Comparison Tool**  
J. Abbott, D. Aanensen, K. Rutherford, S. Butcher and B. Spratt  
*Bioinformatics.* 2005 Sep 15;21(18):3665-6. [↗](#) [10.1093/bioinformatics/bti601](#)
- Aug 2005 **ACT: the Artemis comparison tool.**  
T. Carver, K. Rutherford, M. Berriman, M-A. Rajandream, B.. Barrell and J. Parkhill  
*Bioinformatics.* 2005 Aug 15;21(16):3422-3 [↗](#) [10.1093/bioinformatics/bti553](#)
- June 2005 **A Human-Curated Annotation of the *Candida albicans* Genome**  
Braun *et al.*  
*PLoS Genet.* 2005 Jul;1(1):36-57. [↗](#) [10.1371/journal.pgen.0010001](#)
- Jan 2005 **A comprehensive survey of the *Plasmodium* life cycle by genomic, transcriptomic, and proteomic analyses**  
N. Hall *et al.*  
*Science* 07 Jan 2005: Vol. 307, Issue 5706, pp. 82-86 [↗](#) [10.1126/science.1103717](#)
- Sep 2004 **Genomic plasticity of the causative agent of melioidosis, *Burkholderia pseudomallei*.**  
M. Holden *et al.*  
*Proc Natl Acad Sci U S A.* 2004 Sep 28;101(39):14240-5. [↗](#) [10.1073/pnas.0403302101](#)
- June 2004

- Complete genomes of two clinical *Staphylococcus aureus* strains: Evidence for the rapid evolution of virulence and drug resistance.**  
M. Holden *et al.*  
*Proc Natl Acad Sci U S A.* 2004 Jun 29;101(26):9786-91. [↗](#) [10.1073/pnas.0402521101](#)
- Jan 2004 **GeneDB: a resource for prokaryotic and eukaryotic organisms.**  
Hertz-Fowler C *et al.*  
*Nucleic Acids Res.* 2004 Jan 1;32(Database issue):D339-43. [↗](#) [10.1093/nar/gkh007](#)
- Nov 2003 **The complete genome sequence and analysis of *Corynebacterium diphtheriae* NCTC13129.**  
A. Cerdeño-Tárraga *et al.*  
*Nucleic Acids Res.* 2003 Nov 15;31(22):6516-23. [↗](#) [10.1093/nar/gkg874](#)
- Aug 2003 **The DNA sequence of chromosome I of an African trypanosome: Gene content, chromosome organisation, recombination and polymorphism**  
N. Hall *et al.*  
*Nucl. Acids Res.* (2003) 31 (16): 4864-4873. [↗](#) [PMC169939](#)
- June 2003 **Viewing and annotating sequence data with Artemis.**  
M. Berriman and K. Rutherford  
*Brief Bioinform.* 2003 Jun;4(2):124-32. [↗](#) [PMID:12846394](#)
- Oct 2002 **Genome sequence of the human malaria parasite *Plasmodium falciparum*.**  
J. Malcolm *et al.*  
*Nature.* 2002 Oct 3;419(6906):498-511. [↗](#) [10.1038/nature01097](#)
- Oct 2002 **Sequence of *Plasmodium falciparum* chromosomes 1, 3-9 and 13.**  
N. Hall *et al.*  
*Nature.* 2002 Oct 3;419(6906):527-31. [↗](#) [10.1038/nature01095](#)
- May 2002 **Complete genome sequence of the model actinomycete *Streptomyces coelicolor* A3(2).**  
S. Bentley *et al.*  
*Nature.* 2002 May 9;417(6885):141-7. [↗](#) [10.1038/417141a](#)
- Feb 2002 **The genome sequence of *Schizosaccharomyces pombe*.**  
V. Wood *et al.*  
*Nature.* 2002 Feb 21;415(6874):871-80. [↗](#) [10.1038/nature724](#)
- Oct 2001 **Complete genome sequence of a multiple drug resistant *Salmonella enterica* serovar Typhi CT18.**  
J. Parkhill *et al.*  
*Nature.* 2001 Oct 25;413(6858):848-52. [↗](#) [10.1038/35101607](#)
- Oct 2001 **Genome sequence of *Yersinia pestis*, the causative agent of plague.**  
J. Parkhill *et al.*  
*Nature.* 2001 Oct 4;413(6855):523-7. [↗](#) [10.1038/35097083](#)
- June 2001 **A Re-annotation of the *Saccharomyces cerevisiae* Genome.**  
V. Wood, K. M. Rutherford, A. Ivens, M-A Rajandream and B. Barrell  
*Comp Funct Genomics.* 2001 June; 2(3): 143-154. [↗](#) [10.1002/cfg.86](#)
- Feb 2001 **Massive gene decay in the leprosy bacillus.**  
S. Cole *et al.*  
*Nature.* 2001 Feb 22;409(6823):1007-11. [↗](#) [10.1038/35059006](#)
- Oct 2000 **Artemis: sequence visualisation and annotation.**  
K. Rutherford, J. Parkhill, J. Crook, T. Horsnell, P. Rice, M-A. Rajandream and B. Barrell  
*Bioinformatics.* 2000 Oct;16(10):944-5. [↗](#) [10.1093/bioinformatics/16.10.944](#)
- Sep 2000 **Analysis of 114 kb of DNA sequence from fission yeast chromosome 2 immediately centromere-distal to *his5*.**  
Z. Xiang *et al.*  
*Yeast* 16: 1405-1411. [↗](#) [full text](#)
- Mar 2000 **Complete DNA sequence of a serogroup A strain of *Neisseria meningitidis* Z2491.**  
J. Parkhill *et al.*  
*Nature.* 2000 Mar 30;404(6777):502-6. [↗](#) [10.1038/35006655](#)
- Feb 2000 **The genome sequence of the food-borne pathogen *Campylobacter jejuni* reveals hypervariable sequences.**  
J. Parkhill *et al.*  
*Nature.* 2000 Feb 10;403(6770):665-8. [↗](#) [10.1038/35001088](#)

## Book Chapters

- Apr 2018 **PomBase: The Scientific Resource for Fission Yeast**  
"Eukaryotic Genomic Databases : Methods and Protocols"  
A Lock, K Rutherford, M.A. Harris, V. Wood  
*Methods in Molecular Biology*, vol 1757. [↗](#) [10.1007/978-1-4939-7737-6\\_4](#)