



DR CLINT RHODE

B.SC.HONS CUM LAUDE M.SC. CUM LAUDE PH.D. (GENET)(STELL.) PR.SCI.NAT. (BIOL. SCI.)

“As an academic and scientist I aim to maintain a multifaceted and dynamic portfolio, vested in scholarly excellence and on the forefront of innovation that includes elements of research, teaching, and professional service.”

Biography

Dr Rhode started his tertiary education at Stellenbosch University, enrolling for a bachelor's degree in animal biotechnology and furthered his postgraduate studies in the Department of Genetics, graduating with a doctorate in 2013. After a brief postdoctoral fellowship he accepted a faculty position as Lecturer in Genetics, at Stellenbosch University, during 2013. He joined the *Molecular Breeding & Biodiversity (MBB)* group, as one of the principal investigators with a focus on animal genetics. In 2017, now as Senior Lecturer in Genetics, Dr Rhode co-founded the *Systems Genetics* group.

At present, Dr Rhode is registered by the South African Council for Natural Scientific Professions, and maintains a multifaceted approach to his role as a professional scientist with aspects including teaching, research, consultation, and community engagement. Dr Rhode teaches various modules in introductory genetics, -biotechnology, and advanced courses in population genetics and genetic data analysis. He also manages a diverse research portfolio with research projects focused on understanding the evolutionary factors underlying biological variation in a number of species, including marine organisms of economic importance, traditional livestock and humans.

Dr Rhode is a Hofmeyr-van Schaik medal laureate, for most distinguished B.Sc.Hons-student in Genetics (2007) (awarded by the South African Genetics Society). He is also a recipient of the sought-after National Research Foundation (NRF) – Department of Science & Technology (DST) Innovation Scholarship and Fellowship during his doctoral and postdoctoral tenures, and was awarded the highly competitive NRF-DST Thuthuka Research Grant for young researchers in 2015. Furthermore, he holds granted membership to the Golden Key International Honour Society (inaugurated: 2005); is currently a member of the executive committee of the South African Genetics Society (elected: 2014); is a member of the World Aquaculture Society, serves on the scientific committee of the Southern African Aquaculture Association; and is also a founding member of the Black Soldier Fly Genomics Consortium.

Research Interest

Dr Rhode has a primary disciplinary research focus in molecular population- and -quantitative genetics, with a particular interest in how various micro-evolutionary processes influence genome-wide patterns of genetic diversity and how this in turn facilitates phenotypic development. These evolutionary processes can be broadly categorised as locus-specific (e.g. selection, mutation, recombination) or demographic (e.g. population expansions and contractions, gene flow, founder effects) and leaves unique molecular signatures on the genomes of populations. This integrative investigation of genome function and population dynamics is at the core of a new hybrid discipline, *population genomics*, which creates a juncture between modern molecular bioscience and classical evolutionary biology. Dr Rhode takes a *systems genetics* approach to understand these biological phenomena in order to account for the multidimensional facets of the evolutionary history of populations and the genetic architecture of complex traits. The fundamental nature of Dr Rhode's





scientific inquest, means that it has broad applicability to a various topical issues in modern bioscience, as such Dr Rhode has research projects that encompass investigations on population variability and viability in management and conservation biology; sustainable animal production and domestication; as well as understanding how genetic variation in human populations might underlie various health related traits.

Students & Projects

Current Students (Present and previous projects):

Mr Stephan F. Jenkins

Ph.D. candidate (2018-present) *Research Project* – Population genomics of the black soldier fly (*Hermetia illucens*).

M.Sc. graduate (2018): *Research Project* – Genetic and phenotypic characterisation of commercial dusky kob (*Argyrosomus japonicus*) cohorts.

B.Sc.Hons graduate (2015): *Research Project* – Genetic assessment of an F1 cultured kob (*Argyrosomus japonicus*) cohort.

Mr Thendo S. Tshilate

Ph.D. candidate (2018-present) *Research Project* – Genetic improvement of Mozambique tilapia (*Oreochromis Mossambicus*) for South African aquaculture.

Mr Thomson Sanudi (Co-supervised with Profs D. Brink and R. Roodt-Wilding)

Ph.D. candidate (2014-present) *Research Project* – Genetic characterization and introduction of walk-back selection in lake Malawi Cichlidae (*Oreochromis shiranus*) towards sustainable aquaculture development and biodiversity management.

Mr Nathan S. le Cordeur

M.Sc. candidate (2018-present) *Research Project* – Genetic evaluation of founder populations for emergent aquaculture species, dusky kob and spotted grunter.

B.Sc.Hons graduate (2017): *Research Project* – Investigating coat colour gene variants in South African Merino sheep.

Ms Lelannie Hoffmann

M.Sc. candidate (2018-present) *Research Project* – Mating systems and the effects of inbreeding in the black soldier fly.

B.Sc.Hons *cum laude* graduate (2018): *Research Project* – Parentage analysis and genetic diversity in black soldier flies.

Mr William R. van Niekerk (Co-supervised with Dr N.W. McGregor)

M.Sc. candidate (2018-present) *Research Project* – Elucidating population substructure and heterogeneous genomic differentiation in South African populations to increase the power to identify genetic associations with mental health disorders.

B.Sc.Hons graduate (2017): *Research Project* – Population structure and genetic diversity of South African population cohorts.



Ms Chante Powell (Co-supervised with Dr B. van Asch)

M.Sc. candidate (2018-present) Research Project – Genetic species identification, diversity and population structure of Eriophyoid grapevine mites in South African vineyards.

Ms Thapelo Senyolo (Co-supervised with Dr K. Salie, Dept. of Animal Science)

M.Sc.Agric. candidate (2018-present) Research Project – Thermal induction and determination of tetraploidy in post fertilized eggs of *clarias gariepinus*.

Ms Emma Frickle (Co-supervised with Dr N.W. McGregor)

M.Sc. candidate (2018-present) Research Project – A systems biology approach to investigate antipsychotic treatment response in a South African first-episode schizophrenia cohort, considering neuropsychiatric genetics, neuroimaging, childhood adversity and patient insight.

Ms Tassin Jackson

M.Sc. candidate (2017-present): *Research Project* – Exome characterisation of dusky kob (*Argyrosomus japonicus*).

B.Sc.Hons graduate (2017): *Research Project* - Optimisation of a marker panel for parentage analysis in abalone.

Ms Riana van Deventer (Co-supervised with Prof. R. Roodt-Wilding)

M.Sc. candidate (2017-present): *Tentative Research Project* – Association Analysis of Golden Coat Colour in Blue Wildebeest (*Connochaetes taurinus*).

B.Sc.Hons graduate (2014): *Research Project*. Identification of sequence variants in growth related genes in the South African abalone, *Haliotis midae*.

Ms Marissa Brink (Co-supervised with Prof. R. Roodt-Wilding)

M.Sc. candidate (2017-present): *Research Project* - Genetic diversity and disease studies in the sea urchin, *Tripneustes gratilla*.

B.Sc.Hons graduate (2016): *Research Project* – Population genetics of the sea urchin, *Tripneustes gratilla*.

Ms Michaela van Staden (Co-supervised with Dr A.E. Bester-van der Merwe)

M.Sc. candidate (2017-present): *Research Project* – Comparative genomics using a newly developed molecular marker panel for the Southern African endemic catshark genus, *Haploblepharus*.

Mr Matthew Greenwood

B.Sc.Hons candidate (2018): *Research Project* – Identification of sequence variants of heat shock proteins in black soldier flies.

Ms Christina Heywood

B.Sc.Hons candidate (2018): *Research Project* – Forensic identification of cultured abalone from confiscated specimens.





Former Students:

Ms Jamie C. Julies (Co-supervised with Prof. R. Roodt-Wilding)

B.Sc.Hons graduate (2018): *Research Project* – Parentage analysis and genetic diversity in the collector sea urchin.

Mr Gibbs Kuguru (Co-supervised with Dr A.E. van der Merwe)

M.Sc. graduate (2016): *Research Project* - Genetic diversity of smooth hammerhead sharks *Sphyrna zygaena*: Reconstructing pedigrees and testing for population connectivity along the South African coastline.

Ms Rozane Badenhorst

M.Sc.Agric. graduate (2016): *Research Project* - Genetic Diversity and Inbreeding in a commercial Black Soldier Fly (*Hermetia illucens*) population.

Mr Melt Hugo

B.Sc.Hons graduate (2016): *Research Project* - An evaluation of genetic polymorphisms in genes associated with wool colouration in SA Merino sheep.

Ms Ruth C. Dale-Kuys

M.Sc. *cum laude* graduate (2015): *Research Project* - Linkage disequilibrium in South African abalone, *Haliotis midae*.

B.Sc.Hons graduate (2013): *Research Project* - Association analysis of growth rate QTLs in the South African abalone, *Haliotis midae*: A candidate locus approach.

Ms Natasha Kitchin

M.Sc. *cum laude* graduate (2015): *Research Project* - Population genetics of the South African scallop, *Pecten sulcicostatus*.

Mr William Versfeld

M.Sc. graduate (2015): *Research Project* - Nile crocodile (*Crocodylus niloticus*) genetic diversity and population structure, within the Kunene and Kavango rivers of Northern Namibia.

Ms Clara van Amstel

B.Sc.Hons graduate (2014) – *Research Project*: Characterisation and parentage analysis of an F1 aquaculture cohort of kob (*Argyrosomus japonicus*).

Ms Hayley Mole

B.Sc.Hons graduate (2013) – *Research Project*: Cross-species marker characterisation in the South African abalone, *Haliotis midae*.

Selected Conference Contributions

- i. **Rhode C.**, Badenhorst R., Bester-van der Merwe A.E. Invited lecture: Genetic consequences of mass rearing Black Soldier Flies: Implications for sustainable breeding and production. Symposium: Edible Insects. March 2018, Indianapolis, Indiana, USA.





- ii. **Rhode C.** & Jenkins, SF. Oral presentation: Parentage analysis and genetic diversity in a commercial dusky kob *Argyrosomus japonicus* population. World Aquaculture Society Conference, June 2017, Cape Town, RSA.
- iii. **Rhode C.**, Bester- Van der Merve A. & Roodt-Wilding R. Oral presentation: Spatio-temporal population genetics of the South African abalone (*Haliotis midae*). South African Genetics Society Conference. September 2016, Durban, KwaZulu Natal, RSA.
- iv. **Rhode C.**, van Amstel C. & Mirimin L. Oral presentation: Preliminary assessment of parental contributions and genetic diversity in an F1 dusky kob cohort. Conference of the Aquaculture Association of Southern Africa. September 2015, Polokwane, Limpopo, RSA.
- v. **Rhode C.**, Dale-Kuys R, Vervalle J., Bester- Van der Merve A. & Roodt-Wilding R. Oral presentation: Genetic signatures of selection and association analysis of the domestication event in South African abalone, *Haliotis midae*. International Symposium on Genetics in Aquaculture XII. June 2015, Santiago de Compostela, Spain.
- vi. **Rhode C.**, Maduna S.N., Roodt-Wilding R. & Bester-van der Merwe A.E. Oral presentation: The genetic effects of mass selection in a commercial abalone population: A model for the genetic consequences of domestication events. South African Genetics Society Conference. September 2014, Pretoria, Gauteng, RSA.
- vii. **Rhode C.**, Bester-van der Merwe A.E., Roodt-Wilding R. Oral presentation: Population genetic analysis for the identification of loci associated to abalone domestication in South Africa. Conference of the Aquaculture Association of Southern Africa. September 2013, Stellenbosch, Western Cape, RSA.
- viii. **Rhode C.**, Bester-van der Merwe A.E., Roodt-Wilding R. Oral presentation: Molecular signatures of selection in the genome of the South African abalone, *Haliotis midae*. Congress of the South African Genetics Society. September 2012, Stellenbosch, Western Cape, RSA.
- ix. **Rhode C.**, Bester-van der Merwe A., Roodt-Wilding R. Oral presentation: From classical breeding to genomics: An integrative approach to abalone domestication in South Africa. Congress of the South African Society for Animal Science. July 2012, East London, Eastern Cape, RSA.
- x. **Rhode C.**, Bester-van der Merwe A., Roodt-Wilding R. Oral presentation: Population genetic analysis of cultured abalone (*Haliotis midae*) in South Africa: Considerations for sustainable genetic improvement. International Symposium on Genetics in Aquaculture. June 2012, Auburn, Alabama, USA.
- xi. **Rhode C.**, Bester-van der Merwe A.E., Roodt-Wilding R. Oral presentation (invited lecture): Genetic variability of the South African abalone: Implications for aquaculture and conservation. Critical Thinkers' Platform on Aquaculture and Emerging Technologies in South Africa hosted jointly by the Department of Agriculture Forestry and Fisheries (DAFF), Department of Science and Technology (DST) and the National Science and Technology Forum (NSTF). October 2011, Port Elizabeth, Eastern Cape, RSA.

Peer Reviewed Papers

- i. Brink M., Dale-Kuys R., **Rhode C.**, Macey B.M., Christison K.W., R Roodt-Wilding (2018) Genetic diversity and population connectivity of the sea urchin, *Tripneustes gratilla*, along the South African coast. African Journal of Marine Science *in press*.





- ii. Dale-Kuys R., Vervalle J., Roodt-Wilding R., **Rhode C.** (2017) Genetic association analysis of candidate loci under selection with size in the South African abalone. *Aquaculture International* 25: 1197-1214.
- iii. Difford G.F., Vlok A.C., **Rhode C.**, Brink D. (2017) Heritability of growth traits in South African abalone (*Haliotis midae* L.) using the 'internal reference' method. *Aquaculture* 468: 451-457.
- iv. Picone B., **Rhode C.**, Roodt-Wilding R. (2017) Identification and characterization of known miRNAs in South African abalone, *Haliotis midae*. *Marine Genomics* 31: 9-12.
- v. **Rhode C.**, Bester-van der Merwe A.E., Roodt-Wilding R. (2017) An assessment of spatio-temporal genetic variation in the South African abalone (*Haliotis midae*), using SNPs: Implications for Conservation management. *Conservation Genetics* 18: 17-31.
- vi. Vlok A.C., Difford G.F., **Rhode C.**, Brink D. (2016) An assessment of hatchery cohort growth rates of South African Abalone (*Haliotis midae*) across four commercial environments. *Journal of the World Aquaculture Society*, 47: 658-666.
- vii. Picone B., **Rhode C.**, Roodt-Wilding R. (2016) Evaluation of *de novo* assembly techniques in South African abalone, *Haliotis midae* transcriptome: a comparison from Illumina and 454 systems. *Genomics Data* 10: 165-166.
- viii. Mtileni B., Dzama K., Nephawe K.A., **Rhode C.** (2016) Estimates of effective population size and inbreeding in South African indigenous chicken populations: Implications for the conservation of unique genetic resources. *Tropical Animal Health and Production*, 48: 943-950.
- ix. Picone B., **Rhode C.**, Roodt-Wilding R. (2015) Domain repeats related to innate immunity in the South African abalone, *Haliotis midae*. *Marine Genomics*, 23: 41-43.
- x. Picone B., **Rhode C.**, Roodt-Wilding R. (2015) Transcriptome profiles of wild and cultured South African abalone, *Haliotis midae*. *Marine Genomics*, 20:3-6.
- xi. Biggs R., **Rhode C.**, Archibald S., Kunene L., Mutanga S., Nkuna N., Ocholla P., Phadima L. (2015) Strategies for managing complex social-ecological systems in the face of uncertainty: Examples from South Africa and beyond. *Ecology and Society*, 20: 52-66.
- xii. **Rhode C.**, Maduna S.N., Roodt-Wilding R., Bester-van der Merwe A.E. (2014) Comparison of population genetic estimates amongst wild, F1- and F2 cultured abalone (*Haliotis midae*). *Animal Genetics*, 45: 456-459.
- xiii. **Rhode C.**, Vervalle J., Bester-van der Merwe A.E., Roodt-Wilding R. (2013) Detection of molecular signatures of selection at microsatellite loci in the South African abalone (*Haliotis midae*) using a population genomic approach. *Marine Genomics*, 10: 27-36.
- xiv. Vervalle J., Hepple J., Jansen S., Du Plessis J., Wang P., **Rhode C.**, Roodt-Wilding R. (2013) Integrated linkage map of *Haliotis midae* Linnaeus based on microsatellites and SNPs. *Journal of Shellfish Research* 32: 89-103.
- xv. **Rhode C.**, Hepple J., Jansen S., Davis T., Vervalle J., Bester-van der Merwe A.E., Roodt-Wilding R. (2012) A population genetic analysis of abalone domestication events in South Africa: Implications for the management of the abalone resource. *Aquaculture*, 356-357: 235-242.
- xvi. Slabbert R., Hepple J., **Rhode C.**, Bester-Van der Merwe A.E., Roodt-Wilding R. (2012) Microsatellite marker development in the abalone *Haliotis midae* using pyrosequencing (454): Characterisation and *in silico* analyses. *Genetics and Molecular Research*, 11: 2769-2779.





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- xvii. **Rhode C.**, Roodt-Wilding R. 2011. Bioinformatic survey of *Haliotis midae* microsatellites reveals a non-random distribution of repeat motifs. *Biological Bulletin*, 221: 147-54.
- xviii. **Rhode C.**, Slabbert R., Roodt-Wilding R. 2008. Microsatellite flanking regions: A SNP mine in South African abalone (*Haliotis midae*). *Animal Genetics*, 39: 329.