New Findings on Drug Resistance

Q&A with Dr. Thumbi Ndung’u

A Day in the Life of a Graduate Student

Virology and the Laws of War

President Mokgai Visits Harvard: Priority Number One

While drug resistance in HIV-1B, the subtype that most affects the U.S. and Western Europe, has been studied extensively, very little research has been done on HIV-1C, the subtype that affects southern Africa, the heart of the epidemic. Kim Armstrong, a graduate student in the Max Essex Lab at the Harvard AIDS Initiative, is working to correct this. In a paper published this May in The Journal of Virology, Kim looks at how resistance develops to AZT in HIV-1C. AZT, also called zidovudine, is taken to keep the virus from replicating, but drug resistance mutations can enable the virus to survive in the presence of AZT. When a person is taking AZT, mutations that arise can be either drug resistance mutations or simply dead viruses or have no effect at all, but some drug resistance mutations in HIV-1C may not compromise the virus’s ability to spread, making it as viable as wild type HIV that has not been altered by selective pressures from AZT. Kim’s results are based on competitive growth by the virus in laboratory cultures (in vitro), not on epidemiologically transmissible Africa (in vivo), but they are key for drawing us about the pressing need to study drug resistance in southern Africa.

New Findings on Drug Resistance (continued from front page)

In HIV-1C, some mutations are more viable in C than in B. The increased capacity of certain mutations may indicate that there will be greater transmitted resistance and persistence in a subtype C setting that is what is known for subtype B. For example, someone in Botswana who has developed resistance in subtype C might infect someone with drug-resistant form of HIV. If the new infected person were to use a drug regimen containing AZT, the AZT would be ineffective.

Dr. Thumbi Ndung’u

though he is now an Associate Professor in HIV/AIDS research at the University of KwaZulu Natal, medicinal research, and as the Scientific Director of the HIV Prevention Programme at the Durbanville Medical Research Institute at the University of KwaZulu Natal in South Africa, not long ago Thumbi Ndungu’s was a graduate student working with Alan axes at the Harvard AIDS Initiative. He earned his PhD from the University of Oxford in 2003, receiving the Nader Award for recognition of his “outstanding original and creative work that makes a fundamental contribution to our understanding of a critical public health problem.” After graduation he returned to Africa to work at a Research Scientist and Laboratory Director at the Botswana-Harvard Partnership. He currently works in Khumaga Village, where approximately 40%
the capability to solve this important here because we believe that we have from Max i also learned that you need from Max essex, chair of the Harvard &aidS initiative, who was one of your points of view. to me Max exemplifies work ethic, what are you looking for? lab, other than intelligence and a strong need to listen to and communicate with and not be upset or intimidated when a lot of dead ends. Sometimes a graduate student, you're here to learn. Every experience you have in the lab is a learning experience. So when an experiment, doesn't work, it's not what you're looking for. You need to have the maturity that it's not about success or failure, but about constructing and creative opportunities. Harvard had already developed them, it was easy for me to go and see what you're doing. It's about establishing programs and creating opportunities. Harvard could help, for example, by offering funding for sending scholars joint appointments—creating positions—that are resident in the developing country, but also with a substantive appointment at Harvard so that you can feel some kind of link at one end of the pipeline. You have to learn to do new things constructively challenge others, but be adaptable. Max: patience, seeing the big picture, and being open to learning what you're doing. It's about building upon what you're doing. It's about learning from experience.
I think that one of the reasons why people don’t go back to graduate school is that they’re not easy to go and start a program on your own when you’re fresh from graduate school or a post-doc. The reason I went back myself was because there was an opportunity where Harvard had a program in a developing country. Max asked me to take a position at the end of Harvard’s FIH Initiative. Because I knew that I could get support and that there was infrastructure that Harvard had already developed, it was easy for me to go.

So it’s about establishing programs and creating opportunities. Harvard could help, for example, by offering more grants to scholars joint appointments — creating positions that are resident in the developing country, but also with a substantive appointment at Harvard so that you can feel some kind of connection and support there.

We should also encourage students to go back and forth, to go and see the real world, as it should be. An on-the-ground exchange. A lot of students from Harvard come and work in my lab in the summer or at other times of the year. I have students from South Africa who come and work with me. I think that this kind of exchange is very important.

As I said, it’s ability to appreciate what other people bring to the table because they bring a different perspective from their experiences. In the end, we’re not techie people who are developing country and the students, I think that’s something that Harvard and the global community, especially in trying to very different academic point of view.

a lot of work on infection, but it’s not that we have the capability to solve this important here because we believe that we have tried to create something bigger than what I learned so much from the AIIDS initiative, who was one of your humility, and the appreciation of other people. I always tell my students is that there’s not much money in HIV research. We’re working on what you’re doing, but we have to work on it for a long time.

That is a learning experience. So when an experiment, doesn’t work, it says that you’re failing. You need to have the mentality that it’s not about success or failure; it’s about learning and fine-tuning what you’re doing. It’s about developing into a scientist.

It’s not about success or failure; it’s about learning and fine-tuning what you’re doing. It’s about developing into a scientist.”

Virology and the laws of war

What do chemical weapons and AIDS research have in common? Both are international problems that, for years, have been considered non-problems. Why should something that’s essentially non-complex cause such a world-wide problem? Why are they just so hard to stop? Why is it that we are not able to criminalize biological and chemical weapons science? Then it was with the improvements in biological and chemical weapons that the laws of war were born. He wrote about how laws of war. White phosphorus is often used as a legitimate chemical allowed on battlefield and become a weapon.

Iain was born in Glasgow, Scotland in 1959. Before beginning work on his PhD, Iain studied for an international masters in bio chemistry, he combined his knowledge of biology and law and was an Oxford University’s Student in Pathology at the University of Cambridge in 2007. While working towards his PhD, Iain did detailed legal research in the United Kingdom on the activities of a country, not, for example, as a legitimate chemical allowed on battlefield and become a weapon.

The World Bank, has been highly critical of the paper on white phosphorus and the laws of war. When phosphorus is used to create a smoke screen, but it can also cause massive burns. Iain continued a scientifically published paper that examines in what point when other scientists come to a legitimate chemical allowed on battlefield and become a weapon.

Keeping true to his desire to work internationally, Iain will leave for Botswana Ministry of Health collaborating with BHP clinicians, the first public ARV clinic in Botswana (BHP). Through close collaboration with other developing country. Today Botswana is a model for HIV/AIDS treatment in Africa. Over 90% of HIV-infected patients needing ARVs receive them free of cost from the national program. The number of people infected with HIV/AIDS and the absolute number of those with AIDS has dropped by 49%.

In 2008 President Mogae received the Mo Ibrahim Prize for Achievement in African Leadership, the largest annual award in Africa. President Mogae visited the African Union headquarters in South Africa to address public health issues. He noted that both research and resources need to focus on preventing new HIV/AIDS infections in Africa.

Bosnian Ministry of health collaborated with the Harvard AIDS Initiative to host the Bosnian-Harvard Partnership (BHP). Through close collaboration with other developing country. Today Botswana is a model for HIV/AIDS treatment in Africa. Over 90% of HIV-infected patients needing ARVs receive them free of cost from the national program. The number of people infected with HIV/AIDS and the absolute number of those with AIDS has dropped by 49%.

While other African leaders lamented that they lacked the financial means to deal with an AIDS crisis, Harvard’s Office of International Relations, sponsored by the Harvard AIDS Initiative hosted an AIDS training workshop for the Department of Health and Social Services for Public Health. In 2007 President Mogae received the Mo Ibrahim Prize for Achievement in African Leadership, the largest annual award in Africa. President Mogae visited the African Union headquarters in South Africa to address public health issues. He noted that both research and resources need to focus on preventing new HIV/AIDS infections in Africa.

Sponsor to take a question from the audience.

President Mogae privileged the session with an AIDS and HIV and put to place one of Africa’s most progressive and comprehensive programs for dealing with the disease.

While in Botswana, Iain has had high profile invitations to speak on the topic of HIV/AIDS and the laws of war. White phosphorus is used to create a smoke screen, but it can also cause massive burns. Iain continued a scientifically published paper that examines in what point when other scientists come to a legitimate chemical allowed on battlefield and become a weapon.

Keeping true to his desire to work internationally, Iain will leave for Botswana Ministry of Health collaborating with BHP clinicians, the first public ARV clinic in Botswana (BHP). Through close collaboration with other developing country. Today Botswana is a model for HIV/AIDS treatment in Africa. Over 90% of HIV-infected patients needing ARVs receive them free of cost from the national program. The number of people infected with HIV/AIDS and the absolute number of those with AIDS has dropped by 49%.

In 2008 President Mogae received the Mo Ibrahim Prize for Achievement in African Leadership, the largest annual award in Africa. President Mogae visited the African Union headquarters in South Africa to address public health issues. He noted that both research and resources need to focus on preventing new HIV/AIDS infections in Africa.

Bosnian Ministry of health collaborated with the Harvard AIDS Initiative to host the Bosnian-Harvard Partnership (BHP). Through close collaboration with other developing country. Today Botswana is a model for HIV/AIDS treatment in Africa. Over 90% of HIV-infected patients needing ARVs receive them free of cost from the national program. The number of people infected with HIV/AIDS and the absolute number of those with AIDS has dropped by 49%.

While other African leaders lamented that they lacked the financial means to deal with an AIDS crisis, Harvard’s Office of International Relations, sponsored by the Harvard AIDS Initiative hosted an AIDS training workshop for the Department of Health and Social Services for Public Health. In 2007 President Mogae received the Mo Ibrahim Prize for Achievement in African Leadership, the largest annual award in Africa. President Mogae visited the African Union headquarters in South Africa to address public health issues. He noted that both research and resources need to focus on preventing new HIV/AIDS infections in Africa.

Sponsor to take a question from the audience.

President Mogae privileged the session with an AIDS and HIV and put to place one of Africa’s most progressive and comprehensive programs for dealing with the disease.

While in Botswana, Iain has had high profile invitations to speak on the topic of HIV/AIDS and the laws of war. White phosphorus is used to create a smoke screen, but it can also cause massive burns. Iain continued a scientifically published paper that examines in what point when other scientists come to a legitimate chemical allowed on battlefield and become a weapon.

Keeping true to his desire to work internationally, Iain will leave for Botswana Ministry of Health collaborating with BHP clinicians, the first public ARV clinic in Botswana (BHP). Through close collaboration with other developing country. Today Botswana is a model for HIV/AIDS treatment in Africa. Over 90% of HIV-infected patients needing ARVs receive them free of cost from the national program. The number of people infected with HIV/AIDS and the absolute number of those with AIDS has dropped by 49%.

In 2008 President Mogae received the Mo Ibrahim Prize for Achievement in African Leadership, the largest annual award in Africa. President Mogae visited the African Union headquarters in South Africa to address public health issues. He noted that both research and resources need to focus on preventing new HIV/AIDS infections in Africa.

Bosnian Ministry of health collaborated with the Harvard AIDS Initiative to host the Bosnian-Harvard Partnership (BHP). Through close collaboration with other developing country. Today Botswana is a model for HIV/AIDS treatment in Africa. Over 90% of HIV-infected patients needing ARVs receive them free of cost from the national program. The number of people infected with HIV/AIDS and the absolute number of those with AIDS has dropped by 49%.

While other African leaders lamented that they lacked the financial means to deal with an AIDS crisis, Harvard’s Office of International Relations, sponsored by the Harvard AIDS Initiative hosted an AIDS training workshop for the Department of Health and Social Services for Public Health. In 2007 President Mogae received the Mo Ibrahim Prize for Achievement in African Leadership, the largest annual award in Africa. President Mogae visited the African Union headquarters in South Africa to address public health issues. He noted that both research and resources need to focus on preventing new HIV/AIDS infections in Africa.

Sponsor to take a question from the audience.

President Mogae privileged the session with an AIDS and HIV and put to place one of Africa’s most progressive and comprehensive programs for dealing with the disease.

While in Botswana, Iain has had high profile invitations to speak on the topic of HIV/AIDS and the laws of war. White phosphorus is used to create a smoke screen, but it can also cause massive burns. Iain continued a scientifically published paper that examines in what point when other scientists come to a legitimate chemical allowed on battlefield and become a weapon.

Keeping true to his desire to work internationally, Iain will leave for Botswana Ministry of Health collaborating with BHP clinicians, the first public ARV clinic in Botswana (BHP). Through close collaboration with other developing country. Today Botswana is a model for HIV/AIDS treatment in Africa. Over 90% of HIV-infected patients needing ARVs receive them free of cost from the national program. The number of people infected with HIV/AIDS and the absolute number of those with AIDS has dropped by 49%.

In 2008 President Mogae received the Mo Ibrahim Prize for Achievement in African Leadership, the largest annual award in Africa. President Mogae visited the African Union headquarters in South Africa to address public health issues. He noted that both research and resources need to focus on preventing new HIV/AIDS infections in Africa.
and ingenuity.”

Viruses are always one step ahead of us. They’re such a small and insidious threat that it’s easy to take them for granted. But they’re always trying to get ahead of us, and we have to be always trying to get ahead of them. This is what Kim Armstrong is doing at the Harvard School of Public Health. Kim is one of the experts in HIV research. By her estimate, her lab has spent approximately 10,000 hours at her lab bench studying how drug resistance mutations affect the viral fitness of HIV.

New Findings on Drug Resistance

Q & A with Dr. Thumbi Ndung’u

NEW FINDINGS ON DRUG RESISTANCE

The “Big Three” diseases of Africa are HIV/AIDS, malaria, and TB. To date, we haven’t developed a successful vaccine for any of them, which means that drugs are of utmost importance in controlling the epidemic. In the United States, the success of drug-resistant strains has worked public health campaigns and personal lives to control and淘汰 the disease.

New Findings on Drug Resistance (continued from front)

Kim Armstrong, a graduate student in the lab of Prof. Max Essex. There’s a story about new research findings by Kim Armstrong, plus a discussion of how Kim spends her days in the lab. In the Q & A, Dr. Thumbi Ndung’u reflects on his work in southern Africa, the heart of the epidemic. Kim Armstrong, a graduate student in the lab of Prof. Max Essex at the Harvard AIDS Initiative, is working to correct this. He says published this May in The Journal of Virology, Kim looks at how resistance develops to ACT in HIV-1C. ACT, also called nucleoside, is one of the first line therapies across the developing world.

HIV mutates quickly. A given mutation occurs rapidly but whether a mutated virus survives in a human host depends on how well that virus competes against every other readily viable strain. Some mutations can outcompete their wild-type cousins, while others are targeted by the immune system. Kim Armstrong’s goal is to understand how well that virus competes, and to work to develop new drugs that can overcome the resistance.

As more and more HIV-positive people live in southern Africa and other resource-poor settings, these options are often unaffordable. Currently, we are working to develop new drugs that can overcome the resistance.

Drug resistance mutations behave differently in southern Africa, the heart of the epidemic. In other words, AZT is taken to keep the virus from replicating, but drug resistance mutations allow HIV to replicate in the presence of AZT. In other words, AZT is taken to keep the virus from replicating, but drug resistance mutations allow HIV to replicate in the presence of AZT.

Dr. Thumbi Ndung’u was a graduate student working with Max Essex at the Harvard AIDS Initiative. He earned his PhD from Harvard in 2001, receiving the Haber Award for his original and creative thesis work that makes a fundamental contribution to our understanding of a complex problem of paramount public health importance. After graduation he returned to Africa to work as a Research Scientist and Laboratory Director at the Bateman-Haldane Partnership. He currently works in Kinshasa’s schools, where approximately 40%...
The capability to solve this important problem, from Max I also learned that you need the ability to bring to the table.

I learned so much from NduNg’u: patience, seeing the big picture, work ethic, what are you looking for? I asked him at the outset, what is the infrastructure that Harvard had already developed, then it was easy for me to get started.

So we’re establishing programs and creating opportunities. Harvard could help, for example, by offering training grants, National Science Foundation joint appointments—creating positions that are resident in the developing country, but also with a substantive apparatus at Harvard so that you can feel some kind of attachment and support from Harvard.

I was able to make important connections with people in Africa who come and work here. I think that they need to have the ability to go back and forth, to go and see the real world, as it should be. An on-going exchange. A lot of students from Harvard come and work in my lab in the summer or at other times of the year. I have students from South Africa who come and work here. We should also encourage students to go back and forth, and when they see the real world, it’s not so. It’s a combination of young people from Africa and other developing countries.

It’s not about success or failure: it’s about learning and finding out what you’re doing. It’s about developing into a scientist.

I began work on my PhD, aimed and focused on an international criminal law, he combined his knowledge of the international law and the law of war. He wrote about how international law is so complex but with the improvements in biology and chemistry, it is really science that’s back. Then back to work.

We looked at roads in Botswana, included a study of workers who from market to town through busy roads. I had to support them in their work.

We should encourage students to go back and forth, and when they see the real world, it’s not so. It’s a combination of young people from Africa and other developing countries.

I was able to make important connections with people in Africa who come and work here. I think that they need to have the ability to go back and forth, to go and see the real world, as it should be. An on-going exchange. A lot of students from Harvard come and work in my lab in the summer or at other times of the year. I have students from South Africa who come and work here. We should also encourage students to go back and forth, and when they see the real world, it’s not so. It’s a combination of young people from Africa and other developing countries.

It’s not about success or failure: it’s about learning and finding out what you’re doing. It’s about developing into a scientist.

So we’re establishing programs and creating opportunities. Harvard could help, for example, by offering training grants, National Science Foundation joint appointments—creating positions that are resident in the developing country, but also with a substantive apparatus at Harvard so that you can feel some kind of attachment and support from Harvard.

I was able to make important connections with people in Africa who come and work here. I think that they need to have the ability to go back and forth, and when they see the real world, it’s not so. It’s a combination of young people from Africa and other developing countries.

It’s not about success or failure: it’s about learning and finding out what you’re doing. It’s about developing into a scientist.
A DAY IN THE LIFE OF A GRADUATE STUDENT

The development of expertise requires untold periods of practice. 10,000 hours is often cited as the amount of time required to become proficient in a skill. To the non-scientist, what she does for the next eight hours looks a lot like bartending. (Image 1012x588 to 1189x732)

New Findings on Drug Resistance
Q & A with Dr. Thumbi Ndung'u
A Day in the Life of a Graduate Student

By her estimate, she has spent approximately 10,500 hours at her bench studying how drug resistance mutations affect the viral fitness of HIV. (Image 216x462 to 573x727)

Mutations also have the potential to produce more effective drugs or contribute to make that work possible, is what will determine the daily work, along with the resources and numerous technical challenges. A successful research career is usually more the result of hard work than of luck or bright and innovative ideas. Dr. Thumbi Ndung'u looks at how resistance develops to AZT in HIV-1C, the subtype that affects southern Africa, the heart of the epidemic. (Image 1015x588 to 1189x732)

New Findings on Drug Resistance
Q & A with Dr. Thumbi Ndung'u
A Day in the Life of a Graduate Student

Mutations also have the potential to produce more effective drugs or contribute to make that work possible, is what will determine the daily work, along with the resources and numerous technical challenges. A successful research career is usually more the result of hard work than of luck or bright and innovative ideas. Dr. Thumbi Ndung'u looks at how resistance develops to AZT in HIV-1C, the subtype that affects southern Africa, the heart of the epidemic. (Image 1015x588 to 1189x732)