The Improper Scientist

Official Magazine of the African Society for Bioinformatics and Computational Biology

Issue #5 December 2018

Dear Readers

As the year draws to an end it feels as if the pace increases with demands on everyone to wrap up their academic and research commitments for 2018. We welcome Ryman Shoko to the editorial team and welcome his perspective from Zimbabwe bioinformatics initiatives. The editorial team is happy to include updates of bioinformatics training initiatives in Zimbabwe and Tunisia, the launch of the Lagos Biosecurity and Biobank Initiative, and a Women in Data Science interview with Ms Ines Touiri, system administrator at the Institute Pasteur de Tunis.

Hopefully the holiday season rush has not distracted you from a key scientific event that took place in Sweden, namely the Nobel Prize ceremony. If you are anything like me, then you would have waited for the announcement in October 2018 (as I do each year) of who was named the 2018 Nobel Prize recipients. Nervertheless, in the months leading up to the much anticipated Nobel awaredees Anouncement, I enjoyed an article featuring Dame Jocelyn Bell Burnell who many felt was overlooked for her "dramatic discovery of pulsars in the 1970s". She recently won the Breakthrough Science Prize. The Guardian had an editorial on "Diversity in Science" on 6 September 2018 in response to Dame Jocelyn Bell Burnell's Breakthrough Science Prize. The headline read "...commitment to inclusivity is not at odds with excellence – its about ensuring it". As a scientific community we must hold this view as we recapture Africa's scientific excellence leveraging our diversity of thinking, approaches, and expertise.

Seasons greetings to our readers and I trust you will enjoy the December break with family and friends as a time to recharge for what will most definitely be a busy 2019.

Alan Christoffels (Editor)
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Save The Date!

- Practical Aspects of Drug Discovery: At the Interface of Biology, Chemistry and Pharmacology, Cape Town, South Africa, 07 - 12 April 2019, Application and bursary deadline 18 Dec 2018 (at 23:59 UTC), Wellcome Centre for Anti-Infectives Research (WCAIR), Drug Discovery and Development Centre (H3D), UCT. Funding is available

- 4th Annual International Remote Conference: Science and Society, Remote Conference February 9-10th 2019, Application Deadline - November 30th 2018, Beyond Science Initiatives, Harvard Uni. Infectious Disease Consortium, University of Toronto, Trinity College. Conference is free

- Working with Pathogen Genomes, Wellcome Genome Campus, UK, 24 - 29 March 2019, Application and bursary deadline 03 Dec, Wellcome Genome Campus, UK. Funding is available

- Malaria Experimental Genetics, Wellcome Genome Campus, UK, 12 - 18 May 2019, Application and bursary deadline 21 February 2019, Wellcome Genome Campus, UK. Funding is available

Bioinformatics Capacity

ENSEMBL Bioinformatics Workshop
8th to 10th October 2018 at the Kwame Nkrumah University of Science and Technology (KNUST), Ghana

The Ensembl Bioinformatics workshop was held from 8 to 10 October 2018 at the Kwame Nkrumah University of Science and Technology (KNUST) in Ghana. Three (3) courses were organized each day (Browser workshop; REST API course, and teach the trainer (TtT) course) and facilitated by Dr. Ben Moore (Ensembl Outreach Officer). The 3 day event was organized by Dr. Salifu Pandam, PI for H3aBionet, KNUST node, and forms part of the Ensembl commitment to support Bioinformatics training, particularly, in low to middle income countries. The program which was the first its kind in a Ghanaian academic or research institution centre and was hugely attended by students and faculty in addition to other researchers from nearby African countries such as Nigeria. All training materials are freely available on the Ensembl website in addition to resources from other programs held within the year (http://training.ensembl.org/events/2018/2018-10-08-KNUST)

“Week of Bioinformatics”
Kwame Nkrumah University of Science and Technology (KNUST), Ghana

The week of bioinformatics was held at the Kwame Nkrumah University of Science and Technology (KNUST), Ghana, between 15th and 19th October, 2018. With funding from the Newton Fund, DARA Big Data and Biochemistry and Biotechnology, KNUST, the 5 day event was handled by Prof. David L. Tabb, a professor of bioinformatics currently doing research at Stellenbosch University, South Africa. About 75 students and faculty from KNUST and other universities in Ghana were trained in various themes in bioinformatics. The topics covered but not limited to, were: genome sequencing, variant characterization, and GWAS; genome assembly and sequence annotation; gene expression and differentiation: microarrays and RNA-Sequencing; proteomic identification and quantitation, protein structure; and biological pathways and networks. “The program was timely since it to addressed the bioinformatics capacity gap in Ghana and other developing countries”- says Dr. Alexander Kwarteng, one of the founders of this program and a lecturer at the Biochemistry Department, KNUST.

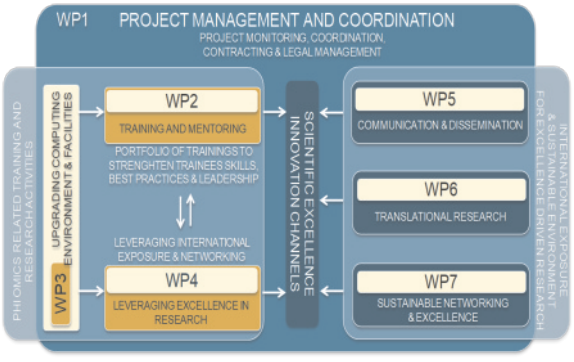
PHIND ACCESS - A centre of excellence in the field of analysis and exploitation of omics data

During the next three years (2018-2021), the Institut Pasteur de Tunis (IPT) will coordinate a European Twinning project called PHINDaccess. It consists of a twinning initiative aimed to serve as a lever for omics research performance of IPT in the field of host-pathogen interaction. Towards this end, IPT has established a partnership with 4 world class european institutions at the forefront of infectious disease research: Institut de Pasteur (France), the Center for Genomic Regulation (CRG), the Max Planck Institute for Molecular Genetics (MPG), and the Robert Koch Institute (RKI).

PHIND ACCESS face-to-face meeting in Tunis

Various strategic and measurabele actions will be set up through 7 work packages to create a thriving and sustainable omics research environment at IPT. We will develop better control and surveillance tools against infectious diseases prevailing in the Mediterranean basin (leishmaniasis, tuberculosis and diseases caused by re-emerging viruses.

On the 7th November 2018, The IPT team held its first face-to-face meeting with its scientific partners and Advisory board in Tunis, Tunisia. Each work package outlined their plans for the next three years including the contributions from their international partners. This period was used to review deliverables and set targets for the future.



Bioinformatics in Zimbabwe

Like some countries in Africa, Zimbabwe is slowly beginning to embrace bioinformatics/computational biology. Some progress is highlighted about the developments in the country: In February 2015 the Government of Zimbabwe officially commissioned a supercomputer (high performance computer) which is housed at the University of Zimbabwe (http://www.zchpc.ac.zw/). The cluster has a theoretical computing capacity of up to 36 Tflops. Zimbabwe became the third African country to host a supercomputer, and in terms of raw computing performance it is the second most powerful in the continent.

In August 2016 the National Biotechnology Association of Zimbabwe, Chinhoyi University of Technology, Harare Institute of Technology and the University of Mauritius, organized the 1st Zimbabwe Bioinformatics Symposium. The symposium, was held at the Harare Institute of Technology campus and was attended by academics and students from the country's universities, research institutes as well as some regional and international scientists.

Dr Justin Manasa explains the operation
of the sequencing machine to the trainees

In August 2016, the Zimbabwe High Performance Computing Centre hosted a 14 day training course on computational chemistry/biology and computer aided drug discovery training. The training was facilitated by local scientists, Dr Raban Masuka and Dr Gadzikano Munyuki. The training course was attended by 28 participants from the countries different universities plus some local and international research institutions. The training focused on use of software for drug discovery such as Xmgrace, Shrodinger Suit-Maestro, Pymol and Chimera. Starting in September 2017, the African Institute of Biomedical Science and Technology) hosted the first Zimbabwean bioinformatics node as part of the Human Heredity and Health for Africa (H3Africa) Bioinformatics Network.

In May 2018 Chinhoyi University of Technology and the African Institute of Biomedical Sciences and Technology signed a memorandum of understanding which would ensure that the two institutions share resourses so Chinhoyi University can offer an MSc in Genomics and Precision Medicine among other areas of specialisation. The MSc will be offered in 2019 and will be the first bioinformatics-related postgraduate coursework degree offered in Zimbabwe.

On 17 - 26 September 2018, the National Biotechnology Authority of Zimbabwe hosted a workshop on DNA barcoding of alien species. This was a Bio-Bridge Initiative project. The Bioinformatics components of the workshop was facilitated by local scientists (Dr Ryman Shoko and Dr Justen Manasa).

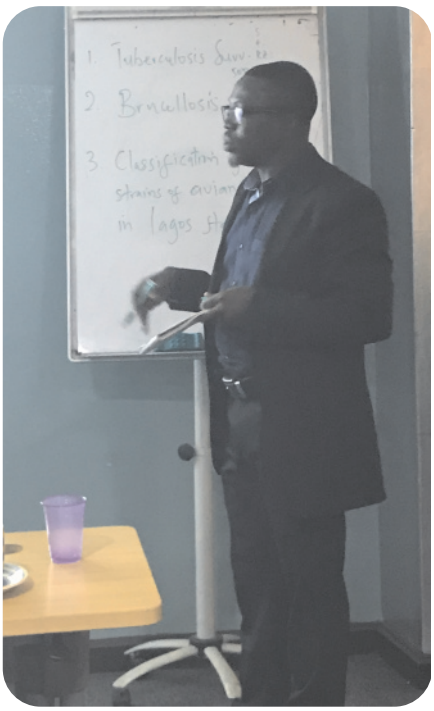
These highlighted events are an indication of the little steps taken by the country in ensuring that we get into the mainstream bioinformatics community in Africa. Plans are in place to launch the Zimbabwean Society for Bioinformatics and Computational Biology. Currently, the bioinformatics activities are coordinated by the Bioinformatics Consortium of Zimbabwe which comprises Bioinformatics experts from Chinhoyi University of Technology, the National Biotechnology Authority of Zimbabwe and the National Biotechnology Association of Zimbabwe.

A more detailed picture of the Zimbabwean bioinformatics situation is available from 29 November 2018 in Shoko et al. (2018). Reference: Shoko R, Manasa J, Maphosa M, Mbanga J, Mudziwapasi R, Nembaware V, et al. (2018) Strategies and opportunities for promoting bioinformatics in Zimbabwe.
PLoS Comput Biol 14 (11): e1006480.
https://doi.org/10.1371/journal.pcbi.1006480

Biobanking and BioSecurity

Lagos Biobank Capacity Development

On 30 October 2018, the Governor-General of Canada, Astronaut Julie Payette, inaugurated a 4.5 million dollars Lagos State Biocontainment laboratory and Biobank for the management of disease outbreak, and the research and development of vaccines at the Mainland Hospital in Yaba, Lagos. The project represented a partnership of the governments of Lagos State and the Global Partnership Program of Canada to design and build a new biological containment laboratory and secure storage facility.



The long-term objective of this project is to equip Lagos State with the capacity to respond to a surge in medical cases caused by an infectious disease outbreak scenario and be in a position to mount effective medical countermeasures and minimize risks of biological threats.

As part of strengthening the human resource capital at the Lagos State Biobank, a biobank and LIMS training team (Drs Dominique Anderson and Carmen Swanepoel, and Prof Alan Christoffels) spent 3 days with the Lagos Biosecurity Biobank team. LIMS hands-on training was provided for 2 days by Dr Anderson, as well as an evaluation of the biobank capabilities of the Lagos Biobank as a benchmark for future improvements by Dr Swanepoel.

The Lagos State biobank will be mentored by the Cape Town Biobank managed by Dr Carmen Swanepoel and will adopt the information management system built by SANBI - UWC and Stellenbosch Department of Pathology.

The mission of the Lagos State Biobank is to extend their capacity development to include bioinformatics training in 2019.

Civic Engagement and stakeholders meeting on Lagos State biosecurity Initiative

On the 14th December 2018 the Lagos State Government Ministry of Health hosted the "Civic Society Engagement and stakeholders meeting on the Lagos State biosecurity initiative". The event was opened by the Honourable Commission of Health Dr Jide Idris. This event relayed an account of achievements of the last 6 years of planning by Dr Jide Idris in his capacity as the Lagos State Ministry of Health senior executive in collaboration with Prof Akin Abayomi the Principal investigator of the Global Emerging Pathogens Treatment Consortium (GET).

Prof Abayomi introducing the Lagos Biobank and Biosecurity Initiative

GET was set up as an African Indigenous think tank and advocacy agency in the biosecurity space to ensure increased preparedness and response capabilities of African states against biosecurity threats. This initiative was accelerated by the catastrophic West African Ebola outbreak in 2014 and the urgency amplified by a series of ongoing biosecurity threats in Nigeria and surrounding countries. Lagos State is particularly vulnerable by virtue of its size (23 million) inhabitants and density as well as its numerous air land and sea ports. It also serves as the gateway into Nigeria and the rest of the sub region. This civil society engagement is part of an ongoing initiative to achieve public learning and understanding of science and biosecurity issues in Lagos and Nigeria as a whole.

It aims to achieve the following understanding in community:

1. improved awareness of the dangers of deforestation and environmental perturbation
2. risk factors driving the increasing trends in emerging infectious diseases
3. link between human, animal, agriculture and environment in the One Health systems integrity initiative
4. the emerging medical and agricultural biotechnology trends and associated risk factors and the principle of dual use
5. assessing and understanding the probability and risk of intentional misuse of biological agents and toxins
6. the components of the age of digital technology and artificial intelligence.
7. what the Lagos State Government is putting in place in terms of governance through the Ministry of Health who are leading this initiative.
8. the role of the community in achieving objectives of securing an intact biosecurity system
9. the role of government in ensuring sustainability of programs and systems.
10. howto gain the trust and partnership of the community in building a secure future for the next generation.

The attendees represent a cross section of members of the Lagos Community and stake holder agencies.

Front left: The community leader of the host community, Dr Akin Osibogun, Prof Ayo Oduola, Dr Olufemi Onanuga, Dr Jide idris (Lagos Health Commissioner), Prof Akin Abayomi, Prof Oyewale Tomiri, Prof Alan Christoffels, Dr Sunday Omilabu, Anthony (Ncdc) and Dr Mutiu Bamidele

The Lagos Biobank team

Women in Data Science

Ines Touiri - Institut Pasteur, Tunis

1. What are your research interests?

I joined H3ABioNet and the Institut Pasteur in 2015 as a system administrator. I don't really do research, but if I may say so, I'm rather trying to facilitate research by taking care of the IT research infrastructure and also by supporting and helping PhD Students using it

2. Describe your current job.

As the IT Girl and the Sysadmin I obviously do Linux system administration of both user's workstations and servers of a bio-bioinformatics research infrastructure. I manage users, install and update things and make sure that all the needed software products are running properly.

A daily task that I appreciate so much is troubleshooting, I have to keep data analyses running as best as I can, PhD Students have [always] deadlines, so I try to spare them errors, whether I know the issue or I don't know it I have to fix it so the user can continue his pipeline. Sometimes I feel a great responsibility [as] sometimes it's stressful but my greatest joy is when everything ends up working on my server.

I represent the Tunisian H3ABioNet node in all infrastructure projects and work packages so I make sure that all services monitored by the central node are up and running at the IPT node, and [I] sometimes help nodes that have issues. Sometimes I have to deal with the IT department of the institute in everything concerning firewall and security, such as opening a port or allowing access to the Institute's network so I have to convince them of the necessity of the thing.

3. What was your career path?
My first professional experience was an internship that I completed in my first year of licence degree in the Computer Centre of the Ministry of Public Health during which I learned about the configuration of network equipment. I did another internship in my second year during which I simulated a network with high availability solutions, load balancing, backup solution, etc. I also did an end-of-study project internship within a service provider. After obtaining my licence in 2015, I joined Institut Pasteur as a system administrator and also enrolled in evening classes to obtain an engineering degree and now i'm on my last year of engineering studies.

4. How big is the gender bias in your institution/country and what opportunities are there to promote women.
In Tunisia, gender bias causes men to be much more recruited than women, at least in the IT field [and] because I belong to that field and I have a clear idea about this. In my opinion, we must encourage even more the recruitment of women in the IT field, believe in her extraordinary ability to be multitasking. The IT girl can be efficient behind her computer, but she can also be efficient when she enters a server room to check cables and she won't come out until she puts everything back in order.

5. Can you get names of a few women computational scientists/Bioinformatics people at your institutions?
I know Alia Benkahla, Fatma Guerfali, Amel Ghouila, Emna Harigua, Meriam Hanachi and Maroua Boujemaa. There are certainly many other names that I can't remember.

Hot Off The Press!!

I contain not just bacteria but viruses – South African skin phages identified

A chunk of human microbiome projects have focused on investigating the bacteria populations (taxa) and their functional profile at the expense of the multitudes of viruses, and fungal species that play important roles in the human microbiome. In the seminal paper by UWC-based researchers in collaboration with French scientists at the L'Oréal Research and Innovation, ~130 new phages-viruses that attack bacteria- were identified exclusively among South African populations. More interestingly, the study demonstrated that phages identified on one body part or any particularly individual were not much different from the ones on other body parts or other individuals. Hopefully, this dataset adds up to the growing database of microbial populations living on and/or in human body parts of clinical importance- particularly addressing the dearth of microbiome information of African populations.

The full paper can be accessed here: https://www.nature.com/articles/s41598-018-30705-1

Fighting breast cancer in Africa using genomics

While breast cancer rates are escalating in sub-Saharan countries, last October was an exciting time for several cancer researchers in Africa and other scientists interested in leveraging the genomics of breast cancer patients of African ancestry for better/targeted treatment and diagnostics. Indeed, Olopade and colleagues in Nigeria and the University of Chicago have opened up the floodgates of cancer genomics in Africa by carrying out- to date-one of the largest studies among ~200 Nigerian breast cancer patients to identify molecular markers of the disease. This dataset was compared to over 1000 datasets from The Cancer Genome Atlas (TCGA) of women with different ancestries-US, African-American and European. Nigerian breast cancer patients were much younger, on the average, and had more advanced disease at diagnosis and higher mortality rates than women from the TCGA group. Homologous recombination deficiency (HRD) events were more pronounced in addition to mutations of the tumor-suppressor gene TP53, GATA3, and the human epidermal growth factor receptor 2 (HER2). In addition, 3 novel genes were identified and associated with breast cancer thus- PLK2, KDM6A, and B2M.

Read the full length article here: https://www.nature.com/articles/s41467-018-06616-0

Longitudinal analysis of viral amplicons just got simpler with FLEA (Full-Length Envelope Analyzer)

Long read sequencing and analysis offers enormous advantage for viral genomics by facilitating our understanding of viral population dynamics and host-pathogen interaction, particularly in HIV research. However, the development of these technologies has outpaced the computational tools and methods required for analysing long read NGS data thus warranting the need for novel tools to accomplish such task. Researchers at the University of Cape Town, South Africa (Prof. Robert Ketteringham and Prof. Morné Valentyn) together with their collaborators in Sweden and America have developed FLEA (The Full-Length Envelope Analyzer). It is an open source and freely available tool for carrying out end-to-end analysis and visualization of long-read sequencing data. FLEA which could be run optionally on a high-performance cluster, exits both as a pipeline and a client-side web application that provides interactive results ready for publication.

The original publication describing this method with Pacific Biosciences HIV env data can be found in PLOS Computational Biology (https://doi.org/10.1371/journal.pcbi.1006498).
A public instance of FLEA is hosted at http://flea.datamonkey.org. The Python source code for the FLEA pipeline can be found at https://github.com/veg/flea-pipeline. The client-side application is available at https://github.com/veg/flea-web-app. A live demo of the P018 results can be found at http://flea.murrell.group/view/P018.

Applications of machine learning algorithms for antimalarial drug discovery

Given the high prevalence of malaria in many African countries and the concomitant mortality rates, particularly among vulnerable groups such as pregnant women and children under 5 years, there is the need for innovative approaches for treatment and prevention. Machine learning, a branch of artificial intelligence, has gained so much popularity in health and biomedical research in recent years. Its numerous applications are not limited to efficient drug design and drug discovery. Researchers at the South African National Bioinformatics Institute (SANBI), University of Western Cape, South Africa, have successfully trained and evaluated four antiplasmodial activity classification models based on a combination of molecular descriptors and molecular fingerprints of natural products with antiplasmodial activity (NAA). In all, 4 model classifiers (Naïve Bayesian, Voted Perceptron, Random Forest and Sequence Minimization Optimization of Support Vector Machines) were applied to the NAA datasets but Random Forest (accuracy 82.81%, Kappa statistics 0.65 and Area under Receiver Operating Characteristics curve 0.91) and Sequential Minimization Optimization (accuracy 85.93%, Kappa statistics 0.72 and Area under Receiver Operating Characteristics curve 0.86) showed the best predictive performances.

read the full-length article here https://doi.org/10.1371/journal.pone.0204644

cosi corner
Community of Special Interest Groups

We launched the community of special interest groups at the ASBCB conference in Entebbe in October 2017. It is hard work for individuals to rally support and sustain the momentum felt at the Entebbe conference. I would urge all those who are looking for a smaller community of discipline-specific scientists to get involved in the COSIs. Here is a reminder of the groups that were initiated and the contact details.

Structural Biology and Drug design (structuralbio@asbcb.org)
Metagenomics group (metagenomics@asbcb.org)
Pathogens group (pathogen@asbcb.org)
Population genomics (popgen@asbcb.org)
System administration (sysadmin@asbcb.org)

Contributors

Alan Christoffels, SANBI-University of the Western Cape
Campbell Rae, SANBI-University of the Western Cape
Amel Ghouila, Institut Pasteur de Tunis
ThankGod Ebenezer, Earlham Institute (formerly The Genome Analysis Centre (TGAC)) Norwich Research Park Innovation Centre
Ahuno Samuel Terkper, Kwame Nkrumah University of Science and Technology (KNUST), Ghana
Ryman Shoko, School of Natural Sciences & Mathematics, Chinhoyi University of Technology, Zimbabwe

We welcome volunteers who wish to contribute to the following areas of the magazine:

*Editorial Team
*Individuals to aid in translating the newsletter to French and Portugese
*Layout and Design – we are looking for individual who wish to exercise their creativity in improving the look at feel of the magazine

Please submit all contributions to

contact@asbcb.org

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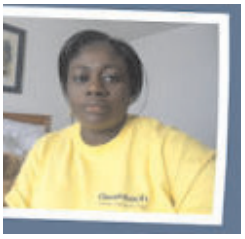

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Vision

To facilitate the development of African scientists as leaders in bioinformatics and computational biology

Mission

To be a scholarly society dedicated to advancing, developing and promoting bioinformatics and computational biology in Africa.

Serve a global membership through distribution of valuable information about training, education, employment and relevant news from related fields.

Encourage the application of bioinformatics in Africa to improve the livelihood of people.