

1. Research Outputs for 2009

Books / Chapters in Books (Total: 2)

Kana BD, Machowski EE, Rubin H, Mizrahi V. (2009) Electron transport and respiration. In: *Mycobacterium: Genomics and Molecular Biology* (Parish T & Brown A, eds.) Horizon Press, ch. 3, pp. 35-64.

McEvoy CRE, Warren RM, van Helden PD. 2009. Molecular Methods and Their Application in TB Epidemiology. In: Schaaf HS, Zumla AI (ed.) *Tuberculosis. A Comprehensive Clinical Reference*. Elsevier Publications. pp 28 – 37.

Articles in Peer-Reviewed Journals (Total: 41)

Mowa MB, Warner DF, Kaplan G, Kana BD, Mizrahi V. (2009) Function and regulation of class I ribonucleotide reductase-encoding genes in mycobacteria. *J Bacteriol.* 191(3):985-995. (IF=3.636)

Kana BD, Bonazzi M, Calzavara-Silva CE. (2009) The molecular and cellular basis of infection - perspectives from the first advanced summer school in Africa. *IUBMB Life* 61:85-90. (IF=2.364)

Abdallah AM, Verboom T, Weerdenburg E, Gey van Pittius NC, Mahasha PW, Jiménez C, Parra M, Cadieux N, Brennan MJ, Appelmelk BJ, Bitter W. (2009) PPE and PE_PGRS proteins of *Mycobacterium marinum* are transported via the type VII secretion system ESX-5, *Mol. Microbiol.*73(3):329–340. (IF=5.213)

Bezuidenhout J, Roberts T, Muller L, van Helden P, Walzl G.(2009) Pleural tuberculosis in patients with early HIV infection is associated with increased TNF-alpha expression and necrosis in granulomas. *PLoS ONE.* 4(1):e4228. (IF unavailable)

Bitter W, Houben ENG, Bottai D, Brodin P, Brown EJ, Cox JS, Derbyshire K, Fortune SM, Gao L-Y, Liu J, Gey van Pittius NC, Pym AS, Rubin EJ, Sherman DR, Cole ST, Brosch R. (2009) Systematic genetic nomenclature for type VII secretion systems, *PLoS Pathogens* Oct;5(10):e1000507 (IF=9.125)

Black GF, Thiel BA, Ota M, Parida SK, Adegbola R, Boom WH, Dockrell HM, Franken KLMC, Friggen AH, Hill PC, Klein MR, Lalor MK, Mayanja H, Schoolnik G, Stanley K, Weldingh K, Kaufmann SHE, Walzl G, Ottenhoff THM, The GCGH Biomarkers for TB Consortium. (2009) Immunogenicity of novel *DosR* regulon-encoded candidate antigens of *Mycobacterium tuberculosis* in three high-burden populations in Africa. *Clin Vaccine Immunol.* 16(8):1203-1212. (IF=2.237)

Chaoui I, Sabouni R, Kourout M, Jordaan AM, Lahlou O, Elouad R, Akrim M, Victor TC, Elmzibri M. (2009) Analysis of Isoniazid, Streptomycin and Ethambutol resistance in *Mycobacterium tuberculosis* isolates from Morocco. *J. Infect. Dev. Ctries.* 2009; 3(4):278-284. (IF unavailable)

Chegou NN, Black GF, Kidd M, van Helden PD, Walzl G. (2009) Host markers in Quantiferon supernatants differentiate active TB from latent TB infection: preliminary report. *BMC Pulmonary Medicine.* 9:21. (IF unavailable)

Cobat A, Gallant CJ, Simkin L, Black GF, Stanley K, Hughes J, Doherty TM, Hanekom WA, Eley B, Jaïs JP, Boland-Auge A, van Helden P, Casanova JL, Abel L, Hoal EG, Schurr E, Alcaïs A. (2009) [Two loci control tuberculin skin test reactivity in an area hyperendemic for tuberculosis.](#) *J Exp Med.* 206(12):2583-2591. (IF=15.219)

Detjen AK, Loebenberg L, Grewal HM, Stanley K, Gutschmidt A, Kruger C, Du PN, Kidd M, Beyers N, Walzl G, Hesselting AC. (2009) Short-term Reproducibility of a Commercial Interferon-gamma Release Assay. *Clin. Vaccine Immunol.* 16(8):1170-1175. (IF=2.237)

Diacon AH, Pym A, Grobusch M, Patientia R, Rustomjee R, Page-Shipp L, Pistorius C, Krause R, Bogoshi M, Churchyard G, Venter A, Allen J, Palomino JC, De Marez T, van Heeswijk RPG, Lounis N, Meyvisch P, Verbeeck J, Parys W, de Beule K, Andries K, Mc Neeley DF. (2009) The Diarylquinoline TMC207 for Multidrug-Resistant Tuberculosis. *New Engl. J. Med.* 360(23):2397-2405. (IF=50.017)

Djoba Siawaya JF, Beyers, N, van Helden PD, Walzl G. (2009) Differential Cytokine Secretion and Early Treatment Response in Patients with Pulmonary Tuberculosis. <i>Clin. Exp. Immunol.</i> 156(1):69-77. (IF=2.853)
Djoba Siawaya JF, Chegou N, Van Den Heuvel MM, Diacon AH, Beyers N, Van Helden PD, Walzl G.(2009) Differential cytokine/chemokines and IL-6 profiles in patients with different forms of tuberculosis. <i>Cytokine</i> 47(2):132-136. (IF=2.214)
Donald PR, van Helden PD. (2009) The Global Burden of Tuberculosis - Combating Drug Resistance in Difficult Times. <i>New Engl. J. Med.</i> 360(23):2393-2395. (IF=50.017)
Espie IW, Hlokwé TM, Gey van Pittius NC, Lane E, Tordiffe ASW, Michel AL, Müller A, Kotze A, and van Helden PD. (2009) A case of pulmonary infection due to <i>Mycobacterium bovis</i> in a Black Rhinoceros (<i>Diceros bicornis minor</i>) in South Africa. <i>J. Wildlife Dis.</i> 45(4):1187-1193 (IF=1.330)
Hayward D, van Helden PD, Wiid I. (2009) Glutamine synthetase sequence evolution in the mycobacteria and their use as molecular markers for Actinobacteria speciation. <i>BMC Evolution. Biol.</i> 9:48. (IF=4.050)
Hesseling AC, Mandalakas AM, Kirchner LH, Chegou NN, Marais BJ, Zhu X, Black GF, Stanley K, Beyers N, Walzl G. (2009) Highly Discordant T-Cell Responses In Individuals With Recent Household Tuberculosis Exposure. <i>Thorax</i> 64(10):840-846. (IF=7.069)
Hoek KG, Schaaf HS, Gey van Pittius NC, van Helden PD, Warren RM. (2009) Resistance to pyrazinamide and ethambutol compromises MDR/XDR-TB treatment. <i>S. Afr. Med. J.</i> 99(11), 785-787. (IF unavailable)
Kagina BM, Abel B, Bowmaker M, Scriba TJ, Gelderbloem S, Smit E, Erasmus M, Nene N, Walzl G, Black G, Hussey GD, Hesseling AC, Hanekom WA. (2009) Delaying BCG vaccination from birth to 10 weeks of age may result in an enhanced memory CD4 T cell response. <i>Vaccine.</i> 27(40): 5488-5495. (IF=3.298)
Louw GE, Warren RM, Gey van Pittius NC, McEvoy CR, Van Helden PD, Victor TC. (2009) A balancing act: Efflux/influx in mycobacterial drug resistance, <i>Antimicrob. Agents Ch.</i> 53(8):3181-3189. (IF=4.716)
Louw GE, Warren RM, van Helden PD, Victor TC. (2009) Rv2629 191A/C nucleotide change is not associated with RIF resistance in <i>Mycobacterium tuberculosis</i> . <i>Clin. Chem. Lab. Med.</i> 47(4):500-501. (IF=1.888)
Marais BJ, Hesseling AC, Schaaf HS, Gie RP, van Helden PD, Warren RM. (2009) <i>Mycobacterium tuberculosis</i> transmission is not related to household genotype in a highly endemic setting. <i>J. Clin. Microbiol.</i> 74(5):1338-1343. (IF=3.945)
Marcotty T, Matthys F, Godfroid J, Rigouts L, Ameni G, Gey van Pittius NC, Kazwala R, Muma J, Van Helden PD, Walravens K, De Klerk LM, Geoghegan C, Mbotha D, Otte M, Amenu K, Abu Samra N, Botha C, Ekron M, Jenkins A, Jori F, Kriek N, McCrindle C, Michel A, Morar D, Roger F, Thys E, and Van den Bossche P. (2009) Zoonotic tuberculosis and brucellosis in Africa: neglected zoonoses or minor public health issues? <i>Ann. Trop. Med. Parasit.</i> 103(5):401-411. (IF=1.652)
McEvoy CRE, van Helden PD, Warren RM, Gey van Pittius NC. Evidence for a rapid rate of molecular evolution at the hypervariable and immunogenic <i>Mycobacterium tuberculosis</i> PPE38 gene region. <i>BMC Evolution. Biol.</i> 9:237. (IF=4.050)
McEvoy CRE, Warren RM, van Helden PD, Gey van Pittius NC. (2009) Multiple, independent, identical IS6110 insertions in <i>Mycobacterium tuberculosis</i> PPE genes. <i>Tuberculosis</i> 89:439-442. (IF=1.758)
McIlleron H, Willemsse M, Werely CJ, Hussey GD, Schaaf HS, Smith PJ, Donald PR. (2009) Isoniazid Plasma Concentrations in a Cohort of South African Children with Tuberculosis: Implications for International Pediatric Dosing Guidelines. <i>Clin. Infect. Dis.</i> 48(11):1547-1553. (IF=8.266)
Michel AL, Coetzee ML, Keet DF, Mare L, Warren RM, Cooper D, Bengis RG, Kremer K, van Helden PD. (2009) Molecular epidemiology of <i>Mycobacterium bovis</i> isolates from free ranging wildlife in South African game reserves. <i>Vet. Microbiol.</i> 133: 335–343. (IF=2.370)
Möller M, Nebel A, Valentonyte R, van Helden P, Schreiber S, Hoal E. (2009) Investigation of chromosome 17 candidate genes in susceptibility to TB in a South African population. <i>Tuberculosis</i> 89:189-194.

(IF=1.758)
Müller B, Hilty M, Berg S, Garcia-Pelayo MC, Dale J, Boschirolu ML, Cadmus S, Naré B, Ngandolo R, Godreuil S, Diguimbaye-Djaibé C, Kazwala R, Bonfoh B, Njanpop-Lafourcade BM, Sahraoui N, Guetarni D, Aseffa A, Mekonnen MH, Razanamparany VR, Ramarokoto H, Djønne B, Oloya J, Machado A, Mucavele C, Skjerve E, Portaels F, Rigouts L, Michel A, Müller A, Källenius G, van Helden PD, Hewinson RG, Zinsstag J, Gordon SV, Smith NH. (2009) African 1; An Epidemiologically Important Clonal Complex of <i>Mycobacterium bovis</i> Dominant in Mali, Nigeria, Cameroon and Chad. <i>J Bacteriol.</i> 191(6):1951-1960. (IF=3.636)
Nusbaum C, Ohsumi TK, Gomez J, Aquadro J, Victor TC, Warren RM, Hung DT, Birren BW, Lander ES, Jaffe DB. (2009) Sensitive and specific polymorphism discovery in bacteria using massively parallel sequencing. <i>Nature Methods.</i> 6(1):67-69. (IF=13.651)
Onajole OK, Govender K, Govender P, van Helden PD, Kruger HG, Maguire GEM, Muthusamy K, Pillay M, Wiid I, Govender T. (2009) Pentacyclo-undecane derived cyclic tetra-amines: Synthesis and Evaluation as potent anti-tuberculosis agents. <i>Eur. J. Med. Chem.</i> 4297-4305. (IF=2.882)
Parsons SD, Gous TA, de Villiers C, Warren RM, Seier JV, van Helden PD. (2009) Detection of <i>Mycobacterium tuberculosis</i> infection in chacma baboons (<i>Papio ursinus</i>) using the QuantiFERON-TB Gold (In-Tube Method) assay. <i>J. Med Primatol</i> 38:411-417. (IF=1.047)
Schaaf HS, Victor TC, Venter A, Brittle W, Hesselning AC, Marais BJ, van Helden PD, Donald PR. (2009) Ethionamide cross- and co-resistance in children with isoniazid-resistant tuberculosis. <i>Int. J. Tuberc. Lung D.</i> 13(11):1355-1359. (IF=2.304)
Uys PW, van Helden PD, Hargrove JW. (2009) Tuberculosis reinfection rate as a proportion of total infection rate correlates with the logarithm of the incidence rate – a mathematical model. <i>J Roy Soc Interface.</i> 6(30):11-15. (IF=3.621)
Uys PW, Warren R, van Helden PD, Murray M, Victor TC. (2009) The Potential of Rapid Diagnosis for Controlling Drug-Susceptible and Drug-Resistant TB in High Prevalence Communities. <i>J Clin Microbiol.</i> 47(5):1484-1490. (IF=3.945)
Van der Spuy GD, Kremer K, Ndabambi SL, Beyers N, Dunbar R, Marais BJ, van Helden PD, Warren RM. (2009) Changing <i>Mycobacterium tuberculosis</i> population highlights clade-specific pathogenic characteristics. <i>Tuberculosis.</i> 89(2):120-125. (IF=1.758)
Van der Spuy GD, van Helden PD, Warren RM. (2009). Effect of study duration on the interpretation of tuberculosis molecular epidemiology investigations. <i>Tuberculosis.</i> 89:238-242. (IF=1.758)
Van der Spuy GD, Warren RM, van Helden PD. (2009) The role of molecular epidemiology in low-income, high-burden countries. <i>Int.J.Tuberc.Lung Dis.</i> 13:419-420. (IF=2.304)
Warren RM, Streicher EM, Gey van Pittius NC, Marais BJ, van der Spuy GD, Victor TC, Sirgel F, Donald PR, van Helden PD. (2009) The clinical relevance of <i>Mycobacterial</i> pharmacogenetics. <i>Tuberculosis.</i> 89(3):199-202. (IF=1.758)
Wright CA, Hesselning AC, Bamford C, Bergess SM, Warren RM, Marais BJ. (2009) Fine Needle Aspiration Biopsy-A first line diagnostic procedure in paediatric tuberculosis? <i>Int. J. Tuberc. Lung D.</i> 13:1373-1379. (IF=2.304)
Wright CA, Warren RM, Marais BJ. (2009) Fine Needle Aspiration Biopsy-A (FNAB) – an undervalued diagnostic modality in paediatric mycobacterial disease. <i>Int J Tuberc Lung D.</i> 13:1467-1475. (IF=2.304)

Non Peer-Reviewed Articles (Total: 2)

Marais BJ, Parker SK, Verver S, Van Rie A, Warren RM. (2009) Primary and Postprimary or Reactivation Tuberculosis: Time to Revise Confusing Terminology? <i>Am. J. Roentgenol.</i> (Letter) 192:W10361-803X/019X1924-W1. (IF=2.940)

van der Spuy GD, Warren RM, van Helden PD. (2009) "The role of molecular epidemiology in low-income (high-burden) countries" (Editorial), *Int. J. Tuberc Lung D.* 13(4):419-420. (IF=2.304)

Published Abstracts (Total: 0)

Technical Reports (Total: 1)

IAEA (Int Atomic Energy Agency): SAF6008 Progress report on drug resistance project for SA (June 2009).

Products / Artefacts / Patents (Total: 0)

Conferences/Meetings Attended & Invited Talks/Seminars Presented (Total: 103)

Warner DF, Mowa MB, Machowski EE, Kaplan G, Kana BD, **Mizrahi V.** Novel and vulnerable pathways in DNA metabolism. Plenary lecture, Keystone Symposium on Tuberculosis: Biology, Pathology & Therapy, Keystone, CO, 25-30 January 2009.

Kana BD. Resuscitation promoting factors in *M. tuberculosis*. Human Genetics Seminar Series, NHLS Braamfontein, 19 February 2009.

Warner DF. Physiology of *M. tuberculosis* – Chinks in the armour. Invited lecture, SATBAT conference on the Molecular Epidemiology of TB, Sunnyside Park Hotel, Johannesburg, 26-27 March 2009.

Mizrahi V. Survival, subversion and stress response strategies in *Mycobacterium tuberculosis*: Implication for Drug Discovery. Plenary lecture presented at the ESF Europe-Africa Frontier Research Conference on Infectious Diseases: From Basic to Translational Research, Cape Winelands, 4-9 April 2009.

Mizrahi V. Survival, subversion and stress response strategies of *M. tuberculosis*: Implications for TB drug discovery. Plenary lecture presented at the 109th General Meeting of the American Society for Microbiology, Philadelphia, 18-22 May 2009.

Kana BD. Resuscitation promoting factors in *Mycobacterium tuberculosis*. Lecture presented at the MRC TB Colloquium, Cape Town 3-4 June 2009.

Warner DF. Mycobacterium and mechanisms of mutagenesis. Lecture presented at the MRC TB Colloquium, Cape Town 3-4 June 2009.

Mizrahi V. Panel Member: TB, Where We Stand and Where We Can Go. Global Health Research Congress, Seattle, USA, 15-18 June 2009.

Kana BD, Gordhan BG, Downing KJ, Sung N, Vostroktunova G, Machowski EE, Tsenova L, Young M, Kaplreylants A, Kaplan G, Mizrahi V. Resuscitation promoting factors are required for the virulence of *Mycobacterium tuberculosis* but are collectively dispensable for growth in vitro. Invited talk presented at the Third Congress of European Microbiologists, hosted by the Federation of European Microbiological Societies (FEMS), Gothenberg, Sweden, 28 June – 2 July 2009.

Kana BD, Abrahams GL, Sung N, Warner DF, Gordhan BG, Machowski EE, Tsenova L, Sacchettini J, Stoker NG, Kaplan G, Mizrahi V. Role of the Y-family polymerase-encoding *dinB* homologues in *Mycobacterium tuberculosis*. Poster presented at the Third Congress of European Microbiologists, hosted by the Federation of European Microbiological Societies (FEMS), Gothenberg, Sweden, 28 June – 2 July 2009.

Moosa A, Mizrahi V, Warner DF. The metabolism of vitamin B₁₂ in *Mycobacterium tuberculosis*: the role of pseudovitamin B₁₂. Talk presented at the SATBAT Meeting, Lung Institute, UCT, 18 July 2009.

Williams M, Kana BD, Mizrahi V. Analysis of molybdopterin cofactor biosynthetic genes in mycobacteria. Invited talk presented at the 6th Gordon Research Conference on Molybdenum & Tungsten Enzymes, Lucca, Italy, 5-10 July 2009.

Gordhan BG. Improving the budget approval process for improved purchasing power and maintenance management. Invited talk presented a talk at the Intelligent Laboratory Management Conference, Rosebank, Johannesburg, 27 July 2009.
Warner DF. Transport and function of vitamin B ₁₂ in mycobacteria. Invited talk presented at the EPFL, Lausanne, Switzerland, 31 July 2009.
Moosa A, Mizrahi V, Warner DF. The metabolism of vitamin B ₁₂ in <i>Mycobacterium tuberculosis</i> : role of alternate B ₁₂ cofactors. Invited short talk presented at the Gordon Research Conference on Vitamin B ₁₂ and Corphins, 2-7 August 2009.
Mizrahi V. Target identification and validation. Invited talk presented at the CSIR/ICS-UNIDO Workshop on the Advanced Design and Development of Potential Drugs Against Tuberculosis. Pretoria, 3-5 August 2009.
Mizrahi V. Novel Tuberculosis Drug Target Identification and Validation. Haemology & Molecular Medicine Seminar, University of the Witwatersrand, Johannesburg, 12 August 2009.
Abrahams GL, Mizrahi V. Target-based whole-cell screening. Talk presented at the Annual Meeting of the IMTB Consortium, Magdalen College, Oxford, 15-16 August 2009.
Kana BD. Resuscitation-promoting factors in <i>M. tuberculosis</i> : Invited talk presented at the Imperial College of London, 24 August 2009.
Kana BD. Resuscitation-promoting factors in Mycobacterium tuberculosis - Wake Up TB. Invited talk presented at the MRC Career Awards Symposium, Medical Research Council, Cape Town, 19 October 2009.
Moosa A, Mizrahi V, Warner DF. Mechanisms of vitamin B ₁₂ transport and regulation in mycobacteria. Invited talk presented at the 2 nd Postgraduate Cross-Faculty Symposium, University of the Witwatersrand, 20-21 October 2009. [Awarded Second prize in Science Faculty Oral Presentation category]
Abrahams GL, Mowa MB, Magwira C, Savvi S, Warner DF, Kana BD, Mizrahi V. Novel TB drug target identification and validation. Talk presented at Human Genetics Seminar Series, University of the Witwatersrand & NHLS, Johannesburg, 26 November 2009.
Mizrahi V. The DST/NRF Centre of Excellence for Biomedical TB Research. The Centres of Excellence Annual Function, STIAS, Stellenbosch, 26 November 2009.
Abrahams GL, Mowa MB, Magwira C, Savvi S, Warner DF, Kana BD, Mizrahi V. Novel TB drug target identification and validation. Invited talk presented at AstraZeneca India. Bangalore, India, 9 December 2009.
Warren RM. Laboratory Based Research at the Faculty of Health Sciences. Invited talk presented to the Harvard Delegation. Stellenbosch University. Stellenbosch. South Africa, January 2009
Walzl G. The possible implementation of Quantiferon TB by the Department of Health. Invited Talk at the National Department of Health / Pro-Gen Diagnostics Workshop. Johannesburg, South Africa, 02 March 2009.
McEvoy CRE, Cloete REA, Gey van Pittius NC. Mycobacterium tuberculosis PE and PPE gene family genetic polymorphisms: antigenic variation or evolution? Poster presented at the Keystone Symposium on Tuberculosis: Biology, Pathology and Therapy, Keystone, USA, January 2009.
Newton-Foot M, Steyn A, Sampson S, Warren RM, van Helden PD, Gey van Pittius NC. The M. tuberculosis ESX-3 secretion system interactome Poster presented at the Keystone Symposium on Tuberculosis: Biology, Pathology and Therapy, Keystone, USA, January 2009.
Warren RM. XDR-TB: a molecular epidemiological perspective. Invited talk at the World TB Day. 2 Military Hospital ,Cape Town, South Africa, 02 March 2009.
Warren RM. South African Molecular Epidemiological Data. Invited talk presented at the SATBAT Workshop - Promoting Innovative TB Research Through Training. Johannesburg, South Africa, 26 March 2009.
Hoal EG. Host genetic susceptibility to tuberculosis. Talk presented at European Science Foundation: Europe-Africa Frontier Research Conference, Infectious Diseases: From Basic to Translational Research.

Somerset West, South Africa, 4-9 April 2009.
Hoal EG. Whole Genome Scans in Tuberculosis. Talk presented at 13 th South African Society for Human Genetics Congress. Stellenbosch, South Africa, 7 April 2009.
van Helden PD. Science versus dogmas in combating the TB scourge. Invited talk presented at the Royal Society of South Africa meeting held in Cape Town, South Africa, 15 April 2009.
McEvoy CRE. Science in the media: opinions from a practicing scientist. Invited talk at the Stellenbosch university Honours journalism class. Stellenbosch, South Africa, 22 May 2009.
Gey van Pittius NC. Evolution, duplication and variation of the PE and PPE multigene families of <i>Mycobacterium tuberculosis</i> . Invited talk presented at the 109 th General Meeting of the American Society for Microbiology (ASM) Philadelphia, Pennsylvania, USA, 17-21 May 2009.
van Helden PD. Keynote Address presented at the MRC TB Colloquium. Cape Town, South Africa, 3-4 June 2009.
Victor TC. Mechanisms of drug-resistance. Talk presented at the MRC TB Colloquium. Cape Town, South Africa, 3-4 June 2009.
Warren RM. Genetic Epidemiology of TB in the Western Cape. Talk presented at the MRC TB Colloquium. Cape Town, South Africa, 3-4 June 2009.
Chegou NN. Differentiate active TB from Latent TB infection: preliminary report. Talk presented at the 2 nd Global Symposium on Interferon Gamma Release Assays. Dubrovnik, Croatia, 30 May-01 June 2009.
van Helden PD. Molecular epidemiology: role for transmission of MDR/XDR. Talk presented at the WHO Catalysing HIV/TB research: innovation, funding and networking meeting. Cape Town, South Africa, 18-19 July 2009.
Hoek KGP, Gey van Pittius NC, van Helden PD, Warren RM. Single closed tube detection of Drug-resistance in mycobacterium tuberculosis complex. Talk presented at the NIH ICORTA South Africa TB Aids Training Program meeting. Cape Town, South Africa, 18 July 2009.
Harper CJ, Hayward D, Wiid I, Van Helden PD. Elucidation Of The Physiological Roles Of Glutamine Synthetase And Glutamate Dehydrogenase In Mycobacterium Smegmatis. Talk presented at the 52 nd Academic Year Day, University of Stellenbosch, 12-13 August 2009.
Salie M, Hoal EG, Möller M. An Investigation Of Purinergic P2x7 Receptor And Toll-Like Receptor 1 In Susceptibility To Human Pulmonary Tuberculosis. Talk presented at the 52 nd Academic Year Day, University of Stellenbosch, 12-13 August 2009.
McEvoy CRE. The Mycobacterium tuberculosis Genome: Insights into Evolution, Epidemiology and Phylogeography. Invited talk at the University of Cape Town Department of Molecular and Cellular Biology Seminar Series. Cape Town, South Africa, 14 August 2009.
Gey van Pittius N.C. Tuberculosis Research at the Faculty of Health Sciences of the University of Stellenbosch. Invited talk presented at the Centre for Aids Research (CFAR) Colorado Tuberculosis Workshop. Fort Collins, Colorado, USA, 09 September 2009.
McEvoy CRE. Extensive analysis of PE and PPE gene variation in Mycobacterium tuberculosis. Invited talk at the TBadapt 3 rd meeting on the Effect of Genetic Variation in Mtb on Vaccine Escape and the Acquisition of Drug Resistance. Cape Town, South Africa, 16-18 September 2009.
Warren RM. A label-free method identified differentially abundant proteins in related Mycobacterium tuberculosis Beijing genotype. Invited talk at the TBadapt 3 rd meeting on the Effect of Genetic Variation in Mtb on Vaccine Escape and the Acquisition of Drug Resistance. Cape Town, South Africa, 16-18 September 2009.
Warren RM. Adaptaion of Mycobacterium tuberculosis gene expression in response to the evolution of rifampicin-resistance. Invited talk at the TBadapt 3 rd meeting on the Effect of Genetic Variation in Mtb on Vaccine Escape and the Acquisition of Drug Resistance. Cape Town, South Africa, 16-18 September 2009.

<p>Hanekom M. Increased bacterial load is associated with strains of the <i>Mycobacterium tuberculosis</i> Beijing genotype. Invited talk at the TBadapt 3rd meeting on the Effect of Genetic Variation in Mtb on Vaccine Escape and the Acquisition of Drug Resistance. Cape Town, South Africa, 16-18 September 2009.</p>
<p>Hanekom M. Mixed <i>Mycobacterium tuberculosis</i> infection in patients resident in a high HIV prevalence setting. Invited talk at the TBadapt 3rd meeting on the Effect of Genetic Variation in Mtb on Vaccine Escape and the Acquisition of Drug Resistance. Cape Town, South Africa, 16-18 September 2009.</p>
<p>Gey van Pittius NC. The evolution of genus <i>Mycobacterium</i> and variation in the <i>M. tuberculosis</i> complex. Invited talk at the TBadapt 3rd meeting on the Effect of Genetic Variation in Mtb on Vaccine Escape and the Acquisition of Drug Resistance. Cape Town, South Africa, 16-18 September 2009.</p>
<p>Victor TC. Beijing genotype <i>Mycobacterium tuberculosis</i> strains drive the drug-resistant tuberculosis epidemic in the Western and Eastern Cape regions of South Africa. Invited talk at the TBadapt 3rd meeting on the Effect of Genetic Variation in Mtb on Vaccine Escape and the Acquisition of Drug Resistance. Cape Town, South Africa, 16-18 September 2009.</p>
<p>Streicher EM. XDR-TB: Acquisition of ofloxacin Resistance during treatment. Invited talk at the TBadapt 3rd meeting on the Effect of Genetic Variation in Mtb on Vaccine Escape and the Acquisition of Drug Resistance. Cape Town, South Africa, 16-18 September 2009.</p>
<p>Hoek KGP. Genotypic based diagnosis of drug-resistance in <i>Mycobacterium tuberculosis</i> complex and treatment implications. Invited talk at the TBadapt 3rd meeting on the Effect of Genetic Variation in Mtb on Vaccine Escape and the Acquisition of Drug Resistance. Cape Town, South Africa, 16-18 September 2009.</p>
<p>Van Helden PD. TB Transmission between Wild and domestic Animals in South Africa. Invited talk at the 49th Interscience Conference on Antimicrobial Agents and Chemotherapy held in San Francisco, California, USA, 12-15 September 2009.</p>
<p>Van Helden PD. TB Transmission between Wild and domestic Animals in South Africa. Invited talk at the University of California, Berkeley, USA 17 September 2009.</p>
<p>Walzl G. Bio-signatures for TB: how close are we? Thaler lecture, Mini-Symposium on TB Biomarkers and Development of New Vaccines hosted by the Aeras Global TB Vaccine Initiative. Washington DC, USA, 21 September, 2009.</p>
<p>Van Helden PD. TB Genomics and TB/HIV in Africa. Invited talk presented at the Keystone Symposia on Overcoming the Crisis of TB and AIDS. Arusha, Tanzania, 20-25 October 2009.</p>
<p>Warren RM. Adaptation of <i>Mycobacterium tuberculosis</i> gene expression in response to the evolution of rifampicin-resistance. Invited talk presented at the TB Adapt Meeting, Stellenbosch. November 2009.</p>
<p>Warren RM. TB Adapt South Africa. Invited talk presented at the TB Adapt Meeting, Stellenbosch. November 2009.</p>
<p>van Helden PD. The DST/NRF Centre of Excellence for Biomedical TB Research. The Centres of Excellence Annual Function, STIAS, Stellenbosch, 26 November 2009.</p>
<p>Walzl G. How do complex cytokine patterns improve our understanding of protection against TB? South African Immunology Society Conference, Cape Town, South Africa, 9-11 December 2009.</p>
<p>Warren RM. Molecular Epidemiology of drug resistant tuberculosis. Invited talk presented at the DAAD Summer School, Stellenbosch, South Africa, December 2009.</p>
<p>Gey van Pittius NC. The evolution of the genus <i>Mycobacterium</i> and virulence in the <i>M. tuberculosis</i> complex. Invited talk presented at the DAAD Summer School, Stellenbosch, South Africa, December 2009.</p>
<p>Moosa A, Mizrahi V, Warner DF. The metabolism of vitamin B12 in <i>M. tuberculosis</i>: the role of alternate B12 cofactors. Poster presented at the MRC TB Colloquium, Cape Town 3-4 June 2009.</p>
<p>Naran K, Mizrahi V, Warner DF. Characterisation of the antimycobacterial effect of a <i>Pseudomonas</i>-derived activity. Poster presented at the MRC TB Colloquium, Cape Town 3-4 June 2009.</p>
<p>Ndwandwe DE, Warner DF, Mizrahi V. Mechanisms of mutagenesis in <i>M. tuberculosis</i>: Structural and functional characterization of the polymerase accessory factors encoded by Rv3394c and Rv3395c. Poster</p>

presented at the MRC TB Colloquium, Cape Town 3-4 June 2009.
Naran K , Veale R, Mizrahi V, Warner DF. Characterization of the antimycobacterial effect of a <i>Pseudomonas</i> -derived activity. Poster presented at the 2 nd Postgraduate Cross-Faculty Symposium, University of the Witwatersrand, 20-21 October 2009.
Ndwandwe DE , Venclovas Č, Mizrahi V, Warner DF. Mechanisms of mutagenesis in <i>Mycobacterium tuberculosis</i> : structural and functional characterization of the DNA polymerase accessory factors encoded by Rv3394c and Rv3395c. Poster presented at the 2 nd Postgraduate Cross-Faculty Symposium, University of the Witwatersrand, 20-21 October 2009.
Bharuthram A , Mizrahi V, Gordhan BG. Construction and phenotypic characterization of <i>M. smegmatis</i> mutants deficient in DNA glycosylases. Poster presented at the 2 nd Postgraduate Cross-Faculty Symposium, University of the Witwatersrand, 20-21 October 2009.
Mapela L , Kana BD. Characterization of resuscitation promoting factors in <i>Mycobacterium smegmatis</i> . Poster presented at the 2 nd Postgraduate Cross-Faculty Symposium, University of the Witwatersrand, 20-21 October 2009.
Black GF , Loxton A, Ottenhoff TH, Haks M, Franken KLMC, Stanley K, Chegou N, Parida SK, Kaufmann SHE, Walzl G and the GC6-74 Consortium. Immunogenicity of novel <i>M. tuberculosis</i> antigens, cytokine profiles and gene expression patterns hold promise as markers of disease activity. Poster presented at the Keystone Symposium on Tuberculosis: Biology, Pathology and Therapy, Keystone, USA, January 2009.
Cliff J, Cho J-E, Whittaker J, van Helden P, Beyers N, Walzl G , Dockrell H. Identification of biomarkers to predict tuberculosis treatment outcome by transcriptomic analysis of peripheral blood. Poster presented at the Keystone Symposium on Tuberculosis: Biology, Pathology and Therapy, Keystone, USA, January 2009.
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Nene N , Walzl G, Ottenhoff T, Franken K, Stanley K, Parida SK, Kaufmann S, Black G. Immunity to tuberculous and non-tuberculous mycobacteria in adult TB contacts in the Western Cape. Poster presented at the Keystone Symposium on Tuberculosis: Biology, Pathology and Therapy, Keystone, USA, January 2009.
McEvoy CRE , Cloete REA, Gey van Pittius NC, Mycobacterium tuberculosis PE and PPE gene family genetic polymorphisms: antigenic variation or evolution? Poster presented at the Keystone Symposium on Tuberculosis: Biology, Pathology and Therapy, Keystone, USA, January 2009.
Newton-Foot M , Steyn A, Sampson S, Warren RM., van Helden PD, Gey van Pittius NC, The <i>M. tuberculosis</i> ESX-3 secretion system interactome Poster presented at the Keystone Symposium on Tuberculosis: Biology, Pathology and Therapy, Keystone, USA, January 2009.
Hemmings SMJ , Tait M, Martin L, Aitken L, De Wit E, Black G, Hoal EG, Walzl G, Seedat S. Genetic markers associated with posttraumatic stress disorder in tuberculosis household contacts: a preliminary study. Biological Psychiatry Congress 2009, Arabella, Kleinmond.
Parsons SDC . Early detection of tuberculosis in chacma baboons (<i>Papio ursinus</i>) using the QuantiFERON-TB Gold assay. Poster presented at the International Meeting on Emerging Diseases. Vienna, Austria, 13-16 February 2009.
Chegou NN . Host markers in Quantiferon Supernatants differentiate active TB from Latent TB infection: preliminary report. Poster presented at the ESF Europe-Africa Frontier Research Conference on Infectious Diseases: From Basic to Translational Research. Cape Town, South Africa, 4-9 April 2009.
Fortuin S . Characterisation of Phosphoproteins in <i>Mycobacterium tuberculosis</i> . Poster presented at the ESF Europe-Africa Frontier Research Conference on Infectious Diseases: From Basic to Translational Research. Cape Town, South Africa, 4-9 April 2009.
Bester M , Warren RM, Johnson R, van Helden PD, Ndimba BK, Victor TC. Mechanisms that determine the level of rifampicin resistance in <i>Mycobacterium tuberculosis</i> . Poster presented at the MRC TB Colloquium.

Cape Town, South Africa, 3-4 June 2009.

Hoek KGP, Gey van Pittius NC, van Helden PD, Warren RM. Single tube detection of ethambutol resistance in mycobacterium tuberculosis complex. Poster presented at the MRC TB Colloquium. Cape Town, South Africa, 3-4 June 2009.

Louw GE, Warren RM, Gey van Pittius NC, van Helden PD, Victor TC. New hope for treatment of drug resistant tuberculosis. Poster presented at the MRC TB Colloquium. Cape Town, South Africa, 3-4 June 2009.

Bruiners N, Gey van Pittius NC, Warren RM. Investigating the human M. tuberculosis interactome to identify the host targets of ESAT-6 and CFP-10. Poster presented at the 53rd Academic Year Day, University of Stellenbosch, 12-13 August 2009.

Fang Z, Van Helden PD, Gey van Pittius NC. Elucidation of the substrates of mycosin 3, an essential protease of Mycobacterium tuberculosis. Poster presented at the 53rd Academic Year Day, University of Stellenbosch, 12-13 August 2009.

Hoek KGP, Gey van Pittius NC, Van Helden PD, Warren RM. Single tube detection of ethambutol resistance in Mycobacterium tuberculosis complex. Poster presented at the 53rd Academic Year Day, University of Stellenbosch, 12-13 August 2009.

Kruger C, Warren R, Gey van Pittius NC. Determining the incidence of non-tuberculous mycobacteria in environmental settings. Poster presented at the 53rd Academic Year Day, University of Stellenbosch, 12-13 August 2009.

Louw GE, Warren RM, Gey van Pittius NC, Van Helden PD, New hope for treatment of drug resistant tuberculosis. Poster presented at the 53rd Academic Year Day, University of Stellenbosch, 12-13 August 2009.

Newton-Foot M, Smit M, Gey van Pittius NC. The construction of genetic knockouts of the antigen secretion systems ESX-3 and -4 in Mycobacterium smegmatis. Poster presented at the 53rd Academic Year Day, University of Stellenbosch, 12-13 August 2009.

Streicher EM, Warren RM, De Kock M, Bosman M, Gey van Pittius NC, Van Helden PD, Victor TC. Extensively drug-resistant tuberculosis (XDR-TB) in the Western Cape region of South Africa: acquisition vs transmission. Poster presented at the 53rd Academic Year Day, University of Stellenbosch, 12-13 August 2009.

Van der Merwe RG, Gey van Pittius NC, Van Helden PD. Isolation and characterization of South African mycobacteriophages. Poster presented at the 53rd Academic Year Day, University of Stellenbosch, 12-13 August 2009.

Hoek KGP, Schaaf HS, Gey van Pittius NC, Van Helden PD, Warren RM. Incidence of resistance to pyrazinamide and ethambutol compromises treatment regimens for MDR/XDR-TB treatment. Poster presented at the 53rd Academic Year Day, University of Stellenbosch, 12-13 August 2009.

Mcevoy CRE, Van Helden PD, Warren RM, Gey Van Pittius NC. Rapid rate of molecular evolution at the hypervariable and immunogenic Mycobacterium tuberculosis PPE38 gene region. Poster presented at the 53rd Academic Year Day, University of Stellenbosch, 12-13 August 2009.

Mlamla ZC, Louw GE, Warren R, Gey Van Pittius NC, Van Helden P, Victor T, Hoornenborg E, Taljaard JJ, Hoffmann R, Morkar J, Jordaan HF. Improving methods for genotypic drug resistance testing in Mycobacterium tuberculosis. Poster presented at the 53rd Academic Year Day, University of Stellenbosch, 12-13 August 2009.

Hanekom M, Van De Berg D, Streicher EM, Cox H, Mcdermid C, Victor TC, Van Helden PD, Warren RW. Mixed Mycobacterium Tuberculosis Infection In Patients Isolates Resident In A High Hiv Prevalence Setting. Poster presented at the 53rd Academic Year Day, University of Stellenbosch, 12-13 August 2009.

Hayward D, Harper CJ, Wiid I, Van Helden PD. Differences In Glutamine/ Glutamate Metabolism May Influence Mycobacterial Survival. Poster presented at the 53rd Academic Year Day, University of Stellenbosch, 12-13 August 2009.

Kleynhans L , Mcconnell A, Walzl G. The Impact Of The Steroid Hormones Medroxyprogesterone Acetate, Cortisol And Progesterone On Protective Immunity To Tuberculosis. Poster presented at the 53rd Academic Year Day, University of Stellenbosch, 12-13 August 2009.
Louw GE, Warren RM , Gey van Pittius NC, van Helden PD, Victor TC. New hope for treatment of drug resistant tuberculosis. Poster presented at the Keystone Symposia on Overcoming the Crisis of TB and AIDS. Arusha, Tanzania, 20-25 October 2009.
Streicher EM, Gey van Pittius NC , Bosman M, van Helden PD, Victor TC, Warren RM. Acquisition of ofloxacin Resistance during treatment of Multidrug-Resistant Tuberculosis. Poster presented at the Keystone Symposia on Overcoming the Crisis of TB and AIDS. Arusha, Tanzania, 20-25 October 2009.
Prach L, Kirby J, Schelle M, Warren RM , van Helden PD, Keasling J, Alber T. Structure and biosynthesis of novel diterpenes in Mycobacterium tuberculosis. Poster presented at the Keystone Symposia on Overcoming the Crisis of TB and AIDS. Arusha, Tanzania, 20-25 October 2009.
Wangh LJ, Rice J, Rahman L, Kreisworth B, Kramer FR, Warren RM . Construction of a highly Multiplexed LATE-PCR Assay for M(X)Dr-TB. Poster presented at the Keystone Symposia on Overcoming the Crisis of TB and AIDS. Arusha, Tanzania, 20-25 October 2009.
Loxton A , Roberts T, Black G, Walzl G. Regulatory T-cells and high levels of FOXP3 mRNA leads to decreased immune responses in HIV-TB co-infection. Poster presented at the AIDS Vaccine 2009 Conference. Paris, France, 19-23 October 2009.

Conferences / Meetings Hosted (Total 2)

The Stellenbosch University node held an International TB conference focusing on the Effect of Genetic Variation in Mtb on Vaccine Escape and the Acquisition of Drug Resistance, at Lanzerac wine estate between the 16 th and 18 th of September 2009.
The Stellenbosch University node and the Desmond Tutu TB Centre held a workshop with colleagues from George Washington University, Debra Benator, Fred Gordin and Donna Conwell from 24 to 27 February 2009 to work on a joint strategy for a SU application to the CDC-sponsored TB Trials Consortium (TBTC). This collaborative effort brings together a strong group of adult and paediatric TB and HIV researchers at the faculty in a joint consortium called TB SUN. TB SUN will aim to join larger collaborative TBTC international activities to implement trials of new TB therapies where most needed, including in children.

Other Relevant Outputs (including honours and awards to staff)

Mizrahi V. Elected into Fellowship of the American Academy of Microbiology in January 2009 and inaugurated into the Academy at a function that took place in Philadelphia during the General Meeting of the American Society for Microbiology. The Academy, the honorific leadership group within the American Society for Microbiology, recognizes excellence, originality, and creativity in the microbiological sciences, and election to fellowship is a mark of distinction.
Mizrahi, V. Awarded an A2 rating by the NRF
Mizrahi V. Appointed to a three-year term on the Scientific Advisory Committee of the Global Alliance for TB Drug Development, which is based in New York. She attended SAC meetings in New York in June and December.
Kana B. Awarded a Career Development Award from the MRC. He is the second member of the Wits node to receive this honour
Kana B. Stage 1 application for the Friedel Sellschop Award successful and invited to submit a proposal for an individual research grant to the URC. This is the premier award from Wits for young researchers.
Kana, BD. Rated as C3 category researcher by the NRF
Van Helden, PD. Academy of Science of South Africa's (ASSAf) Science-for-Society Gold Medal.

Van Helden, PD. Featured in an article on Thompson Reuters' Sciencewatch , citing him as the 4th highest ranked scientist in the World in the field of tuberculosis
Gey van Pittius, NC. Innovation Fund - Patent Incentive Fund Award (2009)
Gey van Pittius, NC. Health Sciences Faculty Award for Outstanding Research (June 2009)
Gey van Pittius, NC. Rated as Y1 category researcher by the NRF.
Gordhan, BG. Rated as C2 category researcher by the NRF
Warner, DF. Rates as Y1 category researcher by the NRF
Walzl G. Received the Rector's Award for Outstanding Research in 2009.
Warren, RM. Rated as B2 category researcher by the NRF.

2. Education and Training

Breakdown of postgraduate students and postdoctoral fellows in the CBTR in 2009

Student category	Number/percentage	Target based on sla3 (for Norming Phase, 2006-2008)
Total number of students	56	≥ 25
% Postdoctoral fellows	15%	≥ 10%
% PhD students	39%	N/A
% MSc students	30%	N/A
% BSc (Hons) students	16%	N/A
% Women students	64%	≥ 50%
% Black students	38%	≥ 45 %

Degrees conferred and postdoctoral fellowships completed

The CBTR graduated 2 postdoctoral fellows, 9 PhD, 4 MSc, and 4 Honours students in 2009.

Dissertations and theses

MSc dissertation:

1. Odelia Strauss- "Differences in gene expression between large and small clusters from the same family of *Mycobacterium tuberculosis* strains found in South Africa".
2. Alecia Falmer- "A Molecular characterization of drug resistant *Mycobacterium tuberculosis* isolates from different settings in South Africa".
3. Margaretha Bester - "Defining mechanisms that determine the levels of drug resistance in *Mycobacterium tuberculosis*".

PhD theses:

1. Mohube Betty Mowa – "Function and expression of class I ribonucleotide reductase small subunit-encoding genes in *Mycobacterium tuberculosis* and *Mycobacterium smegmatis*".
2. Suzanna Savvi – "Identification and characterisation of the vitamin B₁₂-dependent methylmalonyl coenzyme A pathway in *Mycobacterium tuberculosis*".
3. Gian van der Spuy – "Analysis and application of evolutionary markers in the epidemiology of *Mycobacterium tuberculosis*".
4. Erika de Wit (nee Truter) - "Analysis of host determining factors in susceptibility to tuberculosis in the South African coloured population".
5. Andre Loxton – "The role of the regulatory T-cells during HIV/TB co-infection".
6. Novel Chegou – "An Evaluation of Novel Diagnostic Techniques in the Diagnosis of Latent and Active Tuberculosis".

7. Nonhlanhla Nene - "The effect of exposure to environmental mycobacteria on human immune responses against *Mycobacterium tuberculosis*".
8. Gail Louw – "Resistance to first-line anti-TB drugs by gene mutation and gene modulation".
9. Colleen Wright – "The contribution of fine needle aspiration biopsy in the diagnosis of mycobacterial lymphadenopathy with particular reference to children".
10. Madeleine Hanekom - "The Molecular Epidemiology of *Mycobacterium tuberculosis*: Host and Bacterial factors perpetuating the epidemic".

Research interns (MRC sponsored)

1. Dr M Hanekom (Clinical Intern) completed her PhD degree in the 4th year of her internship during 2009.
2. Ms NC Ngombane (Research Intern) Registered for MSc degree in 2009
3. Ms P Seepe (Research Intern) Registered for MSc degree in 2009

Recruitment of new postgraduate students

A number of new students have joined the team already or will do so during the course of 2010. Applications from other students are under consideration, pending availability of supervisory capacity, laboratory and office space and/or funding, including bursary support (see above). At the SU node, we enrolled 2 Postdoctoral fellows, 4 PhD, 10 MSc and 4 Honours students into the CBTRB in 2009. At the Wits node, we enrolled 1 postdoctoral fellow, one PhD student (black female, upgraded from MSc) and five MSc students. .

Honours and awards to students

- Masters students Avani Bharuthram, Anastasia Koch and Krupa Naran were awarded scholarships from the National Research Foundation. They, and another new MSc student, Lusanda Mapela, were also awarded SATBAT grants to support their research projects.
- Students Anastasia Koch, Avani Bharuthram, Lusanda Mapela and Bintou Ahamdou Ahidjo were awarded a Postgraduate Merit Awards from Wits University
- Doctoral student Dudzile Ndwandwe and her supervisors, Digby Warner and Valerie Mizrahi, received a Mellon Postgraduate Mentoring Award from Wits University.
- Anastasia Koch was awarded a SATBAT bursary to attend the Johns Hopkins School of Public Health Graduate Summer Institute of Biostatistics and Epidemiology course, which she attended in June-July.
- Doctoral student, Bintou Ahmadou Ahidjo was selected as an ASM trainee and awarded a Global Health Fellowship to attend the 109th General Meeting of the American Society for Microbiology in Philadelphia, USA in May 2009
- Monique Williams and Duduzile Ndwandwe were awarded bursaries from the Cape Biotech TB Centre of Competence to attend the Advanced Design and Development of Tuberculosis Drugs Workshop held in Pretoria in August, 2009
- Doctoral student Atica Moosa was awarded a prestigious a Carl Storm Fellowship from the Gordon Research Conferences and a Whitehead Scientific Travel Award to support her attendance at the Vitamin B₁₂ and Corphins Gordon Research Conference in August
- Two students from the Wits node were selected to present short talks on their research at the Gordon Research Conferences that they attended in Europe. Monique Williams, a Percy Fox Foundation Postdoctoral Fellow, presented a talk entitled, "*Analysis of molybdopterin cofactor biosynthetic genes in mycobacteria*" at the 6th GRC on Molybdenum & Tungsten Enzymes, held in Lucca, Italy, and doctoral student, Atica Moosa, talked on "*The metabolism of vitamin B₁₂ in Mycobacterium tuberculosis: role of alternate B₁₂ cofactors*" at the GRC on Vitamin B₁₂ and Corphins, held in Oxford in August. This achievement is particularly notable as GRCs are considered to be among the most prestigious conferences in the world.
- Atica Moosa was awarded the 2nd prize in the Science Faculty Oral Presentation category at the 2nd Postgraduate Cross-Faculty Symposium, University of the Witwatersrand, 20-21 October 2009. She was awarded a prize of R 10,000.
- Dr. Cliff Magwira has been awarded a Global Infectious Diseases Research Training Program fellowship for short-term training in the laboratory of Dr. Petros Karakousis at Johns Hopkins University. He will take up this fellowship in early 2010.
- Duduzile Ndwandwe was awarded a Columbia University-southern African Fogarty AITRP pre-doctoral training grant for short-term training in TB Basic Sciences in the laboratories of Dr. Eric Rubin and Sarah Fortune at the Harvard School of Public Health. She will take up her fellowship in March 2010

- Ms Kim Hoek won third prize for her poster presented at the MRC TB Colloquium Held in Cape Town, South Africa, 3-4 June 2009.
- Ms Kim Hoek won third prize for her talk presented at the NIH ICORTA South Africa TB Aids Training Program meeting. Cape Town, South Africa, 18 July 2009.
- Hoek, K. 3rd Prize Oral Presentation - South African TB HIV Training (SATBAT) Meeting of Trainees, UCT Lung Institute, July 2009.
- Doctoral student Andile Ngwane received a Fogarty Fellowship for a research training visit for 6 months (June-November 2009) at the Public Health Research Institute (PHRI) in New Jersey, USA.
- Parsons S. "Best Poster prize"- Conference of the South African Association of Laboratory Animal Scientists, Durban, September 2009
- Fortuin, S. 1st Prize for Poster Presentation - Academic Year day, Tygerberg, Stellenbosch University, 13 August 2009.
- Fortuin, S. HUPO World Congress Toronto, Canada - HUPO 2009 Young Investigators award.
- Mlamla, Z. Runner up: Best Poster Presentation. Infectious Diseases Session, Academic Year day, Tygerberg, Stellenbosch University, 13 August 2009.
- Bester, M. Received S2A3 Bronze medal.

Hosting of international exchange students

The Wits node hosted two international exchange students in 2009, Thomas Niemeier from the USA, and Julia Staffeldt from Germany. Thomas spent two months in the Wits node working under the supervision of Dr. Digby Warner. His visit was arranged through an HHMI program that enables talented undergraduates from US institutions to undertake short-term working visits in the laboratories of International Research Scholars. Julia, who is studying towards her Masters degree in Germany, spent nine months in the Wits node working under the supervision of Dr. Bavesh Kana.

Molecular Epidemiology Course

Prof. Rob Warren ran Molecular Epidemiology courses for African/Asian/South America fellows. In 2009 trainees from Ghana (K Bedzra, R Owusu), Dr L Erasmus (NHLS), the AIEA (see below) visitors from East Asia, and for postgraduate students at the Honours level from the faculty of Health Sciences. This was a comprehensive course where all participants had hands-on experience for the extraction of DNA from *Mycobacteria tuberculosis*, restriction enzyme digests, southern blotting, probe labelling and hybridisation. The course equipped all participants with the necessary skill to enable them to perform world class DNA fingerprinting. The participants from Africa and Asia also received a comprehensive manual and components such as standards, probes and internal markers to ensure that they could immediately begin DNA fingerprinting in their respective countries.

Tibotec Training courses

Ms Amour Venter conducted training during 2009 for Tibotec Inc. on study protocol numbers TMC207-C208 and TMC207-C209. The training involved laboratory procedures for processing of tuberculosis specimens which are multi-drug resistant. Tibotec has invited various countries to take part in the second stage of study C208, as well as in study C209. They requested Amour to train all participating microbiology laboratories to follow the exact same procedures as described in the study Microbiology Manual. This also involved training of the study monitors and clinical sites on some of the protocol procedures.

Training was carried out at the following institutions:

TMC207-C208:

- Beijing Chest Hospital, Beijing, China – February 2009
- Siriraj Hospital, Bangkok, Thailand – February 2009
- Makati Medical Centre, Makati City, Manila, Philippines – February 2009
- FIOCRUZ (Fundação Oswaldo Cruz Hospital), Rio de Janeiro, Brazil – May 2009

TMC207-C209:

- Institute of Phthysiology and Pulmonology of the Academy of Medical Science of Ukraine, Kiev, Ukraine – September 2009

- Korean Institute of Tuberculosis, Microbiology Unit, Seoul, South Korea – October 2009
- Deneysel Tıp Arastırma Enstitüsü, Istanbul, Turkey – November 2009

A pre-training session was conducted via teleconference for Tartu University Hospital, Microbiology Laboratory, Tartu, Estonia on 13 October 2009.

Training courses attended by staff and students

- Fortuin, S. National Proteomic Workshop, Bergen University, Bergen, Norway, April 2009.
- Dr M Moller, Ms E Truter, Dr MM Esterhuysen attended the Baltic Summer School 3-week course on "Genetic Basis of Medicine" in Kiel, Germany in September, 2009.

Staff members studying for higher degrees (all registered at SU)

- Cedric Werely (PGWC) is a 5th year PhD student, working on Arylamine N-acetyltransferase genes in Tuberculosis to study the influence of host genetics on disease susceptibility.

Other capacity development activities

- The Departmental allocation from Prof. Mizrahi's HHMI grant was used to provide BSc Honours bursaries to four students (Mr. G. Beyleveld, Ms. J. Brener, Ms. C. Chang and Ms. A. Manilal) and support the running costs of these students as well as two others (Ms. N. Ebrahim and Ms. T. Ramatsebe). In addition, travel support for conference attendance was provided to one student (Ms. S. Saayman).

Exchange visits and strengthening of collaborative linkages

- The Wits node hosted a number of international visitors during 2009. Prof. Česlovas Venclovas from the Institute of Biotechnology in Vilnius, Lithuania visited the Wits node for a week in March. Prof. Venclovas is an International Research Scholar of the HHMI and is a renowned authority on protein structure prediction. The purpose of this visit was to further develop a collaborative study between Prof. Venclovas and members of Wits node on the structure and function of proteins involved in DNA repair and replication in mycobacteria.
- Dr. Garth Abrahams (postdoctoral fellow) spent 4 months (March-June) working at the NIAID (NIH) I the laboratory of collaborator, Dr. Clifton E. Barry. Dr. Abrahams worked under the supervision of former MMRU member, Dr. Helena Boshoff, on a project supported by the IMTB grant from the Bill & Melinda Gates Foundation
- In July, Digby Warner visited the laboratory of Prof. John McKinney at the Ecole Polytechnique Fédérale de Lausanne (EPFL) in Switzerland to discuss the collaborative study on mechanisms of propionate metabolism in *M. tuberculosis* that is underway in both laboratories and funded the Swiss/South Africa Joint Research Programme.
- The Wits node hosted Dr. Sarah Fortune, from the Harvard School of Public Health, and two members of her laboratory, Rupal Shah and Chris Ford. Accompanying them was Prof. Barry Bloom, Harvard University Distinguished Service Professor and Joan L. and Julius H. Jacobson Professor of Public Health and Dr. Jill Conley from the Howard Hughes Medical Institute. Prof. Bloom is a former Dean of the Harvard School of Public Health and a pioneer in the field of tuberculosis research.
- Dr. William R. Bishai, a leading TB researcher from Johns Hopkins University in Baltimore, USA, visited the Wits node in October. He met with staff and students and the Wits node and with other Wits researchers with an interest in TB/HIV research.
- Long-time collaborator, Prof. Gilla Kaplan (PHRI, New Jersey) also visited the Wits node in October, where she discussed ongoing and future collaboration with Prof. Mizrahi and Dr. Kana.
- Prof. Eric Rubin from the Harvard School of Public Health visited the Wits node on 16 November 2009. He presented a seminar on his work on regulated protein degradation in mycobacteria and spent the rest of the day interacting with staff and students in the Wits node.
- Dr. Warner visited Dr. Alex Zawaira and Prof. Jonathan Blackburn at the IIDMM (UCT) to discuss possible collaborative projects.
- Doctoral student Andile Ngwane went for research training visit for 6 months (June-November 2009) at the Public Health Research Institute (PHRI) in New Jersey, USA.
- Masters student James Hove Mazorodze visited the Lab of Dr Chantal de Chastellier at INSERM in Marseille, France during the month of October 2009.
- Prof. S Kaufmann (Director, Max Planck Institute of Infection Biology, Berlin), Prof. M Maeurer (Infectious Disease Control, Karolinska Institute, Sweden) Prof. G Bunje (University of Oslo, Norway) – 6 April - Review

of field, lab and database activities for the Bill and Melinda Gates Foundation funded Grand Challenge project '*Biomarkers of protective Immunity against TB in Africa*' (GC6).

- Prof. G Kaplan (Public Health Research Institute Center, International Center for Public Health, New Jersey, USA) – October - To meet with various members of the Department and foster collaborations.
- Dr. I Honeyborne (University College, London, Dr S Gillespie's lab) – July and October – Discuss project looking for Mycobacterium tuberculosis biomarkers in sputum of TB patients. She worked in our lab for several months and quantified the amounts of *Mtb* RNA in sputum throughout TB treatment. Some of the sputum samples will also be used for microarray analysis overseas.
- Prof. R Koup, Dr. M Rhoederer (NIH, USA) – November - Discuss ways in which to collaborate.
- Dr. Donata Sizemore (Senior Director of Vaccine Assessment, AERAS Global TB Vaccine Foundation, Maryland, USA) – December - Assessment of laboratory adherence to Standard Laboratory Operating Procedures specifically for the Bill and Melinda Gates Foundation funded Grand Challenge project '*Biomarkers of protective Immunity Against TB in Africa*' (GC6).
- Prof E Bottger, Univ Zurich - Lab meeting to discuss milestones of current projects as well as new collaborations.
- Prof M Borgdorff, Univ Amsterdam, Netherlands - Discussions on Molecular Epidemiology.
- Dr V Schoellhorn, Aid-Diagnostika, Germany - Discussions on collaboration wrt validation of a diagnostic.
- Prof A Steyn, Univ Alabama, USA - Discussions on the ESAT-6 systems.
- Prof R Hernandez Pando, Mexico - Discussions on current collaborations and design of new projects.
- Dr A Trollip, SA - Discussions on collaboration and the establishment of a new research field site in Nelson Mandela Bay, Eastern Cape.
- Dr S Verver KNCV The Netherlands - Discussions on possible collaboration and research funding.
- Prof B Bishai, USA - Discussions on TB research in South Africa and collaboration with the HHI HIV/TB institute in Natal.
- Dr D Warner - Mycobacteriology, WITS - April, June - Discussions on ESAT-6 systems and drug resistance.
- Prof M Murray, Harvard Univ, USA - March, April - Discussions on new epidemiology tools.
- Dr du Toit Loots and Prof C Reinecke - NWU Potchefstroom – March - Discussions on metabolomics.
- Dr P de Haas - Zambart, Lusaka, Zambia – July - Discussions on Zamstar study.
- Prof R Huard - Assistant Professor of Clinical Pathology, Columbia University, New York, USA, - July - Discussions on strain diversity.
- Prof A Christoffels - SANBI, UWC – July, September, October - Discussions on bioinformatics.
- Dr S Sampson - Imperial College, London, UK – August - Discussions on ESAT-6 systems.
- Dr H Boom - TBRU, Case Western Univ, USA – March - Discussions on BMGF-funded project.
- Dr K Jacobson and Ms C Jeon, Harvard Univ, USA - Mentoring purposes.
- Dr D Park, Univ California, San Diego, USA - Mentoring purposes.
- Dr C de Chastellier, INSERM, France – November - Discussions on EM and Mycothiol pathway.
- Prof E Shurr, McGill University, Montreal, Canada – April - Discussions on genetic epidemiology of TB.

International Atomic Energy Agency (IAEA)

For the past 10 years we have been involved in development and transfer of molecular technology to various countries in Africa through funding mostly from the IAEA. In this initiative we use tuberculosis as a model disease to transfer molecular technology. Our involvement includes planning and report meetings with IAEA (Prof. T Victor), the running of training workshops in Africa and the hosting of African Fellows for training purposes. Advice is given electronically to numerous participating countries and 22 students were trained between 2004 and 2009. The technologies and experience have helped other countries in Africa to get a better understanding of tuberculosis, and the value of this initiative is shown in collaborative papers.

The International Atomic Energy Agency (IAEA) awarded eight candidates a two-month fellowship to be trained in theory and practical techniques in molecular diagnostic methods of communicable diseases. The emphasis was on the application of these techniques for the detection of mutations in genes associated with drug resistance in TB. The following candidates were trained in 2009: Mr Kofi Bedzra and Mr Richard Owusa from Ghana.

3. Knowledge Brokerage

The operational environment

Both nodes are actively involved in the sharing of knowledge amongst researchers within the CBTBR through lab meetings held at least weekly. Journal Club meetings, held weekly at both sites, also provide an opportunity to share broader-based scientific issues and ideas within the field of biological sciences. We also attend numerous local and international conferences, often as invited speakers, where we share our work with the international community. As stated earlier, we also have had numerous meetings with health authorities, such as W and E Cape Departments of Health, to share with them our findings and the implication of these. These are just some of the bodies we have met with. We have also been invited to advise international organisations, such as GATB and WHO.

Knowledge translation to stakeholder groups

CBTBR members were involved in numerous public awareness activities countrywide in 2009:

(i) Public awareness, public engagement, and publicity

- ***The 'Festival of Gratitude' community outreach event, Ravensmead, 29 September and 01 October.***

The Bill & Melinda Gates funded Grand Challenges in Global Health project entitled 'Biomarkers of Protection against TB in the context of HIV in Africa' (aka GC6) was launched in 2005 with the aim of identifying immune and mycobacterial factors that may contribute to the high burden of TB in Africa. In addition to the discovery of biomarkers of protection and susceptibility to tuberculosis, the study aims to find new candidates for inclusion in novel TB vaccines. The CMCB team at Stellenbosch University is one of seven African groups that are partnering in this ambitious project. The CMCB team have enrolled over 1000 residents of Ravensmead, Uitsig, Adriaanse and Elsie's River as participants in the ongoing multi-national GC6 study.

As a means of community outreach, research dissemination and study feedback, the 'Festival of Gratitude', was held in the Civic Centres of Adriaanse and Ravensmead on September 29th and October 1st 2009. The event was organized and carried out by SUN GC6 team members with the help of many others from the Department of Biomedical Sciences. The main aim of this outreach initiative was to 'give back' to the members of the community who had participated in the research and say thank you for their invaluable contributions in the advancement of the GC6 project. The two events also provided an important opportunity to provide basic education about TB (including multi-drug resistant TB) and HIV using a creative combination of music, drama and scientific discussion. The serious educational messages were punctuated with many light hearted moments and over the 2 days, 40 prize draw winners walked home with food hampers containing over R200 of essential groceries.

The play 'Touched By TB' which was presented as part of the outreach activities, was written, produced and directed by Cape Town based professional actor David Muller and was performed by students of the University of the Western Cape Centre for Performing Arts. Members of the community were given the opportunity to have their questions about TB, HIV and other public health issues answered by Prof Gerhard Walzl, a chest physician with expert knowledge on tuberculosis. These question and answer sessions were clearly appreciated by the community members and highly interactive. On both days attendees of the Festival were provided with refreshments including a healthy filled roll, fruit juice and fresh fruit. The play 'Touched by TB' will be taken to ScifestAfrica which will be held in Grahamstown in 2010. It is hoped that 'Touched by TB' will travel to many different parts of South Africa as a means of conveying the importance of visiting the clinic with first signs or symptoms of tuberculosis and also completion of treatment if tuberculosis is diagnosed. The 'Festival of Gratitude' was attended by around 800 residents of Tygerberg District as well as several members of the Department of Health, including Karen Jennings, the manager for TB, HIV and STIs for the City of Cape Town. The Festival of Gratitude was a highly successful project which was thoroughly enjoyed by all who attended.

- Prof. Warren gave a talk in 2009 on the Molecular Epidemiology of XDR-TB to health care professionals at 2 Military Hospital.
- Prof. Warren presented a lecture in the MBChB module on Infections and Clinical Immunology in 2009. Title: South African Molecular Epidemiological Data.

- Numerous radio, TV and newspaper interviews locally and abroad. Owing to extreme administrative burden, opportunistic interviews, no accurate records were kept.

(ii) Outreach activities

Prof Valerie Corfield has continued with the outreach activities that she has established over the last 12 years, and for which she has received support and encouragement from many different role players. She is extensively involved in HIV awareness in schools and communities, using a workshop called "*HIV comes to the Party*". In 2007, she developed a TB exhibit ("*The Trouble with TB*"), and in 2009, she developed an accompanying TB workshop. Recent new developments have been a workshop highlighting the neurophysiology of the drug Tik (methamphetamine), "*TIK's Tricks*"; a 2-3 day workshop incorporating many aspects of Biotechnology, with an accompanying talk covering relevant ethical issues and careers in biotechnology; and further development of a skin exhibit, "*The Skin you're in*". She continues to present the popular "*DNA Detective; what's in your genes?*" workshop, which examines genomics and forensic applications in DNA fingerprinting and "*Enzyme Antics*", which introduces the role of enzymes in digestion and in biotechnology applications.

Each year Prof Corfield runs science workshops at the Grahamstown Science Festival (Scifest Africa), National Science Week, MTN Science Centre and other venues. She is a member of the Scientific Advisory Committees of Scifest Africa and the MTN Science Centre. During 2009, she has trained several scientists, postgraduate students and science centre staff facilitators to run outreach activities.

The highlight in 2009 was the award of a prestigious Wellcome Trust International Engagement WTIE grant to Prof Corfield (Principal awardee) in partnership with the MTN Science Centre, Cape Town. The project entitled "Catalysing partnerships: the role of science centres as intermediaries between the public and scientists in engagement with biomedical sciences in South Africa", plans to bring science centres and scientists together to make biomedical science issues more assessable to the general public. The first phase of the WTIE grant involved using "*The Trouble with TB*" exhibit and workshop, along with "*HIV comes to the party*", "*The DNA Detective*" and "*The Skin you're in*" activities to assess what interventions best engage target audiences (scholars, teachers, the general public). The next two phases, preparation of a "how-to-engage" manual and training workshops for scientists and facilitators at all national science centres are scheduled for 2010. In an exciting outcome of phase 1, David Muller (play write and science theatre performer), with Dr Gill Black of CBTBR, scripted and produced a play with student actors from the University of the Western Cape for the general public called "*Touching TB*". This play has already been performed at community events and been critically evaluated by members of CBTBR.

An outline of the activities presented in 2009 is given below:

TB, HIV, DNA, TIK, ENZYME and BIOTECHNOLOGY WORKSHOPS and TB and SKIN EXHIBITS

During the course of 2009, the six workshops "*The Trouble with TB*", "*HIV comes to the party*", "*The DNA Detective, what's in your genes?*", "*TIK's Tricks*", "*Enzyme Antics*" and "*Biotechnology*" and exhibits "*The Trouble with TB*" and "*The Skin you're in*" developed by Prof Corfield were presented at a number of venues across the country, not only by her, but also by others who have been trained in the past, or in the year of this report. The workshops in which she and/or members of CBTBR were involved are detailed below.

Activities in which Prof Corfield primarily involved

14 February short "*Basic Biotechnology*" workshop and talk "*New wave Biotechnology*" given to educators of the Dept of Education, West Coast region in Morreesburg, W Cape.

28 February HIV/AIDS awareness training given to peer educators at TSiBA (private tertiary education institute, Cape Town), using "*HIV comes to the party*". Subsequently, peer educators themselves presented the workshop to learners from socio-economically-disadvantaged schools in Cape Town (25 April).

10 March Prof Corfield wrote fact sheet on DNA forensics to support Public Understanding of Biotechnology initiative (PUB) Media Round Table in Johannesburg

25-31 March SCIFEST Africa, Grahamstown. Exhibits "*The trouble with TB*" and "*The Skin you're in*" were presented. As part of increasing involvement and training, Dr Lester Davids (UCT) and Dr Robea Ballo (UCT) helped develop and man the skin exhibit, and a postgraduate student from Rhodes University helped Prof Corfield man the TB exhibit. Workshops "*The DNA Detective, what's in your genes?*" and "*TIK's tricks*" were also presented daily. Two facilitators (who were both NRF Interns) from the Unizul Science Centre, Richard's Bay were trained in interactive presentation skills at these workshops. The exhibitions and workshops received media attention; Prof Corfield was interviewed for the British radio programme "*The Naked scientists*" and discussed TB <http://www.thenakedscientists.com/HTML/podcasts/show/2009.04.04/> The TB and skin exhibits were filmed and aired on SABC's children's programmes "*Hectic nine 9*"; and "*TIK's Tricks*" was filmed and presented on SABC's "*Knock knock*". An SABC radio interview was also aired on Prof Corfield's research on inherited heart disease.

2 April "*TIK's Tricks*" workshop and "*New Wave Biotechnology*" talk presented at University of Stellenbosch's Maths and Science week.

29 and 30 April "*TIK's Tricks*" workshop presented to primary school educators from socio-economically-deprived schools at Primary Science Programme (PSP), Phillipi.

4 and 5 May Meeting with Prof Corfield and Mr Derek Fish (Director of Unizul Science Centre) to discuss further outreach collaborations with a biomedical focus (HIV and TB) and as part of WTIE awards that they each hold.

9 May "*New wave biotechnology*" talk to learners with leadership potential at MTN Sciencentre.

13-15 May Phase 1 of WTIE at MTN Sciencentre. "*The Trouble with TB*" exhibit and workshop, along with "*HIV comes to the party*", "*The DNA Detective*" workshops and "*The Skin you're in*" exhibit were presented over three days to learners and educators. An evening discussion was held on stem cell therapy for the general public. All interventions were evaluated by three independent evaluators and by questionnaires administered to participants. Results of data analysis will be used in phases 2 and 3. Many people were involved in this phase. From CBTBR, Mss Glenda Durrheim and Carmen Swanepoel and Dr Erika Truter were involved, as well as scientists and students from UCT. Two science centre facilitators who were NRF interns were trained in presenting workshops and exhibit. Ms Marina Joubert, professional science communicator and Mr David Muller (science theatre performer) also participated.

19 May Talk given at UCT Health Sciences to staff and students about the need for public engagement in biomedicine.

8-10 June Three day Biotechnology training workshop given to facilitators at MTN Gateway Science Centre, under auspices of PUB, as part of a programme to empower the facilitators to design an interactive biotechnology programme for school groups visiting the centre. Outcome will be evaluated in 2010.

12 June "*Careers in Health Care*" talk given at University of Stellenbosch to learners from socio-economically-deprived schools.

24 June Training workshop for MTN Cape Town Sciencentre facilitators and Nina Holderness (UCT postgraduate student with interest in "outreach") to enable them to give TB, HIV, DNA workshops.

30 June and 2 July "*DNA detective: what's in your genes?*" and "*The Trouble with TB*" given to primary school children from Kalkfontein attending winter holiday programme.

8 July Training workshop for MTN Cape Town Sciencentre facilitators and Nina Holderness to enable them to give TIK workshop.

13 and 14 July Agriculture Biotechnology training workshop for Free State Dept of Education Agricultural Sciences subject advisors, held in Bethlehem, Free State. Run by Prof Corfield and two senior Dept of Education advisors

3-9 August National Science Week (postponed from May due to presidential inauguration). TB exhibition and workshop, run by trained facilitators and postgraduates from CBTBR and UCT. Also HIV and DNA workshops and skin exhibit, run by trained facilitators and postgraduates from CMCB and scientists and postgraduate students from UCT. Interventions evaluated by Prof Corfield.

The TB and Skin exhibits remain at the Sciencentre and are manned by trained science centre facilitators during school visits. The Skin exhibit also used by the Teaching Biology Programme (offshoot of the Africa Genome Education Institute).

4 August Seminar on “*The genetics of human skin pigmentation*” delivered at the Centre for Critical Research on Race and Identity (CCRRI), University of KZN.

12 and 13 August “Enzyme antics” workshop (with application in human digestion) presented to primary school educators from socio-economically-deprived schools at Primary Science Programme (PSP), Phillipi.

24-27 August 2x2 day Basic Biotechnology training workshops presented under auspices of PUB to educators from the Eastern Cape Dept of Education, held in Mount Frere and Mthatha, to facilitate attendance by educators from rural areas.

7-10 December Prof Corfield attended by invitation a WTIE award-holders 3 day workshop in Bangalore, India on the role of storytelling in public engagement.

4. Networking

Existing networks and linkages

Both nodes of the CBTBR are involved in wide collaborative networks that involve TB researchers and research institutions in a large number of countries. Maintaining existing collaborative networks and developing new linkages is of critical importance to the CBTBR. For this reason, members continued to devote significant time and effort to networking.

New networks and linkages

The Wits node was invited to participant in a 24-member consortium of research teams from Europe, South Korea, India and South Africa, led by Prof. Stewart Cole (EPFL, Switzerland) that applied for funding for a TB drug discovery project under the EU FP7 program. If successful, this grant will commence in January 2011 and will sport activities in the Wits node for 4 years.

NAME	INSTITUTION	NATURE/ PURPOSE, OUTPUTS AND FUTURE DIRECTION OF COLLABORATION
Prof. John D. McKinney	École Polytechnique Fédérale de Lausanne (EPFL), Lausanne, Switzerland	Collaboration on the mechanisms of propionate catabolism, co-author on a manuscript published in 2008 and joint awardee (with Prof. Mizrahi) on a three-year grant from Swiss/ SA Joint Research Programme. Dr. Warner visited Prof. McKinney’s lab in July to discuss the collaborative research project.
Dr. Clifton E. Barry III and Dr. Helena Boshoff	Tuberculosis Research Section, Laboratory of Host Defenses, National Institute of Allergy & Infectious Diseases, NIH, Rockville, MD	Collaborating members of the “IM TB” Consortium funded through SBRI. Hosted Dr. Garth Abrahams during his 4-month working visit to the NIAID in 2009.
Prof. Gilla Kaplan	Public Health Research Institute, International	Ongoing collaboration in the area of in vivo phenotyping of mutant strains of <i>M. tuberculosis</i> . Profs Kaplan &

	Center for Public Health, Newark, NJ	Mizrahi Jointly run the TB Basic Sciences component of the CU-SA Fogarty AITRP. Visited the Wits node in October 2009
Prof. Česlovas Venclovas	Institute of Biotechnology, Vilnius, Lithuania	New collaboration on the structure and function of a novel mutagenic complex in mycobacteria. Spent a week in the Wits node in March 2009 to further the collaboration with Dr. Warner and Ms. Ndwandwe
Prof. Heini Dirr	University of the Witwatersrand	New collaboration on the expression and structure determination of members of a novel mutagenic complex in mycobacteria
Dr. Deborah Hung	Broad Institute of Harvard and MIT, Boston, USA	Collaborating member of the "IM TB" Consortium funded through the SBRI. Also collaborating on the characterization of Rpf-deficient mutants of <i>M. tuberculosis</i>
Prof. Eric Rubin	Microbiology and Immunology, Harvard Medical School, USA	Collaborating member of the "IM TB" Consortium funded through SBRI. Visited the MRU in November 2009. Will co-host Ms. Ndwandwe during her Fogarty training fellowship in 2010
Prof. David Sherman	Seattle Biomedical Research Institute, USA	PI of the "IM TB" Consortium funded by the Bill & Melinda Gates Foundation
Prof. James Sacchettini and Dr. Tom Ioerger	Biochemistry and Biophysics, Texas A&M University, College Station, TX	Collaborating members of the "IM TB" Consortium funded through the SBRI. Also collaborating on whole-genome sequence analysis of strains of <i>M. tuberculosis</i> .
Prof. Sir Tom Blundell and Prof. Chris Abell	Cambridge University, UK	Collaborating members of the "IM TB" Consortium funded through the SBRI
Prof. Jean Content	Institut Pasteur Bruxelles, Brussels, Belgium	Collaboration on genome duplication in <i>M. smegmatis</i> resulted in co-authored publication in 2006
Dr. Chris Sassetti	University of Massachusetts, USA	Collaborating member of the "IM TB" Consortium funded through the SBRI
Prof. Tanya Parish	Barts and the London, UK & Infectious Diseases Research Institute (IDRI), Seattle, USA	Collaborating member of the "IM TB" Consortium funded through the SBRI
Prof. Stewart Cole	EPFL, Lausanne, Switzerland	PI of the <i>More Medicines for Tuberculosis</i> (MM4TB) Consortium, which has applied for funding under the EU FP7 framework
Prof. Vickery Arcus	AgResearch, University of Waikato, New Zealand	Collaboration on the role of VapBC toxin-antitoxin modules in the physiology of <i>M. tuberculosis</i>
Prof. Gregory Cook	University of Otago, Dunedin, New Zealand	Collaboration on the role of VapBC toxin-antitoxin modules in the physiology of <i>M. tuberculosis</i>
Prof. Petros Karakousis	Johns Hopkins University, Baltimore	New collaboration on nucleotide pool determination in mycobacteria. Will host Dr. Cliff Magwira in 2010 for short-term training fellowship

Dr. S. Sampson	Imperial College, UK	The evolution and function of the PE and PPE gene families (2001-present) & the ESAT-6 secretion system interactome (2007- present).
Dr. H. Mardassi, Mr. A. Karboul and Mr. A. Namouchi	Institut Pasteur, Tunisia	Characterization of <i>M. tuberculosis</i> lineages through the PE/PPE gene family (2002 - present)
Dr. W. Bitter and Mr A. Abdallah	Vrije Universiteit, Amsterdam, Netherlands	The trafficking of the <i>M. tuberculosis</i> PE and PPE proteins (2006 – present).
Dr. John Ho	Cornell University, New York, USA	Characterization of <i>M. tuberculosis</i> lineages through the PE/PPE gene family (2007 - present).
Prof. J. Ho, Dr. A. Gibson and Prof. R. Huard	Cornell University, New York, USA	The dissemination of the major RDRio sub-lineage of the LAM <i>M. tuberculosis</i> spoligotype family in Luso-American countries, Portugal and Africa
Dr. H. Mardassi	Institut Pasteur de Tunis, Tunisia	Characterisation of LAM evolutionary history (2007-present).
Prof. A. Steyn	University of Alabama, Birmingham, USA	The ESAT-6 secretion system interactome (2007-present).
Prof. VPMG Rutten, Dr. I van Rhijn, Dr. AP Koets	Utrecht University	Non-tuberculous mycobacteria in wildlife (WOTRO Integrated program proposal) (2007).
Dr. R Anthony	KIT The Netherlands	MLPA assay for the detection of ofloxacin resistance
Prof D van Soolingen	RIVM The Netherlands	Evolution of the Beijing genotype Lineage
Dr. Kristin Kremer	RIVM The Netherlands	Whole genome sequencing of Beijing genotype strains
Dr. V Dartois	Novatis Singapore	MassArray detection of mutations conferring drug resistance
Prof. E Bottger	University of Zurich	Development and evaluation of novel genetic based diagnostics for drug resistance.
Prof. E Nardell	AIR facility, Witbank	Transmissibility of drug resistant TB
Prof. Sturm	UKZN and LifeLab	Whole genome sequencing and development of a genetic based diagnostic for second-line drug resistance
Prof. Erwin Schurr	McGill University, Montreal, Canada	Genetic epidemiology. Poster outputs; 4 papers published 2009-2010.
Prof Laurent Abel & Alexandre Alcais	INSERM / Université Paris 5, France	Analysis of genetic epidemiology. Poster outputs; 4 papers published 2009-2010.
Dr. Iris Grossman	GlaxoSmithKline, NC, USA	Genetic susceptibility to TB.
Dr. Alkes Price	Harvard School of Public Health, Boston, USA	New collaboration. Analysis of admixture mapping.
Dr. Ingileif Jonsdottir	decode, Iceland	Genetic susceptibility to TB.
Dr. Lluís Quintana-Murci	Institut Pasteur, Paris, France	Genetic susceptibility to TB and population structure. Paper expected 2010.
Prof. Stefan Schreiber and Dr. Almut Nebel	Christian Albrechts University, Kiel, Germany	Investigation of candidate genes in TB. Resulted in 2 co-authored publications in 2007, and 2 co-authored publications in 2009
Prof .Megan Murray	Harvard / Broad institute	Various project including the evolution of XDR-TB strains; other mechanisms of drug resistance (in addition to genomic mutations); mechanisms of resistance to 2 nd line

		drugs; strain fitness; certain strain families may have both increased fitness and increased potential for acquiring drug resistance. All of these projects involve whole-genome sequencing, proteomics, and microarray. Prof. Murray is directly involved in project planning, paper writing, funding proposals (NIH and Wellcome trust).
Dr. Judit Nagy	Imperial College London	Proteomics of large clusters (more transmitted) vs. small clusters (less transmitted) in the same strain family after other criteria to select isolates have been taken into consideration. The aim is to identify proteins that are differentially expressed in the same strain family which may give them an advantage to transmit better.
Prof. Harald Wiker	Bergen University, Norway	Ongoing collaboration on the <i>M. tuberculosis</i> phosphorolome. New collaboration on the detection of drug resistance by single run multi-locus sequencing. New collaboration on the <i>M. tuberculosis</i> secretome.
Dr. Hernandez Pando Rogelio	National University of Mexico	Test different drug resistant strains (MDR / XDR) in a mouse model for strain fitness/virulence. The isolates are the same as described above and will compliment the data obtained by molecular investigations.
Dr. Cheryl McDermott	MSF	New collaboration on drug resistance in Khayelitsha, Western Cape.
Prof. Tom Alber	Berkeley	New collaboration on the <i>M. tuberculosis</i> lipidome.
Prof. Brigitte Gicquel	Pasteur Institute	New collaboration on mutation in <i>M. tuberculosis</i> DNA repair genes.
Prof. Kathy Eisenach	Arkansas, USA	Mechanisms of strain fitness in an in vitro THP-1 cell line model. Project is in planning phase.
Prof. Stefan Kaufmann	Max Planck Institute for Infection Biology, Berlin, Germany	Collaborators on BMGF-funded project.
Prof. Henry Boom	Cleveland, Ohio, US	Collaborators on BMGF-funded project.
Prof. Hazel Dockrell	London School for Hygiene and Tropical Medicine, London, UK	Collaborators on BMGF-funded project, Co-applicants on grant application to BMGF.
Dr. Mark Doherty	Statens Serum Institute, Copenhagen, Denmark	Collaborator on BMGF-funded project, collaborators on NIH-sponsored study
Dr. Martin Ota	MRC, The Gambia	Collaborators on BMGF-funded project.
Prof. Harriet Mayanja	Makarere University, Uganda	Collaborators on BMGF-funded project.
Prof. Ronnie Anderson & Dr. Caroline Cholo	MRC/ UP Unit on Inflammation & Immunity, University of Pretoria	Collaboration on the role of potassium transport in mode of action of anti-tubercular action of riminophenazines.
Prof N. Beyers, Dr A. Hesseling, Dr S. Tonkin, Prof B. Marais	SU	Non-tuberculous Mycobacteria (NTM) - Prevalence and Clinical relevance in HIV-infected and HIV-uninfected children (2006 - present).
Prof. N. Beyers	DTTC, SU	Ongoing collaboration of the molecular epidemiology of <i>M. tuberculosis</i> in the W. Cape.

Dr. A. Michel, J. Godfroid, K. Coetzer & N. Kriek	Onderstepoort Veterinary Institute	Non-tuberculous mycobacteria in wildlife (WOTRO Integrated program proposal) (2007 - present).
Prof. L. Dicks	Microbiology, SU	Bacteriocins as a possible method to treat <i>M. tuberculosis</i> infection (2007-present). One publication in J. Appl. Microbiol. 2007.
Prof. S. Mehtar	Unit for Infection Control, Tygerberg Hospital	The anti microbial activity of copper and copper alloys against nosocomial pathogens and <i>M. tuberculosis</i> isolated from healthcare facilities in the Western Cape—an in-vitro study. One publication in J. Hosp. Inf. 2008.
Prof. Kelly Chibale	Dept Chemistry University of Cape Town	Screen antituberculosis lead compounds
Dr Thavi Govender	Dept. Chemistry, UKZN	Test antituberculosis activity of existing antituberculosis drug derivatives. K. Onajole 2009
Prof Green	Dept Chemistry, UWC	Screen new compounds and derivatives for antituberculosis activity
Dr. S. Todorov	Univ. Sao Paulo, Brazil	Antituberculosis activity of Bacteriocins (Todorov, 2008)
Dr C. Kenyon	CSIR, Pretoria	Dormancy regulators of M.tb in human macrophages.
Dr. Haynes	Hong Kong University of Technology	Testing new compounds for antituberculosis activity
Prof Peter Folb	Pharmacology, UCT	Testing derivatives of Diphenyl Oxazole for antituberculosis activity
Ms. Marlein Bosman	NHLS , Green point	Collaborator on all our projects – provides routine samples.
Dr. Sias May	TB Control program in Suidkaap/ Lawwaaikamp	TB Control strategy.
Dr. Danie Theron	Eben donges Hosp, Worcester	New project on DOTS program on farms.
Dr Else Marais	Wits/NHLS	Ongoing collaboration on the molecular epidemiology of drug resistant TB in Gauteng.
Prof C. Reinecke & Dr du Toit Loots	North West University	New collaboration on the <i>M.tuberculosis</i> metabolome.
Prof C Wright	NHLS Tygerberg	The diagnostic utility of FNAB
Dr. Alistair Calver	Gold Mine in Northern province	Ongoing, outbreak of drug resistance in a setting with a good control program.
Prof. Willem Hanekom	IIDMM, UCT	Sharing of technology (multicolour FACS, Luminex machine), sharing of samples, manuscript accepted for publication.
Prof. Frank Brombacher	IIDMM, UCT	Sharing of expertise (murine helminth models).
Dr A. Hesseling	SU	New collaboration to investigate genotype-immunological phenotype correlations in children.
Dr Cahal Seioghe, and team	NBN node, Cape Town	New collaboration. Analysis of whole-genome sequence data.
Mrs. Lungi Kwitshana	MRC, Durban	Collaboration in project on worm-HIV co-infection.
Prof. Keertan Dheda	Lung Institute, UCT	Collaboration in diagnostic/biomarker project. Molecular epidemiology of XDR-TB
Dr. Anna Mandalakas	Case Western Reserve University, USA	Collaboration of diagnostic studies in paediatric TB.
Dr. Marc	Bernhard Nocht Insitute,	Collaboration on helminth/TB co-infection studies.

Jacobsen	Hamburg, Germany	
Dr Muazzam Jacobs	University of Cape Town	New collaboration to assess the impact of steroid hormones on protective immunity to <i>Mycobacterium tuberculosis</i> in a mouse animal model.

Conference and Workshop Organisation

International TB conference hosted and organised by CBTBR SU node

The Stellenbosch University node held an international TB conference focusing on the Effect of Genetic Variation in Mtb on Vaccine Escape and the Acquisition of Drug Resistance, at Lanzerac wine estate between the 16th and 18th of September 2009. Twenty-four delegates from Europe, Asia, Central and South America and South Africa presented their findings on how *Mycobacterium tuberculosis* adapts to the selective pressure of antibiotics and vaccines. Ground breaking research was presented concerning the influence of vaccines on the virulence of *M. tuberculosis*, the possible role of DNA repair genes in the evolution of *Mycobacterium tuberculosis*, the mechanisms whereby *M. tuberculosis* develops mutations, extensively drug-resistant tuberculosis (XDR-TB), novel mechanisms which define the level of drug resistance and whole genome sequencing as the future tool for molecular epidemiology. Prof Rob Warren, Prof Gey van Pittius, Prof Tommie Victor, Dr Chris McEvoy, Dr Madeleine Hanekom, Dr Elizma Streicher and Ms Kim Hoek from the SU node and Dr Digby Warner from the Wits node presented at the meeting.

TB Trials Consortium (TBTC) visit to the CBTBR SU Node

Colleagues from George Washington University, Debra Benator, Fred Gordin and Donna Conwell visited the CBTBR SU node from 24 to 27 February 2009 to work on a joint strategy for a SU application to the CDC-sponsored TB Trials Consortium (TBTC). Professor Benator the director at the Infectious Diseases Clinic at the VA, gave an overview of TBTC trial experiences gained during the past 10 years on 27th February; the lecture was well attended by a broad spectrum of clinicians and researchers.

The TBTC visit was hosted by the CBTBR and the Desmond Tutu TB Centre. This collaborative effort brings together a strong group of adult and paediatric TB and HIV researchers at the faculty in a joint consortium called TB SUN. TB SUN will aim to join larger collaborative TBTC international activities to implement trials of new TB therapies where most needed, including in children.

5. Service rendering

As per our Business Plan for the current phase of the CBTBR, the following services were provided in 2009:

The provision of scientific/ technical service, advice and assistance to local Government, regional services, institutions, research groups and individuals

Thesis examination

- Dr. Gordhan served as external examiner of two MSc dissertations from UCT and as internal examiner of an MSc dissertation from Wits. Dr. Kana served as internal examiner of an MSc dissertation from Wits, and external examiner of an MSc dissertation from Stellenbosch University. Drs. Kana and Warner reviewed PhD proposals from the Nelson Mandela School of Medicine, UKZN and Drs. Kana and Gordhan reviewed PhD proposals from Wits.
- Numerous external examinations were done by members of the SU node. These include examining PhD or MSc theses for WITS, Pretoria, UCT, UWC and other universities and Universities of Technology

Journal editing and reviews

- Prof. Mizrahi served on the Editorial Advisory Boards of the *Biochemical Journal*, *Tuberculosis*, and the *International Journal of Biochemistry and Cell Biology*. She also served as Guest Editor of the thematic issue on Neglected Topical Diseases in *FEMS Immunology and Medical Microbiology* (to be published in March 2010). In 2009, she also reviewed manuscripts submitted to the following journals: *Expert Opinion on Therapeutic Targets*, *PLoS ONE*, *Cellular Microbiology*, *American Journal of Respiratory and Critical*

Care Medicine, FEMS Immunology and Medical Microbiology, Molecular Microbiology, Journal of Bacteriology and PLoS Pathogens.

- Dr. Warner reviewed manuscripts submitted to *Future Medicine, FEMS Immunology and Medical Microbiology, PLoS Pathogens, Molecular Microbiology* and *Proceedings of the National Academy of Sciences*. Dr. Kana reviewed manuscripts submitted to *FEMS Immunology and Medical Microbiology* and *Biotechnology & Applied Biochemistry*.
- Most if not all senior members of the SU node review numerous manuscripts for international journals. Records are not kept, but journals include *Nature Reviews, Lancet, Lancet Infectious Diseases, PLoS, J Antimicrobial Chemotherapy, J Mol Med, BMC, Tuberculosis, IJTL, JID, J Biotech, IJMS, Indian Heart Journal, Cardiovasc. J SA, J Biotech, IJMS, "Molecular Biology and Evolution", "Journal of Infection in Developing Countries", "Journal of Bacteriology", "Journal of Medical Microbiology", "American Journal of Respiratory Critical Care Medicine", "Tuberculosis" and Journal of Molecular Biology and Biotechnology.*

Promotion reviews

- Prof. Mizrahi reviewed applications for promotion at the Seattle Biomedical Research Institute, the University of Illinois at Chicago and Cornell University (USA).

Expert Panel or Committee Membership

- Prof. Mizrahi chaired the International Scientific Advisory Committee of the Institute of Infectious Disease and Molecular Medicine at UCT.
- Prof. Mizrahi served on the Management Committee of the IMTB Project, SBRI, USA
- Prof. Mizrahi served on the Council of Scientific Advisors of the International Centre for Genetic Engineering and Biotechnology (Trieste, Italy).
- Prof. Mizrahi was re-appointed to, and served on the Scientific Advisory Board of the KwaZulu-Natal Research Institute for TB and HIV (K-RITH), UKZN, Durban
- Prof. Mizrahi served on the Scientific Advisory Board of CAPRISA, UKZN, Durban
- Prof. Mizrahi served on the Steering Committee of the Columbia University-southern Africa Fogarty AIDS and TB Research Training Program (CU-SA Fogarty AITRP).
- Prof. Mizrahi served on the Scientific Advisory Committee of the EU-funded New Medicines for TB Program (NM4TB) based at the École Polytechnique Fédérale de Lausanne (EPFL, Switzerland).
- Prof. Mizrahi served on the Committee on Genomics and Discovery of the UNICEF/UNDP/World Bank/WHO Special Programme for Research and Training in Tropical Diseases (TDR) (Geneva)
- Prof. Mizrahi served on the Jury for the Unesco-L'Oreal *For Women in Science* Awards for 2010 (Life Sciences), Paris.
- Dr. Kana served as a judge for the Discovery Health Journalism Awards.
- Prof. Mizrahi served on the Executive Committee of the School of Pathology of Wits University.
- Prof. Mizrahi served on the FRC Advisory Board, Faculty of Health Sciences, Wits University.
- Drs. Gordhan and Kana served on the Postgraduate Committee, Faculty of Health Sciences, Wits University.
- Dr. Warner acted as specialist reviewer on a Radioactivity audit of the CHJAH Laboratory at the Charlotte Maxeke Johannesburg General Hospital
- Profs Warren, Victor and Gey van Pittius served on the Feedback meeting on XDR-TB to the Dept. of Health, Eastern Cape.
- Profs van Helden and Walzl served on MSF, GATB, WHO and Stop TB Partnership.
- Prof van Helden served on the GMO Advisory Committee for the Dept. Agriculture.
- Prof van Helden served on the Interim Steering Committee of the DST TB Centre of Competence.
- Profs Walzl and Wiid served on the Ethics Committee for Experimental Animal Research of Stellenbosch University.
- Prof Warren served on the Centre for Infectious Diseases of Stellenbosch University.
- Profs Walzl and Warren served on the Research Committee of Stellenbosch University Faculty of Health Sciences.
- Prof Gey van Pittius served on the Committee for Postgraduate Research and Health Research Ethics Committee of Stellenbosch University Faculty of Health Sciences.

Examples of Research Funding Reviews

- Wits node staff participated actively in reviewing proposals submitted to international and local funding agencies/ institutions. Prof. Mizrahi served as a reviewer of proposals for the Health Research Council of New Zealand, the Wellcome Trust (UK), NRF, CIDRI (IIDMM, UCT) and CU-SA Fogarty AITRP. Dr. Gordhan reviewed proposals from the Wellcome Trust/ DBT India Alliance and the NRF. Dr. Kana reviewed proposals from the MRC, NHLS Research Trust and the Wits URC (Major Equipment grants, Vice-Chancellor's Research Award and Mellon Postgraduate Mentoring Awards). Dr. Warner reviewed proposals from the Innovation Fund, Biopad and NRF.
- Numerous grant application reviews were done by the staff of the SU node for both the MRC, NRF and NHLS, as well as other national and international funding organisations by all the senior members of the CMCB. No accurate records are kept, as these are too numerous and frequent. International bodies include the Wellcome Trust, Royal Society, Swiss Science Foundation, WOTRO, WHO, Alexander von Humbolt Foundation, European Young Investigator Award for European Science Foundation, Rolex Awards, etc.)

Other services rendered

- Speciation of Non Tuberculous Mycobacteria (NTM) for the Onderstepoort Veterinary Institute and Kruger National Park
- Identification of *M. tuberculosis* in tissue specimens for the NHLS
- Provision of reagents for IS6110 RFLP analysis to the NHLS.
- Provision of reagents for RFLP to the Ghanan Research Fellows
- Genotyping of clinical isolates (RFLP or mutation detection) for the NHLS.

6. Gender impact of research

“Science for Women” (gender-sensitivity of the research agenda)

The work being undertaken in the CBTBR is aimed at contributing towards global efforts in researching and developing new laboratory-based tools for reducing the societal burden of TB. TB is the greatest single infectious cause of death in young women, and causes more deaths among women than all causes of maternal mortality combined. The particularly high rates of HIV co-infection in women are expected to fuel an increased prevalence of TB in women over time. In addition to the disease burden, TB also imposes a massive, but largely hidden burden of social impact on women. The long-term nature of the research projects being undertaken within the CBTBR makes it impossible to assess their gender impact in the short-term.

“Science by Women” (the participation by women in the research programme)

Five out of the 13 Core Team Members of the CBTBR are women. The CBTBR has also maintained a high percentage of female students (70% of all students and 50% of postdoctoral fellows), which is in line with demographic norms for the Life and Health Sciences at a national level. Both nodes have demonstrated that they are able to provide an environment which is attractive to, and supportive of women researchers at all levels, from Honours students to senior postdoctoral fellows and Core Team Members. These indicators confirm that the CBTBR serves as a centre in which women researchers are nurtured and developed.

Recent NEWS

Drug resistant TB studied to develop new drugs

Through the study of drug sensitive and drug resistant TB strains, scientists hope to identify markers for the design of rapid TB tests, develop new drugs and to assist the TB program to control drug resistant TB.

When it comes to TB research, the CBTBR enjoys competitive advantage in many areas, mainly as a result of funding, expertise in the field and valuable resources – such as a unique bank of samples, collected over many years by Profs Tommie Victor and Rob Warren of the CBTBR SU node.

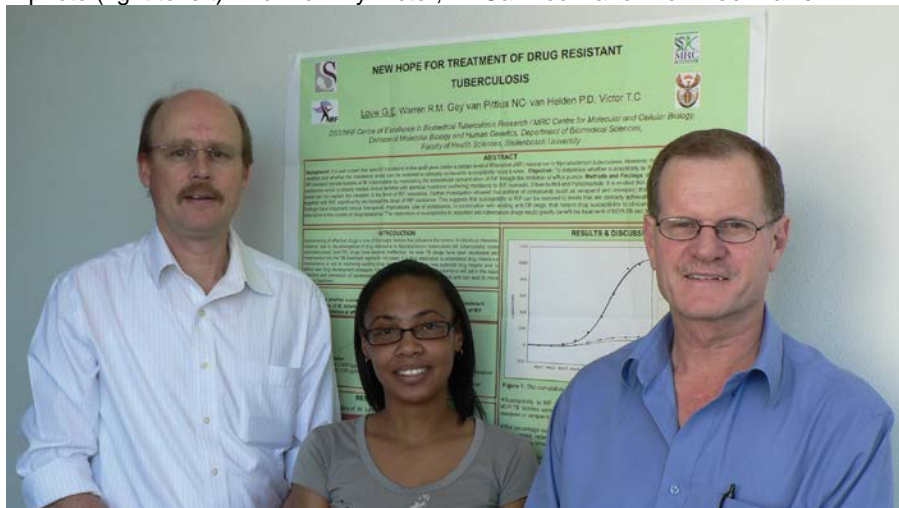
This bank represents one of the largest collections of TB samples in the world, including more than 13 000 drug sensitive and 6 000 drug resistant cultures which form a vital resource for studies that use DNA fingerprinting to track the evolution of drug resistant strains and how they spread through populations.

Working with these strains, the CBTBR team are trying to find out how tuberculosis strains mutate to become resistant to antibiotics. By whole genome sequencing and comparing the DNA of numerous strains, they identify gene variations that seem to correlate with drug resistance. So far the team, in collaboration with partners at the Harvard School of Public Health in the United States, have identified more than 40 mutations that can either confer or enhance drug resistance in TB bacteria. They hope to sequence thousands of TB bacteria to derive the most comprehensive view of drug resistance possible.

Recently, Prof. Victor received a grant amounting to R4 million over a period of three years from the Wellcome Trust to study drug resistant TB.

His team plan to use a range of state of art complementary strategies to identify molecular events which allow the bacterium to become hyper-resistant. These events may change the characteristics of the bacterium by altering metabolic processes which regulate the intracellular drug concentration. These events can be targeted (in combination with existing anti-TB drugs) to restore the level of drug resistance, Prof. Victor says.

In photo (right to left): Prof Tommy Victor, Dr Gail Louw and Prof. Rob Warren.



CBTBR boasts a whopping 9 PhD graduates in 2009

The CBTBR has successfully produced 9 PhD graduates in the past year. These students with their “thesis titles” are as follows: Mohube Betty Mowa (Function and expression of class I ribonucleotide reductase small subunit-encoding genes in *Mycobacterium tuberculosis* and *Mycobacterium smegmatis*), Suzanna Savvi (Identification and characterisation of the vitamin B₁₂-dependent methylmalonyl coenzyme A pathway in *Mycobacterium tuberculosis*), Erika de Wit (Analysis of host determining factors in susceptibility to tuberculosis in the South African coloured population), Andre Loxton (The role of the regulatory T-cells during HIV/TB co-infection), Novel Chegou (An Evaluation of Novel Diagnostic Techniques in the Diagnosis of Latent and Active Tuberculosis), Nonhlanhla Nene (The effect of exposure to environmental mycobacteria on human immune responses against *Mycobacterium tuberculosis*), Gail Louw (Resistance to first-line anti-TB drugs by gene mutation and gene modulation), Colleen Wright (The contribution of fine needle aspiration biopsy in the diagnosis of mycobacterial lymphadenopathy with particular reference to children) and Madeleine Hanekom (The Molecular Epidemiology of *Mycobacterium tuberculosis*: Host and Bacterial factors perpetuating the epidemic).

In Photo: Some of the CBTBR PhD graduates and their supervisors at the Awards Ceremony.



Stellenbosch University in the World Top 20 institutions and CBTBR co-director 4th highest ranked scientist in the World in the field of Tuberculosis

Recently, ScienceWatch listed Stellenbosch university in the top 20 institutions out of a pool of 9,186 institutions which attracted the highest total citations to their papers published on the topic [tuberculosis](#) (TB) in [Thomson Reuters](#)-indexed journals. In July 2009, Prof Paul van Helden was featured in an article on [Thompson Reuters' Sciencewatch](#), citing him as the 4th highest ranked scientist in the World in the field of tuberculosis.

CBTBR co-director receives prestigious ASSAf Science-for-Society Award

Prof Paul van Helden, from the co-director of the CBTBR, was amongst two scientists who recently received the Academy of Science of South Africa's (ASSAf) Science-for-Society Gold Medal. ASSAF awards this prestigious award annually for scholarly excellence.

Prof van Helden was, until recently, Chair of the Research and Ethics committee of the Faculty of Health Sciences of the Stellenbosch University (SU), the first person who is not a clinician and not a Dean to head this committee in its history. He is the executive head of the Department of Biomedical Sciences at SU's Faculty of Health Sciences, and head of the Division of Molecular Biology and Human Genetics. He is also the director of the MRC/SU Centre for Molecular and Cellular Biology, and co-director of the CBTBR.

Van Helden has initiated major new directions in TB research, obtained funding, found local and international collaborators, coordinated and managed the projects – all in the interests of finding new tools to diagnose, treat and prevent one of the world's most devastating diseases.

Under his leadership, the group has set out to understand the mechanisms of drug resistance; to challenge all the existing conceptual frameworks and to re-examine fundamentals; to introduce rapid diagnostics; and to assess whether drug-resistant TB cases are caused by acquisition of resistance or transmission of already resistant microorganisms.

Van Helden's contribution towards the body of science is evidenced by his extensive list of publications, book chapters and patents. There are few South African scientists who have such an excellent record, particularly in so many high-impact journals.

