

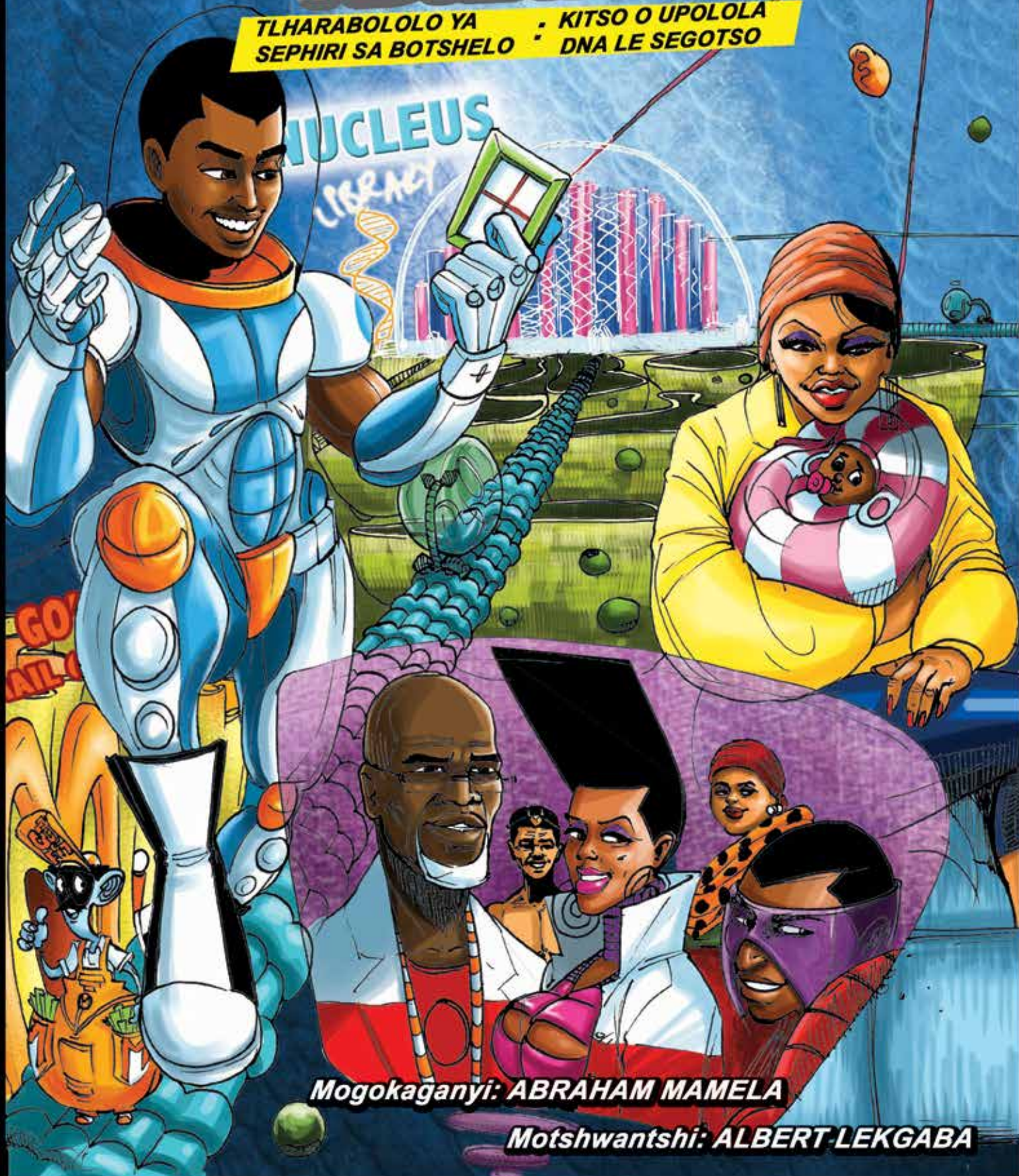
LEKWALO 2

GENOME

ADVENTURES

TLHARABOLOLO YA : KITSO O UPOLOLA
SEPHIRI SA BOTSHELO : DNA LE SEGOTSO

NUCLEUS
LIBRARY



Mogokaganyi: ABRAHAM MAMELA

Motshwantshi: ALBERT LEKGABA

FOREWORD



Science communication is a priority in Botswana's educational landscape. Beyond schools and colleges, the Ministry of Education and Skills Development has been at the forefront in taking measures to improve the appreciation of science by the general public. This is attested by the broadcast content aired in our national broadcasting media led by the Ministry of Education and Skills Development. Our efforts in this regard are consistent with a key pillar of vision 2016, namely, an informed and educated nation. This ambitious vision cannot be achieved without the cooperation of all stakeholders.

It is with the greatest delight to learn that the Botswana-Baylor Children's Clinical Centre of Excellence (COE), in trying to fulfill the goals of the Collaborative African Genomics Network (CAfGEN), is already contributing to this course through its flagship community engagement project - *Genome Adventures*. Funded jointly by Wellcome Trust and the US National Institutes of Health, *Genome Adventures* is presented in four comic books that seek to communicate and engage Botswana and other African countries on issues of science with a special focus on biomedical research.

In the first book entitled "Blast to the past" *Kitso* - the young hero of the book series explores heredity and genetics. In this, the second book, entitled "Cracking the code" *Kitso* with the assistance of several superheroes shrinks to microscopic size to explore how DNA and the genes affect the human body and its functions. Presented in a pictorial and entertaining way using simple language, this book can be enjoyed by all - young and old, less and more educated. I urge all learners to pay attention to the story and compare it to the content from their biology books for their benefit.

Aware that genetics is one of those topics that can be challenging to understand, I am happy to endorse and recommend *Genome Adventure Book Two* as an opportunity to our students and communities to learn genetics in an easy and more exciting style that combines story-telling comics and analogies to engage and educate its readers.

Significantly, the book features female scientists - an encouragement for our girl children to aspire to take science as a career. This is notable as Botswana is a signatory to the Southern African Development Community Science and Technology Protocol that requires members to close the numerical gap between female and male scientists.

I am informed that *Genome Adventures Comic Books* will be translated into Setswana, Luganda, Swahili, Hausa, Arabic, French, Portuguese and featured in various social media in order to reach as many African People as possible.

On behalf of Botswana, and indeed all Africans, I take this opportunity to thank all those who are involved in bringing this project to fruition and to the Wellcome Trust and National Institutes of Health for providing funding support. We at the Botswana Ministry of Education and Skills Development we are happy to *crack the code with Kitso*. I invite you all to join.

A stylized, handwritten signature in black ink, likely belonging to Honourable Dr Unity Dow.

Honourable Dr Unity Dow
Minister of Education and Skills Development
Republic of Botswana

TLHALOSO YA MAFOKO

MAFOKO A BORANYANE

MOTHEO- SE AGA DNA. METHEO E E GANE ELENG ADENINE, GUANINE, THYMINE, CYTOSINE

LORAKO LWA KAROLWANA E NNYE YA SETSHEDI- LOTH A LE LE SESANE LE LE KGAOGANYANG DI TENG TSA KAROLWANA E NNYE YA SETSHEDI MO GO TSE DI KWA NTLE

CHROMOSOMES- LODI LA DNA LE LE FITLHELWANG MO (BOROBE JWA KAROLWANA E NNYE YA SETSHEDI), MO GO FITLHELWANG DIKGANG TSA BOSIKA/SEGOTSO

CYTOPLASM- METSINYANA BOREREPU A FITLHELWANG MO KAROLWANENG E NNYE YA SETSHEDI GAPE A SIRELEDITSWE KE LORAKO LA KAROLWANA E NNYE YA SETSHEDI

DNA- DEOXYRIBONUCLEIC ACID- KAROLWANA E NA LENG DITAELO TSA GORE KGOLO LE GO BEREKA GA SETSHEDI DI NNE JANG

NUCLEOTIDES- DI AGA MATUTE A BOROBE, DNA LE RNA

GENOME- DIDNA TSE DI FITLHELWANG MO DICHROMOSOMES TSA SETSHEDI FA DI SOBOKILWE DI BIDIWA GENOME

GOLGI- KAROLWANA E E NANG LE DIKGETSI TSE DI PHAPHATHI TSE DI FETOLANG LE GO TLHAOLA DIKOTLA

HELIX- POPEGO E MATSWAKETSWAKE YA DNA E NA LENG MALODI A DNA A TSHWARAGANTSWENG KE DIKGOKAGANO TSA HYDROGEN

LYMPHOCYTES- MANGWE A MASOLE A MMELE A LWANTSHANG MALWETSI MO MEBELENG

MUTATION- PHETOGO MO NOMORONG YA SEPHIRI YA DNA, KOKETSEGO, PHIMOLO KANA KEMISETSE E E DIRANG GORE GO DIRWE MATHUTE A A PHAROLOGANYA

NUCLEUS/BOROBE- KAROLWANA E E DIKAGANYEDITSWENG KE MARAKO ALE MABEDI E E FITLHELWANG MO DIKAROLWANENG TSE DI NNYE TSA DITSHEDI TSE DI NA LENG TSA SEGOTSO DI LE MO SEBOPEGONG SA DNA

ORGANELLE- NNGWE YA DIKAROLWANA TSE DI MMALWA TSEDI PHUTHEGILENG DI NA LE DITIRO TSE DI FAPHEGILENG, TSE DI FITLHELWANG MO METSINYANENG A A BOREREPU A FITLHELWANG MO KAROLWANENG E NNYE YA SETSHEDI

PROTEINS- DIKOTLA TSE DI DIRILWENG KA KEETANE YA DIAMINO ACIDS ELE NNGWE KGOTSA GO FETA. GO LATELANA GA DIAMINO ACIDS GO TSWA MO TATELANONG YA MATUTE A FITLHELWANG MO NOMORENG YA SEPHIRI YA DNA E E LAOLANG POPEGO YA KOTLA E O

RIBOSOMES- MATUTE A FITLHELWANG MO DIKAROLWANENG TSE DI NNYE TSA DITSHEDI GO KO DIRELWANG DIKOTLA TENG

RNA(RIBONUCLEIC ACID)- MATUTE A BOTLHA A FITLHELWANG MO DIKAROLWANENG TSE DINNYE TSA DITSHE- DI LE MEGARE ELE MMALWA, A TSAYANG KAROLO MO GO DIRENG DIKOTLA

TRANSCRIPTION- TSAMAISSO E E SALWANG MORAGO FA DIKOTLA DI DIRWA E AMA GO LOMOLOGANNWANG DNA GO DIRA RNA

TRANSLATION- TSAMAISSO E KA FA DIKOTLA A DIRWANG KA TENG MO DIRIBOSOMES

VESICLE- KGETSANA E FITLHELWANG MO DIKAROLWANENG TSE DI NNYE TSA DITSHEDI MO DIMELENG LE DIPHOLOGOLO E E BEELANG KANA E TSAMAISSA TIRAFALO YA GO ANAMA GA DIKOTLA MO MMELENG

X-RAY CRYSTALLOGRAPHY- BOITSEANAPE JO BO DIRISIWANG GO SENOLA SEPOBEGO SA DIMOLECULES TSE DI TSHWANANG LE TSA DNA

KITSO



DUMELANG! LEINA LA ME KE KITSO! KE NNA KO TLOKWENG LE MMANGWANE! KE TSHOTSWE KA MOGARE WA HIV, MME GA O NKGORELETSE KA SEPE!

DR. MABOKO



KE MOETELEDIPELE WA SETDHOPIA SA GENOME ADVENTURES (GO SA KGATHALESEGE GORE KGOSIGADI O GO RAA A RENG). KE NA LE BOKGONI KE NA LE MAATLA A GO RALALA MABOTA LE BOKGONI JWA GO ETELA DINAKO TSE DI FITILENG KA SEKUTA SAME. EBILE GA SE GONE GOTLHE, KE KGONA LE GO BALA DIKAKANYO TSA BATHO.

KGOSIGADI



DUMELANG, BAGAETSHOI KE MOTHO YO O BUANG EBILE KE MOETELEDIPELE WAS BATHO BAME BA BATSWANAI KE KA TSWA KE LEBEGA JAACA MMEMOGOLO WA GAGO MME FELA THOBANE YA ME E NA LE MAATLA A FAPHEGILENG GO TSWENG KO BADIMONG BA MEI KA ONE MAATLA ONE A, KE KGONA GO LAOLA SEEMO SA LOAPI, KE LAOLA DIPHOLOGOLO LE GO DIRA DILO TSE DINGWE TSE DI GAKGAMATSANG.

PHODISO

KE BIDIWA PHODISO, MME LE KA MPITSA "MMAGWANE". KE SALE KE TSAYA KITSO GO NNA LE NNA MORAGO GA GO TLHOKAFALA GA GA MMAAGWE EBILE KE MO RATA JAACA KE RATA BONGWANAKE BA BANGWE. RE NNA MMOGO MO TLOKWENG. RE KA TSWA EBILE RE LE BAAGISANYE



XGAO-TCGAI

LEINA LAME KE XGAO-TCGAI (BALE BANTSI BA MPITSA XT). KE MOTLOTLO GO BO KE LE MONNA WA MOSARWA - RE ITSWE THAT KA LEINA LA BASARWA KGOTSA BUSHMEN. LE NNA KE MOGALE (SUPERHERO) WA NAKO-MAATLA A GO TSAMAYA. LEINA LA ME LE RAA TEBO E BOGALE KA GORE TEBO YA ME E BOGALE JWA THIPA GAPE KE KGONA GO BONA ISAGO!



MARANYANE

EITAI FELA JAACA LEINA LAME LE BUA KE BIDIWA MARANYANE, KE RATA MARANYANE THATAI... BONA FELA JAACA MMELE WAME O NTSEI KE MOCHINE GAPE KE MOTHO. KE BOTLHALE THATA EBILE KE RATA GO DIRISA MARANYANE A SESA A MARATA GOLEJWAI



MMATLI

LEINA LA ME KE MMATLI. KE MMATLISISI WA TSA MARANYANE, EBILE LE NNA KE NA LE BOKGONI JWA GO NGOTLA DILO LE BATHO DI NNA DINNYE MO O KA SEKANG WA DI BONA KA MATLHO A GAGO. KE RATA DILO TSE DI KGATLHISANG TSE BORANYANE BO RE THUSANG GO DI ITHUTA GAPE NKA RATA GO BONA BANA BA BASETSANA BA NNA BAITSEANAPE BA BORANYANE HELA JAACA NNA.



KGABAGARE ... KWA NTLWANENG YA TSHEKATSEKO YA
CAVENDISH KWA MMADIKOLO WA CAMBRIDGE...

KITSO, KA DINGWAGA TSA
BO1950 BAITSAANAPE BA
TSA BORANYANE NE BA
EPOLOTSE GO LE GONTSI
KA TSA SEGOTSO, MME BA
NE BA ISE BA KGONE GO

RARABOLOLA SEPHIRI SA
BOTSHELO. MAJITA A A FALE-
WATSON LE CRICK-BA NE BA
DUPELELA GORE SEPHIRI SA
BOTSHELO SE TSHWANA LE

SETLHARE SA MOFINE LE DI
NUCLEOTIDE OKARE
MATLHARE.



NUCLEO-ENG?



NUCLEOTIDES: KE DILO
TSE DI AGANG
THULAGANYO YA
SEGOTSO GAPE DI NA LE
METHEO E E MEFUTA
MENE.



KE ENG DITSHWANTSHO
TSELE DI BIDIWA KA
DITLHAKA A,T,C LE G?



KE YONE METHEO
E E MENE. E
BIDIWA ADENINE(A),

THYMIANE (T), CYTOSINE(C), LE
GUANINE (G). WATSON LE CRICK
BA DIRISITSE DIKAO TSE GO SUPA
KA FA THULAGANYO YA SEGOTSO
E LOMAGANANG KA TENG.



KE GONE MOO? KE SONE
SEPHIRI SA BOTSHELO? SE
NTSE OKARE LERE LE LE
KONEGILENG JAANA?

EHEE, SEO SE BIDIWA
'DEOXYRIBONUCLEIC ACID',
KGOTSA DNA KA
BOKHUTSHWANE, EBILE
POPEGO YA YONE E NTLA E
E BIDIWA DOUBLE HELIX! ...
MALODI A MABEDI A DI

NUCLEOTIDES A LOMAGANA,
METHEO YA LELODI LA
NTLHA E LOMAGANA LEYA
LELODI LA BOBEDI.

GO A KGATLHISA!

A O LOMAGANA LE T, C O
LOMAGANA LE G. GO A
KGATLHISA AKERE?

KE MANG MOSADI OLE, GAPE
O TSHWERE ENG?

WATSON LE CRICK GA BA KAKE BA
TSAA DITEBOGO TSOTLHE GO BO
BA BATLISISITSE KA DNA. A GA O
ITSE GORE BANNA GA SE BONE
FELA BA BA KA NNANG BAITSEANAPE
BA TSA MARANYANE?

OLE KE NKGONNE WA MOITSEANAPE WA
MARANYANE ROSALIND FRANKLIN, O
TSHWERE SETSHWANTSO-MORITI SA DNA
SE A SE TSERENG.

FA O KA LEBISISA SENTLE O
TLA BONA POPEGO E RE NENG
RE BUA KA YONE YA DOUBLE
HELIX.

EHE GO RAYA GORE MOSADI
KE ENE A RARABOLOITSENG
POPEGO YA DNA?

DITSHWANTSHO TSE DI NE ELE
PINAGARE YA GO LEMOGWA GA
DNA, KA JALO KE TLA GO LETLA
O NNA MOATLHODI WA SEO KITSO.

JAANONG A RE
BOELENG GAE.

KE SANTSE KE SA TLHALOGANYE.
XT O RILE THULAGANYA YA
SEPHIRI YA SEGOTSO E TENG
MO GO RONA ROTLHE. A SEO
SE RAYA GORE LE NNA KE NA LE
LERINYANA E E KONEGILENG MO
TENG GAME?

KE NAKO JAANONG YA
GO ITSE, AKERE?

KITSO, LOETO LWA RONA
LE KGAKALA LE GO HELA.

O TSILE GO
ITHUTA GO LE
GONTSI.

RE NA LE LEANO.

LEANO KE LEFE?

EE, JAANONG LEANO
KE LEFE?

KE SONE SEBAKA SE O NTSENG
O SE EMETSE SE KITSO.

MME KANA GA O
ISE O MPOLELELE
LENANEO. LENANEO
KE ENG?!?

KE NAKO YA GORE O BONE
GORE GO DIRAGALA ENG MO
MMELENG WA MOTHO. O
IPONELE SEPHIRI SA
BOTSHELO KA MATLHO A
GAGO.

EMA PELE... GA O REYE GORE...

KE NNETE!

RE YA GO GO ROMELA MO
MADING A MMELE A GA
NTSALAO TUMO.

KE NAKO YA GO
GO FOKOTSEGA
KITSO.

GO FOKOTSEGA? EMA
PELE!

GA O KAKE WA
BONA SENTLE
SEPHIRI SA
SEGOTSO O LEBEGA
JALO, AKERE?

GAPE O BATLA GO
BONA SEPHIRI SE
AKERE?

NNYAA ...

EE...

TEE O A BATLA. O NTSHEPHE,
MELAITI, GO BABALESEGILE. RE
TLA GO TSAMAISA KGATO
NNGWE LE NNGWE. TSAYA SE.

RE TLA KGONA GO BUSIANA RE
DIRISA SELO SE. TEKO, TEKO, 1,2,3. A
WA NKUTLWA?

EE, E BILE KE A
GO BONA.

E-HE! JAANONG
WA RENG? A O
IPANKANYEDITSE
LOETO LE LENGWE?



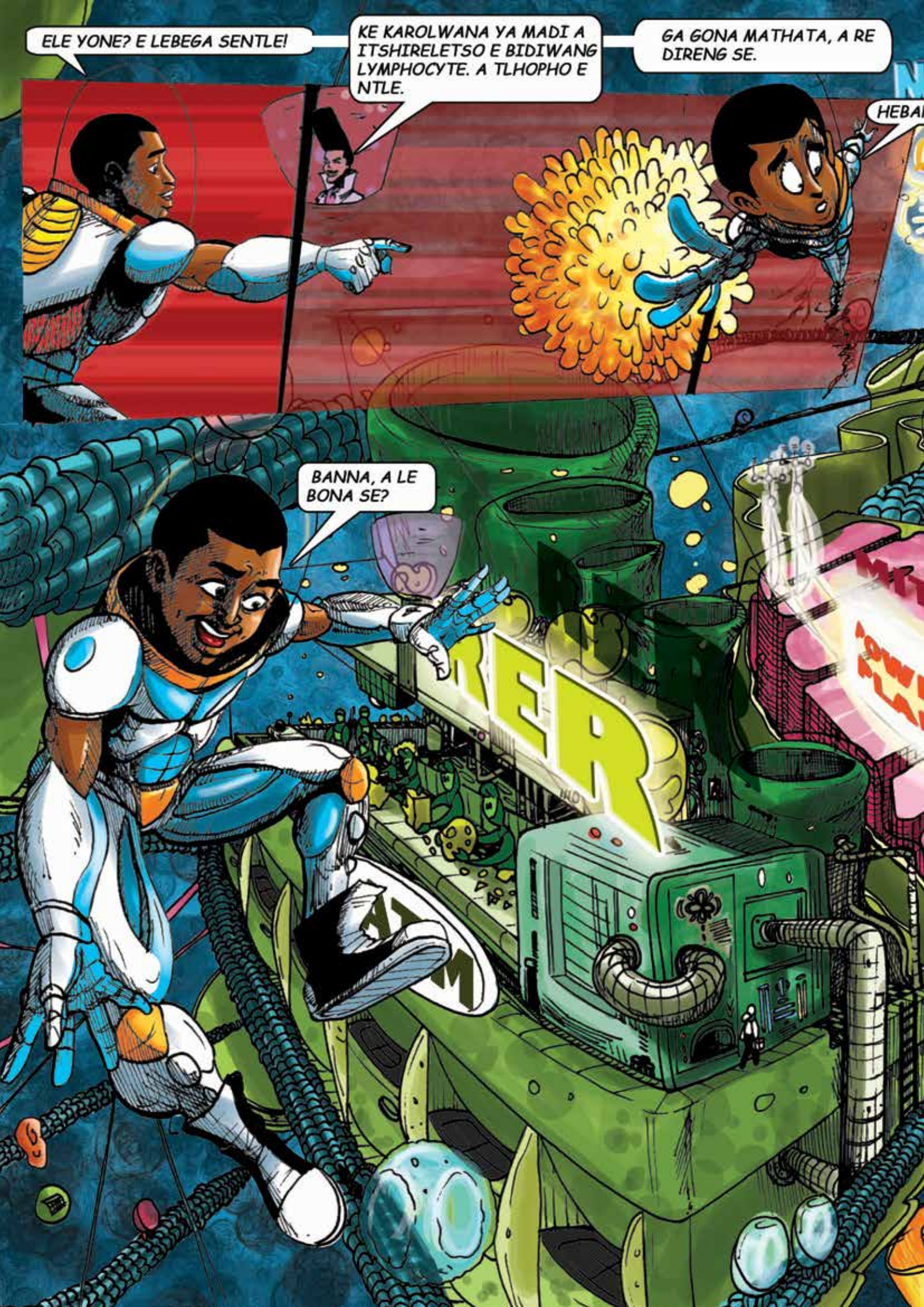
ELE YONE? E LEBEGA SENTLE!

KE KAROLWANA YA MADI A
ITSHIRELETSO E BIDIWANG
LYMPHOCYTE. A TLHOPHO E
NTLE.

GA GONA MATHATA, A RE
DIRENG SE.

HEBA!

BANNA, A LE
BONA SE?



NUCLEAS

NNAI!

BANNA, DUMELANG?

LYSOSOME
RECYCLING
PLANT

MITOCHONDRIA

GOLGI
MAIL CENTER

UHU, KE IPOTSA GORE MOLATO KE ENG.

CENT

25:47s



25:46s



A O KITSO?



KE TSHWERE
LEKWALO LA GAGO.



LAME?



LE TSWA KO
BAGAKENGI!



GO KITSO!

O AMOGESEGILE MO CELL-TOWN. JAAKA O BONA, KE LEFelo LE GO NANG LE TIRO E NTSI. O MO METSINYANENG A NNANG MO KAROLWANENG E AGANG SETSHEDI, KAGO NNGWE LE NNGWE KE ORGANELLE. ORGANELLE NNGWE LE NNGWE E NA LE TIRO GO TSAMAISA SENTLE KAROLWANA E AGANG SETSHEDI.

KA GO RIALO O TLA TSHWANELA KE GO UPULOLA TSE DINGWE O LE NOSI. ... LORAKO LWA KAROLWANA E AGANG SETSHEDI LO KGORELETSA PUISANO YA RONA, KA JALO GA RE KGONE GO GO TSHWARA MO TSHUPA NAKONG. O SEKA WA TSHWENYEGA, RE A BAAKANYA. GO NE JAANONG DIRISA SE O SE ITHUTILENG GO BATLA TSELA YO GO TSWA FA. RE TLA NNA RE LEKA GO IKGOLAGANYA LE WENA.

RE GO ELETSA MASEGO I

GO TSWA KO SETLHOPHENG SA GENOME ADVENTURES

KE DIKGANG TSE DI
SENG MONATE?

KE TSHWANETSE GO
BATLA TSELA YA GO
TSWA FA. MME GA KE
ITSE GORE KE
SIMOLOLA KAE!

O SEKA WA TSHWENYEGA NNAKA.
SE O TLHOKANG GO SE DIRA KE
GO BATLA PASA.

21:45

O BONA RIBOSOMES
TSELE? O KA BONA
PASA TENG.

KE A LEBOGA
RRE MAILMAN!

AHA, PASA YAME! JAANONG
KE TLA LALA KE E NTSHITSE
JANG MO TENG?

O TSHWANETSE WA
TOBETSA DINOMORO
TSE DI MALEBA.

O A DI ITSE
DINOMORO
TSA TENG?

NYAA. MME O KA
BATLISISA GORE
KE DIFE.

KE KADIRA JALO
KAE?

KO MOTLOBONG
WA DIBUKA
AKERE!

MOTLOBO WA
DIBUKA?

EE, NTLO YA KITSO, BOBOKO JO
BOTONA, KO DITAELO DI
TSWANG TENG, LEGALE GO
BIDIWA "NUCLEUS" (BOROBE
JWA KAROLWANA E NNYE YA

SETSHEDI). NUCLEUS E TLETSE
KITSO E E BOTLHOKWA LE
MAINANE A A MONATE THATA.
LEGONE, KE YONE KAGO E E
BOTLHOKWA THATA MO
CELL-TOWN OTLHE!

WOW, KE TSHWANETSE GO
NNA KE ETELA MOTLOBO
WA DIBUKA MAKGETHO ALE
MANTSI TOTA. KEA LEBOGA!

17:53s



15:34s



KE KA GO THUSA?

KE BATLANG LE TLHARABOLOLO YA GO TSWA FA.

E KO DIBUKENG KO GODIMO, O LEBE GENE 2.67. O LATEDISE DINOMORO.



13:06s



INTSHWARELE. A O LEMOGILE GORE SEBEELO SE SA DIBUKA SE TSHWANA LE DNA?

THAAKA!



SHHH! KE LEKA GO BALA.



EE DI A TSHWANA. NUCLEUS KE GONE KO DNA YA GAGO E NNA TENG. FA RE SOBOKA DIDNA DI BIDIWA GENOME. O MOSHA FA AKERE?

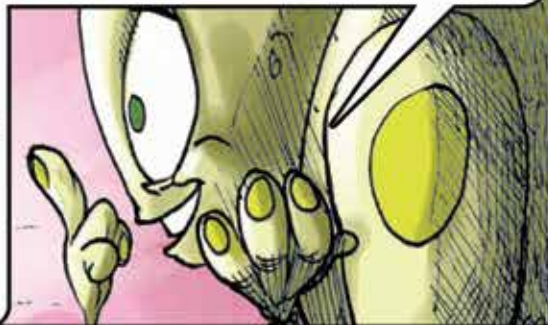
EE.



KE YA GO BONA JANG
TLHARABOLOLO YA GENE
2.67?

GO MOTLHOFO GO NA LE JAAKA O AKANYA. GO NA LE
DI-GENE DI LE DIKETEKETE MO TENG GA NUCLEUS, GO
NNETE, MME LODI NNGWE LE NNGWE E NA LE DIPALAMO
DI LE MASOME A MANE LE BORATARO.

MASOME A MABEDI LE
BORARO GO TSWA MO
MOTSADING O MONGWE,
DI BIDIWA CHROMOSOMES.
LEKA GO BATLA O BONE
GORE O KA SEKA WA BONA
SEPALAMO 2, O BO O
LATELA DINOMORE TSEO
GO YA KO GO GENE 2.67.



KE ELE!

EHEE, JAANONG BATLA BUKA
YA GENE 2.67.

EMA PELE, TLHARABOLOLO E YA
SEPHIRI E DIRILWE KA DINOMORE
TSE WATSON LE CRICK BA NA LE
TSONE FA BA UPOLOLA DNA- **A,T,C,G**.



10:00s

A KELOTLHOKO E NTLA. JAAKA
O BONA, DITLHARABOLOLO
TSA SEPHIRI DI BOELA MO
DITHAKENG DI LE NNE.

JAANONG.. SE KE TSHWANETSENG
GO SE DIRA KE GO TLISA BUKA E
KO DIRIBOSOMES, KE TSENYE
NOMORE YA SEPHIRI KE BO KE
AMOGELA PASA YAME YA GO BOELA
GAE.

KE LEBOGA THATA!



EMA PELE NGWANAKA, GA O
KAKE WA NTSHETSA DIBUKA
TSE KO NTLA GA MOTLOBO
WA DIBUKA.

MME KE TLHOKANA
LE NOMORE E YA
SEPHIRI TO BOELA
GAE.

O KA DIRA MERITI FALE.



07:58s

EMA PELE, KE ENG ELE BO U GO SENA BO T? A MOCHINE O ROBEGILE? KA BO LESEGO LAME.



FA O DIRA MERITI, BO T BOTLHE BA NNA BO U. U O EMETSE URACIL GAPE KE MORONGWA O BOTOKA GO NA LE THIAMINE.



EISH, KE A LEBOGA MMA. O BOLOKA MATSHELO.



O TLHOKOMELE JAANONG.

KITSO, KE A IPOLE TSA FA O RE UTLWA KAYA GORE O SIAME.



05:51s

WELANG DIBETE BANNA, KE SIAME. GA O KAKE WA DUMELA LOETO LE LE KGATLHISANG LE KE NNILENG LE LONE. BONA SE!



O UPULOTSE TSELA YA TRANSCRIPTION, O DIRILE SENTLE.



GO NE GO LE MOTLHOFO. KE NTSIFADITSE MERITI YA NOMORE YA SEPHIRI YA DNA.



MERITI EO E BIDIWA RNA.



JAANONG SE KE TSHWANETSENG GO SE DIRA KE GO ISA NOMORE E YA SEPHIRI KO DIRIBOSOMES.

EE! FA O TSENYA NOMORE YA SEPHIRI YA RNA E O E RARABOLOTSENG, DIRIBOSOME DI TLA FELELE TSA TSELA YA TRANSLATION, DI BO DI NTSHA MATUTE A O A BATLANG- PASA E O TLA E TLHOKANG GO TSWA MO KAROLWANENG YA SETSHEDI.



O DIRILE BONTLE, KITSO!



04:14s



KE TLA UTLWA BOTLHOKO GO TSAMAYA. GO MONATE TOTA, THATA THATA MOTLOBO WA DIBUKA. ERR... NUCLEUS.



O ETELE MOTLOBO WA DIBUKA GAUFI LE WENA FA O GOROGA KO GAE.



EMA PELE, E GA SE PASA YAME YA GO BOELA GAE! GO DIRAGETSE ENG?

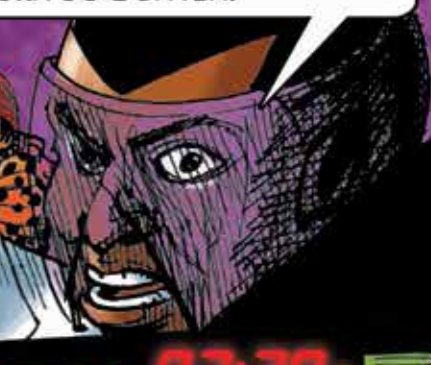


IJA! O KATSWA O DIRILE NOMORE YA SEPHIRI YA RNA E FETOILENG POPEGO (MUTATION) FA O NTSIFATSA.

GO FETOGA GA POPEGO KE FA GO FETOGA NOMORE YA SEPHIRI- GO TLHAKANA, GO SUTLHEGA KANA GO IPAAKANYA GAPE MO GO FELETSANG KA MATUTE A PHAROLOGANO.



O TSHWANETSE O NA LE TSEBE E TLHAELANG! O TSHWANETSE GO BOELA MOTLOBONG WA DIBUKA GO E BATLA.



A KE YA GAGO?



KE A LEBOGA MMA. O...



KE BOLOKA MATSHELO? KE A ITSE.



03:20s



KE A GO AKGOLA KITSO. O KGONNE. TSAMAYA O YE KO VESICLE STATION. BATHO



BA BA GONE KWA BA TLA GO THUSA GO YA GAE.



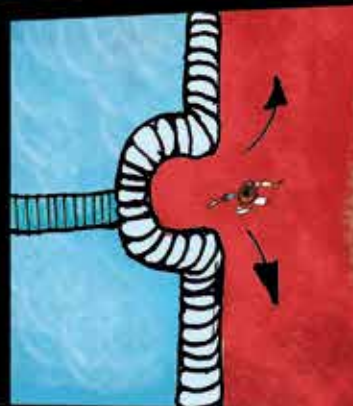
02:22s



KITSO! FA O TSHWERE PASA, SEPALAMO SA GAGO KE SE.

EE, RRA!

01:53⁵



01:18⁵



O KGONNE KITSO! O NNE MOTLOTLO KA WENA. A O IPAAKANTSE GO TSWA MO MMELENG WA MOTHO GO YA GAE?

KE JELE MONATE, MME KE AKANYA GORE KE WEDITSE LOETO LAME.

HEE BANNA! A TEBEGO E SA TLWAELESEGANG YA KAROLWANA E NNYE YA SETSHEDI! E LEBEGA JAAKA PANANA.



TSHABA, BONA KOO!



A SE KE SONE SE KE AKANYANG GORE KE SONE?

00:05⁵



DIKAROLONYANA TSE DI NNYE TSA SETSHEDI TSA TEBEGO E SA TLWAELESEGANG TSE DI LEBEGANG JAAKA PANANA KE ENG? A KITSO O TLA KGONA GO TSWA A TSHELA? A O TLA BOELA KO SELEKANYONG SA GAGWE SA GALE? NNA O TLHWAILE TSEBE MO KGATISONG E LATELANG YA BUKANA YA GENOME ADVENTURES GO BATLISISA!

GO-RIBOLOLA NOMORE YA SEPHIRI: KITSO O UPULOLA KA DNA LE SEGOTSO
E GATISITWE MO BOTSWANA KE BA BOTSWANA-BAYLOR CHILDREN'S CLINICAL CENTRE OF
EXCELLENCE
KGAOLO YA NTLHA, E GATISITWE LANTLHA KA 2015
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DITEBOGO

BATLHAMI LE BATSHWANTSHI: ABRAHAM MAMELA, ALBERT LEKGABA, EDWARD PETTITT

BAKWADI: STEPHEN ALEXANDER MANNING, NATASHA MORAKA, JONATHAN STRYSKO,
TSWELELOPELE MASUTLHA, TIERRA HOLMES, AAMIRAH MUSSA,

BAGAKOLODI BA TSA BORANYANE: MASEGO TSIMAKO-JOHNSTONE, SEBALD VERKUIJL

BATHUSI BA TIRO E: THATO REGONAMANYE, TAPIWA KANGWA, DR BATHUSI MATHUBA

BAKWADI BA BANANA BABA TSERENG KAROLO: ANNAH KETLAARENG

THUSO YA GO LOMAGANYA GO TSWA MO BABATLISISI BA BOTSWANA CAFGEN: SHEIK H. HASSAN (BOTSWANA
MUSLIM ASSOCIATION); CINDY KELEMI (BONELA: BOTSWANA NETWORK ON ETHICS, LAW, AND HIV/AIDS); NON-
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GENOME ADVENTURES

MOTSHAMEKO O WA GENOME ADVENTURES KE MENGWE YA MEGOPOLO LE THULAGANYO YA GO AKARETSA MERAPE YA COLLABORATIVE AFRICAN GENOMICS NETWORK (CAFGEN) MME E ROTLOEDIWA KE WELLCOME TRUST. CAFGEN KE LELOKO LA BOKOPANO JWA HUMAN HEREDITY AND HEALTH IN AFRICA CONSORTIUM (H3AFRICA) MME E RULAGANNGWA KE KOKELWANA YA BANA YA BOTSWANA-BAYLOR CHILDREN'S CLINICAL CENTRE OF EXCELLENCE (COE).

GENOME ADVENTURES E DIRISA DITHUTOPUISANYO GO ABELANA MEGOPOLO LE SETSHABA LE BATSAYA KAROLO, THUTO LE BOTAKI DIPOPAE, BOBEGA DIKGANG, LE SETSHABA KA KAKARETSA BOGOLO JANG BANANA GO RUTA KA BORANYANE JWA SEGOTSO LE DIPATLISISO. DIKAROLO TSETSA GENOME ADVENTURES DI IKAELELA GO RUTA SETSHABA KA DITSO TSA SEGOTSO LE KAMANO YA GONE LE BORANYANE JWA GO GOTSATSA, POPEGO LE TIRISO YA DNA LE DI-GENE (SEGOTSO), KAMANO YA BORANYANE JWA SEGOTSO LE BOTSOGO. E RUTA GAPE LE TSAMAISO YA GO TSAYA KAROLO MO DIPATLISISO TSA BORANYANE JWA BOTSOGO LE SEGOTSO GO AKARETSA LE TSAMAISO E E AMOGELESENGANG YA GOITETLA ONA LE KITSO MO DITLHOTLHOMISONG, TLHALOGANYO YA GO ROMELA LE GO BEWA SENTLE DIDIRISIWA KANA MADI A BATSAYA KAROLO LE GOTSAYA KAROLO GA SETSHABA.

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