

## SOPHIE VON DER HEYDEN

Associate Professor, Evolutionary Genomics Group, Department Botany and Zoology, Stellenbosch University  
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DOB: 01 October 1979

Marital Status: Married, three children

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### SUMMARY PROFILE

Prof von der Heyden holds a BSc. Hons (King's College London) in Aquatic Biology and D.Phil (University of Oxford) in Molecular Evolution and has been an active researcher in the marine biological sciences since 2001. She has worked and taught in the fields of marine ecology, molecular systematics, phylogeography, evolution and protozoology. Her interests are wide, but primarily focus on the conservation and sustainable utilisation of marine species and the marine environment. Prof von der Heyden is particularly interested in the applicability of molecular ecological and genomic tools to help inform marine spatial/biodiversity planning, understanding Marine Protected Area connectivity and patterns of genetic structuring and speciation in southern Africa. Much of her work focuses on resilience and adaptation of marine species to ongoing and future change and the impacts of changing marine communities on society. She has experience with commercially exploited species such as rock lobster, molluscs, gamefishes and southern African hake, as well as many non-model species. Using multi-species approaches, she has worked on rocky and sandy shores in a wide variety of marine ecosystems. Prof von der Heyden has an active interest in evidence-based decision-making and the integration of science into the formulation of policy and legislation and her work supports management decisions for several exploited species in South Africa. She has published over 60 peer-reviewed papers, a number of research reports and book chapters, a childrens marine book and serves on several working group committees, including as the elected chair of the SANCOR Steering committee and the SANBI genetic monitoring and biodiversity group. Her current h-factor is 26 and she holds a C1 rating from the National Research Foundation of South Africa. She has 13 years of experience in the management of a diverse and active research group and its finances. Prof von der Heyden has a strong collaborative network of colleagues both nationally and globally and is regularly invited to speak at international conferences and workshops. She also has extensive postgraduate supervision having supervised over 30 postgraduate students (Honours, MSc, PhD), hosted several postdoctoral research fellows and undergraduate teaching experience in fields including conservation genetics and conservation biology, marine ecology and global climate change.

### QUALIFICATIONS

- Oct. 2001 – Dec. 2004: **Doctorate of Philosophy (D.Phil.), University of Oxford, UK**  
Molecular and Evolutionary Biology, Department of Zoology and Brasenose College  
Thesis title: Testing ubiquitous dispersal and freshwater/marine divergence within free-living protist groups
- Sept. 1998 – July 2001: **B.Sc. (Hons.) King's College, London (University of London), UK & The University of New South Wales, Australia**  
Biological Sciences specialising in Aquatic Biology

### EMPLOYMENT HISTORY

- Sept. 2001 – Aug. 2004 **University of Oxford, UK:** Biological sciences tutor (several colleges) and undergrad course demonstrator (Vertebrate and Invertebrate Biology)
- Apr. 2005 – Oct. 2010 **University of Stellenbosch, South Africa:** Postdoctoral Research Fellow
- Nov. 2010 – Dec. 2011 **University of Stellenbosch, South Africa:** Lecturer (permanent)
- Jan. 2012 – Dec. 2015 **University of Stellenbosch:** Senior Lecturer (permanent)
- Jan 2016 - present **University of Stellenbosch:** Associate Professor (permanent)

**SCIENTIFIC ACHIEVEMENTS AND RECOGNITION**

- Chair of the Steering Committee of the South African Network for Coastal and Oceanographic Research (SANCOR)
- Elected as Future Young Leader 2016 by the Science and Technology in Society Forum, Japan
- Elected as a Young Affiliate to the World Academy of Sciences (TWAS Young Affiliate 2014-2018; one of only three women globally, 21 fellows in total in 2014)
- Nominated for the 2015 PEW Marine Fellowship Programme
- Recipient of a 2014 CV Raman Senior fellowship for African Researchers to conduct research in India
- Winner of a 2011 ANFASA (Academic and Non-fiction Authors' Association of South Africa) grant
- Invited speaker and participant to international conferences and workshops (listed since 2010) including 10<sup>th</sup> INTECOL conference (Brisbane, Australia), NESCENT meeting on evolution of Indo-Pacific (Durham, USA x3), IPSA meeting on the ecology and evolution of Atlantic reef fishes (Lisbon, Portugal), meeting on the evolution and biogeography of the Red Sea and Western Indian Ocean (King Abdullah University of Science and Technology, Saudi Arabia), meeting of the INDEEP genetic connectivity working group (Tallahassee, Florida)
- 2014 & 2015, University of Stellenbosch Rector's Award for excellent all-round performance
- Invited speaker to the Claude Leon Foundation/Royal Society of South Africa Annual Lecture
- Invited Technical Expert for Carte Blanche programme on DNA based fisheries fraud

**FUNDING AWARDED (SINCE 2014)****Selected grants awarded as a Co-Investigator**

- April 2014                      **SeaKeys: unlocking foundational biodiversity knowledge**  
In association with nine collaborating institutes in South Africa (coordinated by SANBI) (R2,000,000; molecular work on kingklip and crinoids was R150,000)
- June 2014                      **Western Indian Ocean Marine Sciences Association (WIOMSA) Marg I grant**  
(US\$5500; with MSc student Nikki Phair)
- April 2015                      **National Science Foundation, USA: DipNet collaborative grant for research in the Indo-Pacific** (US\$480,000; I am a member of the steering committee that collaborated on this grant and was responsible for organising a marine conservation planning workshop for African researchers in 2017.
- October 2017                      **Western Indian Ocean Marine Sciences Association (WIOMSA) MargII grant**  
(US\$6000; with PhD student Olivier Pasnin)

**Selected grants awarded as PI**

- January 2014                      **Foundational Biodiversity Information Small Grant** (R93,000)
- June 2014                      **Western Indian Ocean Marine Sciences Association (WIOMSA) Marg I grant**  
(US\$5500 with MSc student Nikki Phair)
- August 2014                      **National Research Foundation: Competitive Support for Rated Researchers**  
(R580,500; Historical and future perspectives of South African marine biodiversity)
- April 2015                      **University of Stellenbosch: Early Researchers Award** (R15,000)
- May 2016                      **UK-SA Mobility Grant for conference attendance** (R30,000)
- August 2016                      **Foundational Biodiversity Information Small Grant** (R200,000) + Follow up grant for 2014 FBI Small grant (R79,000)
- August 2016                      **National Research Foundation: Competitive Support for Rated Researchers**  
(R1.8 million; MarDNA – characterising marine biodiversity using eDNA)
- August 2017                      **Newton Fund Mobility Grant: two year programme** (GBP12,000; with Prof Simon Creer at Bangor University, UK)

- August 2018                    **Foundational Biodiversity Information Project Small Grant (R200,000)**
- November 2018                **NRF Marine and Coastal Research Programme**  
(R3.98 million; Project SeaStore: functional diversity, climate change impacts and resilience of *Zostera capensis*)
- January 2019                   **National Geographic – Okavango Wilderness Project (R170,000)**

## PUBLICATIONS & PRESENTATIONS

### Books, book chapters and Reports

- **von der Heyden S.** Southern African shores – a young explorers guide. Struik Nature, 88pgs. (2012)
- Balkenhol N, Dudaniec RY, Krutovsky KV, Johnson JS, Cairns DM, Segelbacher G, Selkoe KA, **von der Heyden S**, Wang IJ, Selmoni O, Joost S. (2017) Landscape Genomics: Understanding relationships between environmental heterogeneity and genomic characteristics of populations. In *Population Genomics*, Springer
- Co-author of 2011 National Biodiversity Assessment: Marine component. Technical Report. Sole author of chapter on “Status and current knowledge of genetic approaches for South African marine systems”
- Co-author of 2018/19 National Biodiversity Assessment: Genetics chapter, submitted.

### Peer-reviewed ISI accredited publications

**(selected 2014 onwards only: refer to <http://www.vonderheydenlab.com/publications.html> for the complete list)**

- Beger M, Selkoe KA, **von der Heyden S**, et al. (2014) Evolving coral reef conservation with genetic information. *Bulletin of Marine Science*, **90**: 159-185.
- **von der Heyden**, Toonen R, van Herwerden L et al. (2014) Integration of genetic data into marine conservation and management in the Indo-Pacific: a review and case studies. *Bulletin of Marine Science*, **90**: 123-158.
- Bowen BW, Shanker K, Yasuda N, Malay MCD, **von der Heyden S**, et al. (2014) Phylogeography Unplugged: comparative surveys in the genomic era. *Bulletin of Marine Science*, **90**: 13-46
- Toms JA, Compton JC, Smale M, **von der Heyden S**. (2014) Variation in paleo-shorelines explains contemporary population genetic patterns of rocky shore species. *Biology Letters*, **10**: 20140330
- Rius M, Clusella-Trullas S, McQuaid CD, Navarro R, Griffiths CL, Matthee CA, **von der Heyden S**, Turon X. (2014) Range expansions across eco-regions: interactions of climate change, physiology and genetic diversity. *Global Ecology and Biogeography*, **23**: 76-88.
- Mkare T, **von der Heyden S**, Groenevel JC, Matthee CA. (2014) Genetic population structure and recruitment patterns of three sympatric shallow-water penaeid prawns in Ungwana Bay, Kenya, with implications for fisheries management. (2014) *Marine Freshwater Research*, **65**: 255-266.
- Froeschke G, **von der Heyden S**. (2014) A review of molecular approaches for investigating patterns of co-evolution in marine host-parasite relationships. *Advances in Parasitology*, **84**: 209-252
- Wright D, Bishop JC, Matthee CA, **von der Heyden S**. (2015) Genetic isolation by distance reveals restricted dispersal across a range of life-histories: implications for biodiversity planning across a highly variable marine environment. *Diversity and Distributions*, **21**: 698-710
- Phair N, Barendse J, Smith K, **von der Heyden S**. (2015) Molecular analyses confirm genetically distinct populations of two indigenous estuarine fish species in an isolated coastal lake: implications for the management of introduced ichthyofauna. *Conservation Genetics*, **16**: 801-809.
- **von der Heyden S**, Toms JA, Teske PR, Lamberth SJ, Holleman W. (2015) Contrasting signals of genetic diversity and historical demography between two recently diverged marine and estuarine fish species. *Marine Ecology Progress Series*, **526**: 157-167
- Baco AR, Etter RJ, Ribeiro PA, **von der Heyden S**, Beerli P, Kinlan BP. (2016) A synthesis of genetic connectivity in deep-sea fauna and implications for marine reserve design. *Molecular Ecology*, **25**: 3276-3298
- Swart BL, **von der Heyden S**, Bester-van der Merwe AE, Roodt-Wilding R. (2015) Molecular systematics and biogeography of the circumglobally distributed genus *Seriola* (Pisces: Carangidae). *Molecular Phylogenetics and Evolution*, **93**: 274 - 280
- Andreotti S, Rutzen M, van der Walt S, **von der Heyden S**, Henriques R, Meyer M, Oosthuizen H, Matthee CA. (2016) An integrated mark-recapture and genetic approach to estimate the population size of white shark in South Africa. *Marine Ecology Progress Series*, **552**: 241-253
- Henriques R, **von der Heyden S**, Matthee CA. (2016) When homoplasy mimics hybridization: a case study of Cape hakes (*Merluccius paradoxus* and *M. capensis*). *PeerJ* **4**: e1827
- Selkoe KA, D’Aloia CC, Crandall ED, Iacchei M, Liggins L, Puritz JB, **von der Heyden S**, Toonen RJ. (2016) A decade of seascape genetics: contributions to basic and applied marine connectivity. *Marine Ecology Progress Series*, **554**: 1-19 (selected as FEATURE ARTICLE)

- Henriques R, **von der Heyden S**, Lipinski MR, du Toit N, Kainge P, Bloomer P, Matthee CA. (2016) Peering into the deep: spatio-temporal genetic structure and the effects of long-term fishing in two partially sympatric offshore demersal fishes. *Molecular Ecology*, **25**: 5843-5861
- **von der Heyden S**, Lukey P, Celliers L, Prochazka K, Lombard AT. (2016) Science to policy - reflections on South African reality. *South African Journal of Science*, **2016**: 112, #0183
- Nielsen E, Beger M, Selkoe KA, **von der Heyden S**. (2017) Multi-species genetic objectives in spatial conservation planning. *Conservation Biology*, **31**: 872-882
- **von der Heyden S**. (2017) Making evolutionary history count: biodiversity planning for coral reef fishes and the conservation of evolutionary processes. *Coral Reefs*, **36**: 183-194
- Henriques R, Nielsen E, Durholtz D, Japp D, **von der Heyden S**. (2017) Genetic population sub-structuring of kingklip (*Genypterus capensis* - Ophidiidae), a commercially exploited demersal fish, off South Africa. *Fisheries Research* **187**: 86-95
- Nielsen ES, Henriques R, Toonen RJ, Knapp I, Guo B, **von der Heyden S**. (2018) Complex signatures of genomic variation of two non-model marine species in a homogeneous environment. *BMC Genomics*, **19**: 347
- Rao Golla T, Sandoval-Castillo J, Emami-Khoyi A, van der Lingen CD, **von der Heyden S**, Chiazzari B, Jansen van Vuuren B, Beheregaray LB, Teske PR. (2018) Mitochondrial DNA is unsuitable to test for isolation by distance. *Scientific Reports*, **8**: 8448
- Mertens LEA, Treml EA, **von der Heyden S**. (2018) Genetic and biophysical models help define marine conservation focus areas. *Frontiers Marine Science: Marine Conservation and Sustainability*, **5**: 26
- Diedericks G, Henriques R, **von der Heyden S**, Weyl O, Hui C. (2018) The ghost of introduction past: Spatial and temporal variability in the genetic diversity of invasive smallmouth bass. *Evolutionary Applications*, **11**: 1609-1629
- Diedericks G, Henriques R, von der Heyden S, Weyl O, Hui C. (2018) Sleeping with the enemy: introgressive hybridisation in two invasive centrarchids. *Journal of Fish Biology*, **93**: 405-410
- Mbongwa N, Hui C, Pulfrich A, **von der Heyden S**. (2019) Every beach an island - deep population divergence and possible loss of genetic diversity in an enigmatic sandy shore isopod. *Marine Ecology Progress Series*, **in press**
- Teske PR, Sandoval-Castillo J, Rao Golla T, Emami-Khoyi A, Tine M, **von der Heyden S**, Beheregaray LB. (2019) Thermal selection as a driver of marine ecological speciation. *Proceedings of the Royal Society B*, **286**: 20182023
- Phair NL, Toonen RJ, Knapp I, **von der Heyden S**. (2019) Shared genomic outliers across two divergent population clusters of a highly threatened seagrass. *PeerJ*, **in press**

#### **Selected Conference Presentations (oral presentations only since 2011)**

- **von der Heyden S**. Applying molecular approaches to real-life conservation issues in Africa. Society for Molecular Biology and Evolution Regional Conference, Zomba, Malawi. (September 2019; keynote speaker)
- **von der Heyden S**. How ready are we for integrating genetics into marine conservation and management? - reflections on progress and an exciting future. The Conservation Symposium, KZN, South Africa. (November 2018)
- **von der Heyden S**. Genes and conservation: molecular approaches for sustaining marine biodiversity and ecosystems. Gordon Research Conference in Marine Molecular Ecology, Hong Kong (July 2017; invited speaker)
- **von der Heyden S**. Genes and boundaries: taxonomic bias and the shifting balance of marine spatial planning. Fisheries Society of the British Isles, Bangor, UK (July 216)
- **von der Heyden S**. (2014) Molecules, marine life and management: making evolutionary history count. The World Academy of Sciences, Muscat, Oman (October 2014; invited speaker)
- **von der Heyden S**. (2014) Connectivity of South African marine species is lower than expected: insights from molecular tools and implications for biodiversity planning in the region. Southern African Marine Sciences Symposium, Stellenbosch, South Africa (July 2014)
- **von der Heyden S**. (2011) How many species of southern African fishes? World Conference of Marine Biodiversity, Aberdeen, Scotland (September 2011)

#### **CAPACITY AS REVIEWER**

**Associate Editor:** Frontiers for Young Minds, Frontiers Marine Conservation and Sustainability, Frontiers Marine Evolutionary Biology, Biogeography and Species diversity

**Associate Editor:** Estuarine, Coastal and Shelf Science

**Reviewer for >30 ISI-accredited journals, incl.** Nature Ecology & Evolution, Trends in Ecology & Evolution, Molecular Ecology, Molecular Ecology Resources, Coral Reefs, Marine Biology, Molecular Phylogenetics and Evolution, Biological Journal of the Linnean Society, Fisheries Research, PlosOne, Journal of Biogeography

#### **Other review panels**

- NRF panels (SARChi, Rated Researchers, African Coelacanth Ecosystem Programme); MSc/PhD examiner (Rhodes University, University of Pretoria, University of Cape Town); Grant proposals: NRF, National Science Foundation, National Geographic Society, Graduate Women in Science Program, European Society for Evolutionary Biology 'Diversity in Evolution' panel

### OUTREACH AND CONFERENCE ORGANISING

- Numerous radio and TV coverage for World Oceans Day (2017), Operation Phakisa (2016) and others
- Numerous written pieces for the general public, including The Conversation
- Chair of South African Network for Coastal and Oceanographic Research (SANCOR) – 2016 onwards and organiser of the annual SANCOR Forum
- Chair of organising committee for 2014 Southern African Marine Sciences Symposium (500 delegates)
- Member of scientific committees for the 2008 and 2014 Southern African Marine Sciences Symposium
- Mentoring of high school students for school projects and work experience in the molecular ecology laboratory
- Alien invasive removal with Honours students
- Primary and high school marine education through school and beach visits, particularly focussing on previously disadvantaged communities