

## Stellenbosch University computer scientist wins African award for HIV research

Prof Konrad Scheffler, a Stellenbosch University (SU) computer scientist who uses his expertise in bioinformatics to analyse the evolution of HIV, is one of three researchers who have been honoured with the annual TWAS-AAS-Microsoft Award for Young Computer Scientists working in Africa.



Prof Scheffler of the SU Department of Mathematical Sciences: Division Computer Science is the only researcher from sub-Saharan Africa to be honoured this year. He received the award at the 5th TWAS-ROSSA Young Scientists' Conference in Kenya, along with two academics from Egypt and Algeria.

Microsoft Research, in partnership with TWAS, the academy of sciences for the developing world and AA the African Academy of Sciences that focuses on the development of scientific and technological capacity for science-led development in Africa, established the TWAS-AAS-Microsoft Award for Young Scientists over the three year period 2009-2011. It recognises young scientists living and working in Africa whose research in computer science has had, or could have, a positive impact in the developing world.

### A published authority on viral evolution

The work that the 37-year-old Prof Scheffler does on viral evolution is providing valuable input into research aimed at countering HIV, among other viruses. He has already published extensively in relevant scientific papers and has written book chapters on the subject.

He applies computational techniques and probabilistic modelling to gain insight into the selective forces that drive the evolution of HIV as it adapts to changes in its environment, for instance in reaction to drugs aimed at suppressing the virus, or to the different immune systems of its hosts.

"It is critical for medical researchers who are developing vaccines or other treatments to suppress the epidemic, to be able to predict and understand how the virus might possibly react to different scenarios," explains Prof Scheffler, an electronic engineer by training who now combines fundamental research in computer science and biology.

For the past few years, Prof Scheffler has been involved in quite a few influential developments in the field. A 2006 paper on improved methodology for evolutionary inference, of which he was the first author, was described as providing "a solution to one of the most important problems in evolutionary bioinformatics",

according to a review by *Faculty of 1000 Biology*, which selected the study as its monthly "Hidden Jewel"

## **A practical solution**

In this study Prof Scheffler was able to devise a practical solution to the serious problem inherent to existing techniques for detecting positive selection, which made them unreliable when applied to recombining sequences such as (typically) HIV. His new method was able to correct successfully a problem which was first identified in 2003 and which invalidated many of the selection studies that had been performed on HIV and other data sets.

Amongst his collaborators are academics from the University of California, San Diego, the University of Swansea, Wales, the National University of Ireland, Galway, and Cambridge University, UK.

"The computational tools we develop are freely available, both as downloadable software and on a dedicated webserver called [www.datamonkey.org](http://www.datamonkey.org), and are widely used by researchers in biology and medicine," he explains the practical impact of his work.

## **The 'Scheffler model' has become a standard reference point**

Before Prof Scheffler switched to bioinformatics and evolutionary modelling, his research focussed on areas of speech recognition and speech technology. "The sequential nature of speech means that the mathematical descriptions we use are very similar to those of DNA sequences," he explains. The so-called "Scheffler model" of dialogue system users, which is based on his PhD work, has become a standard reference point in an application area which is also of much current interest for Africa, with its large number of languages for which technological resources do not exist.

"Low-cost methods for development of resources such as dialogue systems in African languages is an emerging African research focus which is likely to have a positive impact on the continent," he believes.

## **TWAS**

TWAS, the academy of sciences for the developing world - [www.twas.org](http://www.twas.org) - is an autonomous international organisation founded in Trieste, Italy in 1983. It aims to represent the best of science in the developing world and its principal aim is to promote scientific capacity and excellence for sustainable development in the South. The administration and financial operation of TWAS is undertaken by UNESCO in accordance with an agreement signed by the two organisations.

The African Academy of Sciences (AAS) - [www.aasciences.org](http://www.aasciences.org) - is an honorific society that aims facilitate the development of scientific and technological capacity for science-led development in Africa.

Founded in 1991, Microsoft Research is dedicated to conducting both basic and applied research in computer science and software engineering. Its goals are to enhance the user experience on computing devices, reduce the cost of writing and maintaining software, and invent novel computing technologies.

## **TWAS-AAS-Microsoft Award for Young Scientists**

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