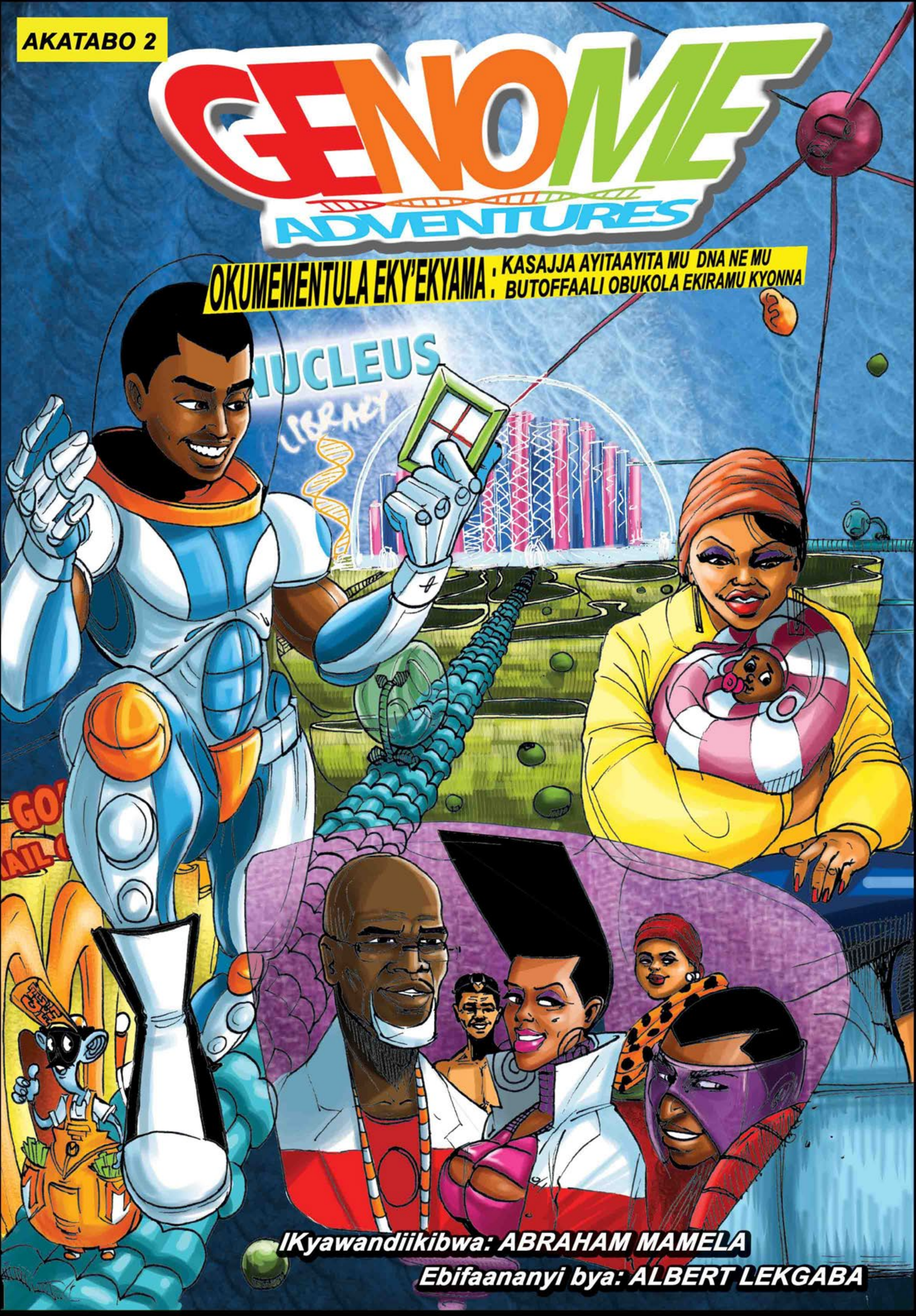
AKATABO 2

GENOME ADVENTURES

OKUMEMENTULA EKY'EKYAMA : KASAJJA AYITAAYITA MU DNA NE MU BUTOFFAALI OBUKOLA EKIRAMU KYONNA



IKyawandiikibwa: ABRAHAM MAMELA

Ebifaananyi bya: 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 broad-cast content aired in our national broadcasting media led by the MoESD. 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 Botswna-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 Batswana 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 noteable as Botswana is a signatory to the Southren 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 batswana, 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.*

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

KITSO

MULI MUTYA! NZE KASAJJA. MBEERA WANDEGEYA NE SSENGA. NJAGALA NNYO EBY'OKUVUMBULA! NNAZAALIBWA N'AKAWUKA AKALEETA MUKENENYA NAYE EKYO TEKINVUVUBA.

DR. MABOKO

NZE NKULIRA EKIBINJA EKIVUMBUZI KU BY'OBUTONDE BW'EBIRAMU (NAKAYONDO ABEERE NGA ABAGAMBA KI!) NNINA OBUSOBOZI OBUSAMAARZA OBUMPISA MU BISENGE NE MBUZAAWO SUKUUTA KANGE WANO ATE NENKADDIZAAWO ERI. SIKOMA AWO, MMANYA OMUNTU BY'ALOWOOZA!

KGOSIGADI

NDI MUKYALA ATEEMOTYAMOTYA ERA OMUKULEMBEZE WA BANTU BANGE OWA NNAMMADDALA, BA NNAYUGANDA. NNYINZA OKUBALABIKIRA NGA JJAJJAMMWE OWA BULIJJO, NAYE OMUGGO GWANGE GWENTAMBUZA GULINA AMAANYI AG'ENJAWULO AGAAVA MU BA JJAJJANGE! NGA NKOZESA AMAANYI GANO, NNYINZA OKULOGA ENKUBA, OKULAGIRIRA ENSOLO, N'OKUKOLA EBYEWUUYISA EBIRALA.

PHODISO

NZE PHILIPPA NAYE OYINZA OKUMPITA "SSENGA". BAABA BWE YAFA YANDEKERA OMWANA WE KASAJJA, ERA KASAJJA, MMWAGALA NGA BWE NJAGALA ABAANA BANGE ABALALA! TUBEERA FFENNA E WANDEGEYA, NGA WAKAVA OTI E KAMPALA TUYINZA N'OKUBEERA BALIRAANWA BO!

XGAO-TCGAI

NZE KWATA-MU NSAWO [OBA "KWATA" MU BUFUNZE]. NNENYUMIRIZA OKUBA OMUMBUTI- ABAMU ABANTU BANGE BABAYITA BA 'NNAKALANGA' OBA 'BUNNAKALANGA'. ERA NDI MUZIRA MU BAZIRA MU MAANYI G'OKUTAMBULIZA ABANTU MU BISEERA! ERINNYA LYANGE, NGA TOLIGENZE BUZIBA, LITEGEEZA 'OKULABA OKUSALA NG'AKAGIRITA', KUBANGA ENDABA YANGE NJOGI NGA AKAMBE AKOOGI ERA NSOBOLA N'OKULABA EBY'OMU MAASO!

MARANYANE

MMATLI

MULI MUTYA! NGA ERINNYA LYANGE, MAKANIKA, BWE LIRI, NJAGALA EBY'EMIKONO. MWEKEBEJJE OMUBIRI GWANGE! EKITUNDU EKIMU KYUMA ATE EKRALA MUNTU. MU BWONGO NSAZA BUSAZA ERA NJAGALA OKUKOESA EBIKOZESEBWA EBYAKAFULUMA!

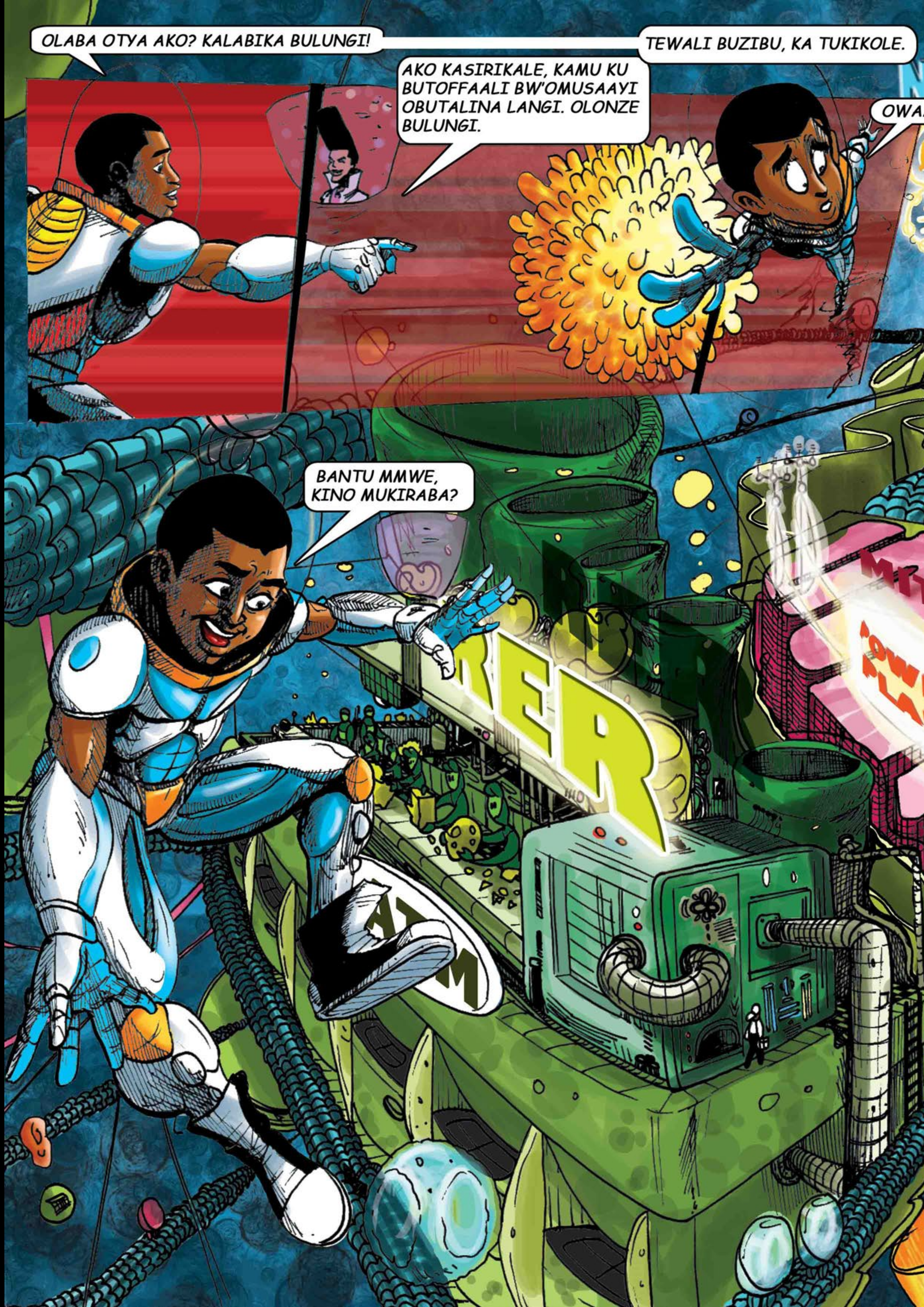
NZE NNANZIRI. NDI MUNOONYEREZA! NANGE NNINA AMAANYI AG'ENJAWULO AGASOBOLA OKUTONIYA EBINTU OKUBITUUSA KU BUNENE BW'EBIRABIBWA GAALBINDI EZIZIMBULUKUSA ZOKKA NG'OMWO MW'OTWALIDDE N'ABANTU! NJAGALA EBYEWUUNYO SSAAYANSI BY'ATUYAMBA OKUVUBULA ERA NNANDIYAGADDE OKULABA ABAWALA ABATO ABALALA MU UGANDA NGA BAFUUKA BA NNASSAAYANSI NGA NZE!

NGA TULINDIRIRA...KA TUDDE AWAKEBERERWA EBIGGYIBWA KU BALWADDE MU CAVENDISH E CAMBRIDGE.
KATI, KASAJJA, MU MYAKA GY'OLUKUMI MW'OLWENDA MU ATAANO (1950), BANASSAAYANSI BAALI BAMALA DDA OKUZUULA EBIKWATA KU MUSOMO
GW'ENKULA Y'EBINTU EBIRAMU NFAAFA, KYOKKA BAALI TEBANNAMEMENTULA EKY'EKYAMA EKIKUSIKE- OBUTOFFAALI OBUKOLA EKIRAMU KYONNA MU BULAMU.
ABALENZI ENVUUMUULO BOLENGERA WALI—WATSON NE CRICK—EKIROWOOZO NTI OBUTOFFAALI OBUKOLA EKIRAMU KYONNA BWAKULA NGA EKIMERA EKIRANDA EKIRINA OBUNYUSI OBULI MU KI- FAANANYI KY'EBIKOOLA.
OBUNYU-BIKI?
OBUNYUSI. BWE BUBBULOOKA OBUZIMBA OBUTOFFAALI OBUKOLA EKIRAMU KYONNA ERA NGA BULINA AMASIGA GA NGERI NNYA.
LWAKI EBY'ENFAANANA EBYO BIRAMBIDDWA A, T, C NE G?
GANO GE MASIGA ANA. GAYITIBWA ADENINE (A),
THYMINE (T), CYTOSINE (C), NE GUANINE (G). WATSON NE CRICK BAAKOZESA AMASIGA GANO OKULABA ENGERI EKY'EKYAMA EKIKUSIKE- OBUTOFFAALI OBUKOLA EKIRAMU KYONNA GYE BIKOLEGANIRA AWAMU

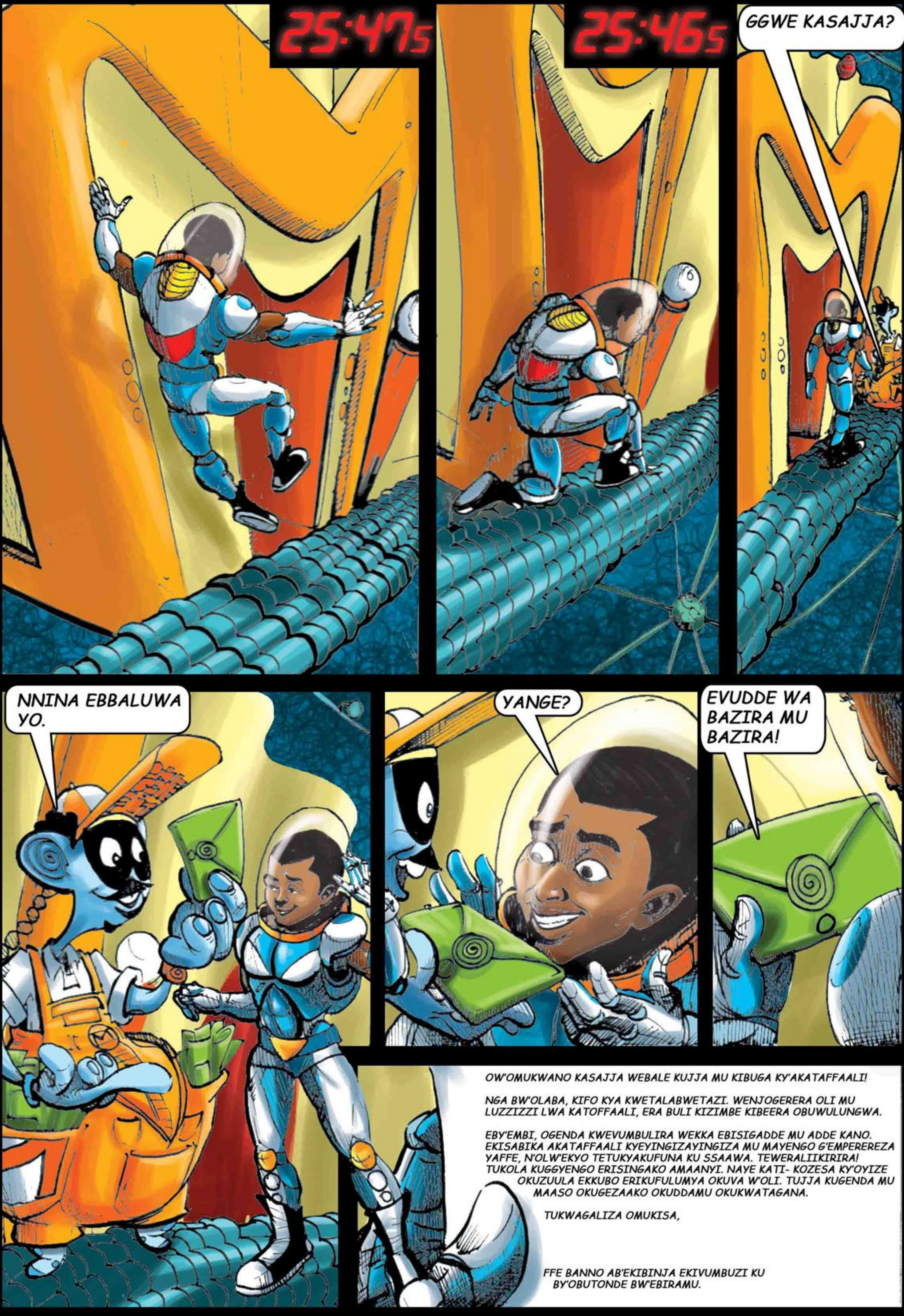
KY'EKYO? EKYO KYE EKYEKYAMA EKIKUSIKE KY'OBUTOFFAALI OBUKOLA EKIRAMU KYONNA? KIFAANANA NGA EDDAALA ERIRANGIDDWALANGIDDWA
EKYO KIYITIBWA DEOXYRIBONUCLEIC ACID, OBA DNA MU BUFUNZE, ERA ENFAANANA YAKYO ENNUNGI EYO EYITIBWA OKWEGOMBEZA KWA NNABANSANSAANA!
EMBU BBIRI EZ'OBUNYUSI ZERANGIRALANGIRA BULI LUMU KU LUNNAALWO, ERA BULI SSIGA OKUVA KU LUBU OLUSOOKA LYEKWATA NE LINNAALYO OKUVA KU LUBU OLW'OKUBIRI.
KYEKYO...KIYITIRIVU.
ESSIGA A LYEKWATA T NE C NE LYEKWATA G. KITEGEEREKEKA, KYEKYO?
OWANGE, KATI OMUKYALA OLI Y'ANI, ERA AKUTTE KI?
WATSON NE CRICK SI BE BALINA OKUTENDEREZEBWA OLW'OKUZUULA DNA. TOKIMANYI NTI ABASAJJA SI BE BOKKA ABASOBOLA OKUBEERA BA NNASSAAYANSI?!
OYO MWANNYINAZE-MUNNASSAAYANSI ROSALIND FRANKLIN, ERA AKUTTE EKISULE KYA DNA KYE YAKUBA.
BWE WETEGEREZA ENNYO, OYINZA OKUTEEBEEREZA ENDABIKA Y'OKWEGOMBEZA KWA NNABANSANSAANA.

EKITEGEEZA OMUKYALA YEYAVUMBULA ENFAANANA YA DNA?
EBIFAANANYI BINO BYALI BIKULU NNYO MU KUZUULA DNA, KATI KASAJJA KA NKULEKE GGWE OBA OMULAMUZI.
KATI, TUDDE EKA.
NAYE NZE NAKATI SINNABITEGEERA, KWATA YAGAMBYE NTI EKY'EKYAMA EKIKUSIKE EKY'OBUTOFFAALI OBUKOLA EKIRAMU KYONNA KIRI MU BULI MUNTU. EKYO KITEGEEZA NTI NNINA EDDAALA ERIFAANAN ENGERI MU NZE?
KATUZUULE, TUGENDE MU MAASO? AKAKUNIZO K'OMUZIRA MU BAZIRA!
KASAJJA EBY'OKUVUMBULA KWAFFE TEBIRIIKO WE BYATUUSE.
OGENDA KUYIGA BINGI DDALA!
TULINA ENTEGEKA.
ENTEGEKA Y'ERUWA?
NZIKIRIZZA, KATI OLWO ENTEGEKA ERUWA?
KANO KE KASEERA KOOBADDE OLINDIRIRA, OMUTO KASAJJA.
KYOKKA TONNABA KUMBUULIRA NTEGEKA! NTEGEKA KI?!?

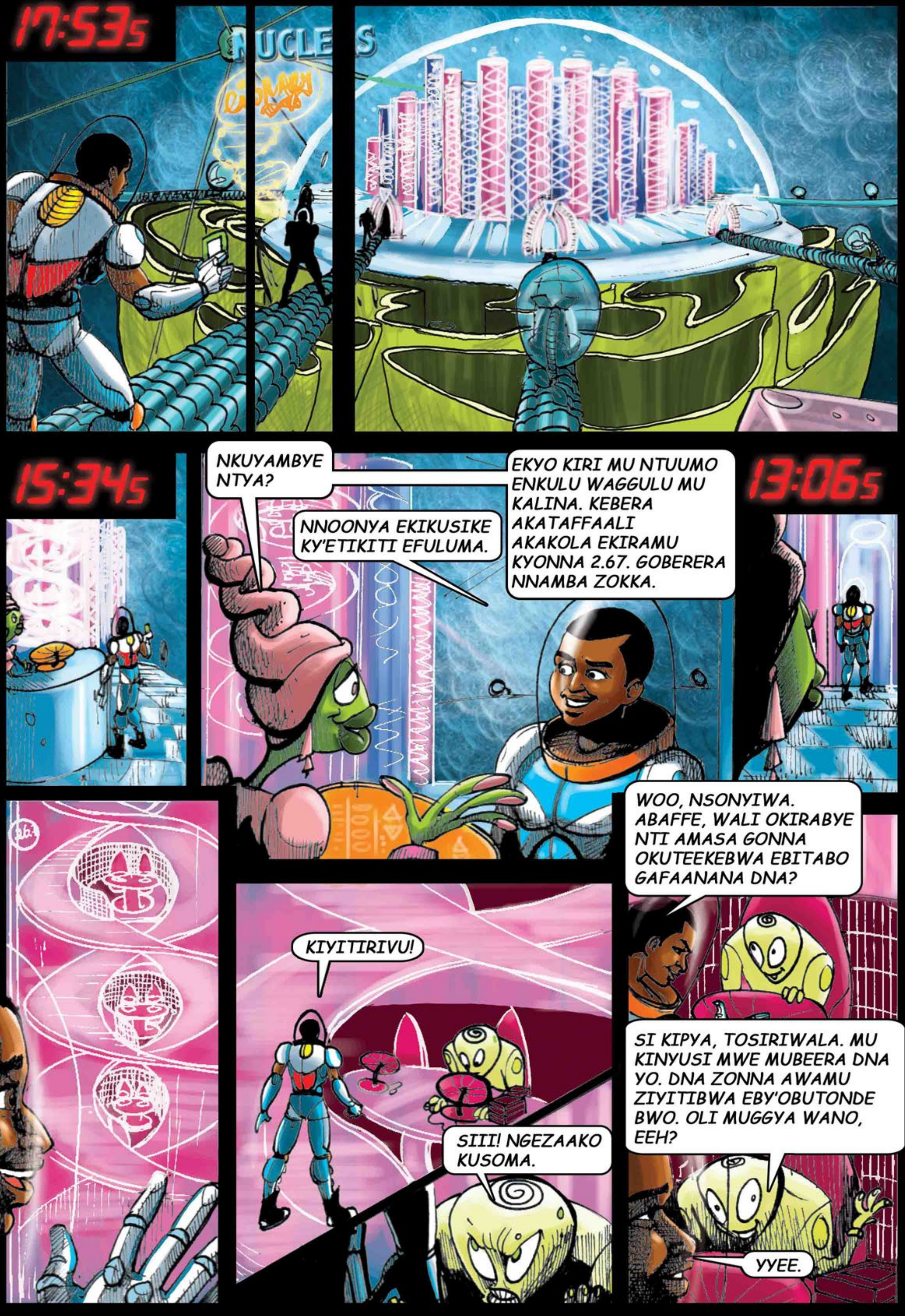
KINO KYE KISEERA OKULABA KIKI EKIBAAWO MU MUBIRI GW'OMUNTU GWE NNYINI. OKULABA EKY'EKYAMA EKIKUSIKE EKY'OBUTOFFAALI OBUKOLA EKIRAMU KYONNA N'AMAASO GO GENNYINI.
LINDAKO...TOTEGEEZA NTI...
EKYO KITUUFU.
TUGENDA KU KUSINDIKA MU MUSAAYI GWA TAMO KA KIZIBWE KO.
KYE KISEERA OKUKENDEERA OMULUNDI GUMU OBA EBIRI, KASAJJA.
KUKENDEERA? OWAA, KWATIRIRAKO AKATIKITIKI.
TOLABA BULUNGI DDALA EKY'EKYAMA EKIKUSIKE EKY'OBUTOFFAALI OBUKOLA EKIRAMU KYONNA NGA KIRABIKA KITI, OKIRABA?
KYOKKA OYAGALA OKULABA EKIKUSIKE, SI KYEKYO?
KA ŊŊAMBE, NEDDA...
KA ŊŊAMBE, YYEE...
TEWALI KUWANNAANYA AYAGALA! NNESIGA, TEKIRINA KABI KONNA. TUJJA KUKUYISA MU BULI MUTENDERA GWONNA. KALE, KWATIRA AWO.
TUJJA KUSOBOLA OKUWULIZIGANYA NGA TUKOZESA KINO. KUGEZESA, KUGEZESA EMU, BBIRI, SSATU. MUMPULIRA?
KALE, KATUKOLE KINO!
MWENYWEREZE KULI DDALA.

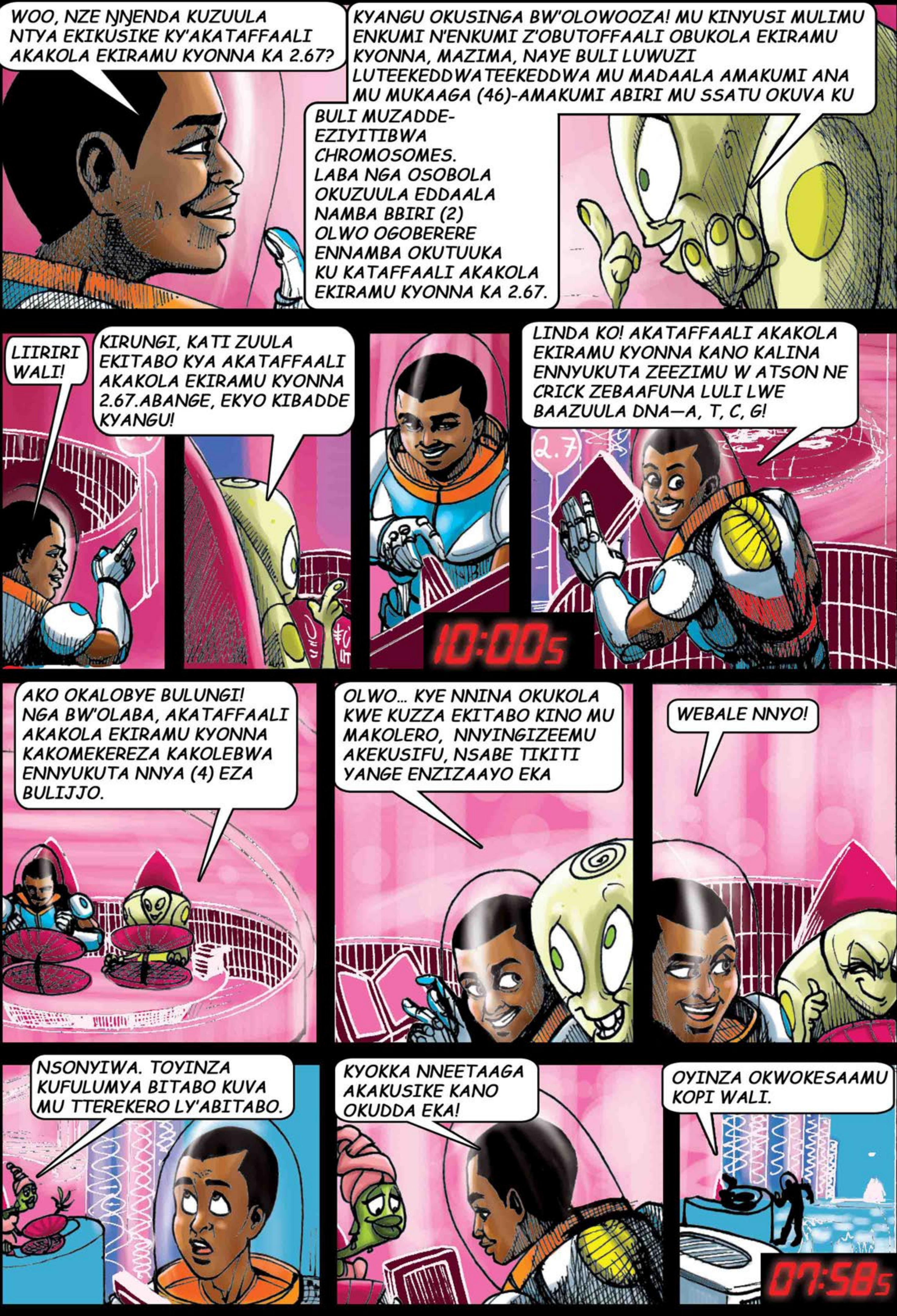

OLABA OTYA AKO? KALABIKA BULUNGI!
AKO KASIRIKALE, KAMU KU BUTOFFAALI BW'OMUSAAYI OBUTALINA LANGI. OLONZE BULUNGI.
TEWALI BUZIBU, KA TUKIKOLE.
BANTU MMWE, KINO MUKIRABA?

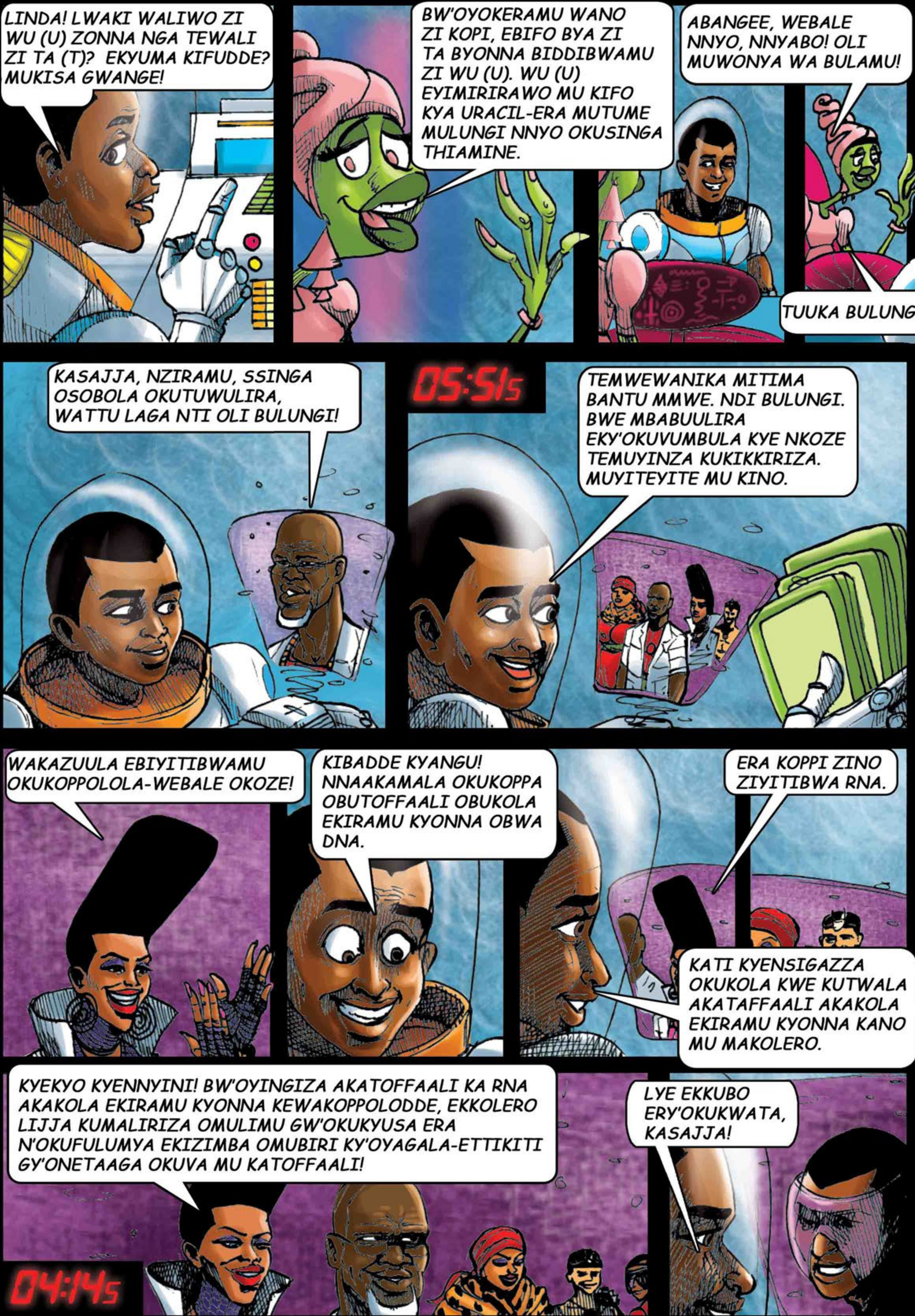
NUCLEAS
A!
BANTU MMWE?
LYSOSOME
RECYCLING
PLANT
TOCHONDRIA
OWANGE, NNEEWUUNYA KIKYAMU KI EKIBADDEWO.
GOLGI
MAIL CENTER


25:47s
25:46s
GGWE KASAJJA?
NNINA EBBALUWA YO.
YANGE?
EVUDDE WA BAZIRA MU BAZIRA!
OW'OMUKWANO KASAJJA WEBALE KUJJA MU KIBUGA KY'AKATAFFAALI!
NGA BW'OLABA, KIFO KYA KWETALABWETAZI. WENJOGERERA OLI MU LUZZIZZI LWA KATOFFAALI, ERA BULI KIZIMBE KIBEERA OBUWULUNGWA.
EBY'EMBI, OGENDA KWEVUMBULIRA WEKKA EBISIGADDE MU ADDE KANO. EKISABIKA AKATAFFAALI KYEYINGIZAYINGIZA MU MAYENGO G'EMPEREREZA YAFFE, N'OLW'EKYO TETUKYAKUFUNA KU SSAAWA. TEWERALIIKIRIRA! TUKOLA KUGGYENGO ERISINGAKO AMAANYI. NAYE KATI- KOZESA KY'OYIZE OKUZUULA EKKUBO ERIKUFULUMYA OKUVA W'OLI. TUJJA KUGENDA MU MAASO OKUGEZAAKO OKUDDAMU OKUKWATAGANA.
TUKWAGALIZA OMUKISA,
FFE BANNO AB'EKIBINJA EKIVUMBUZI KU BY'OBUTONDE BW'EBIRAMU.

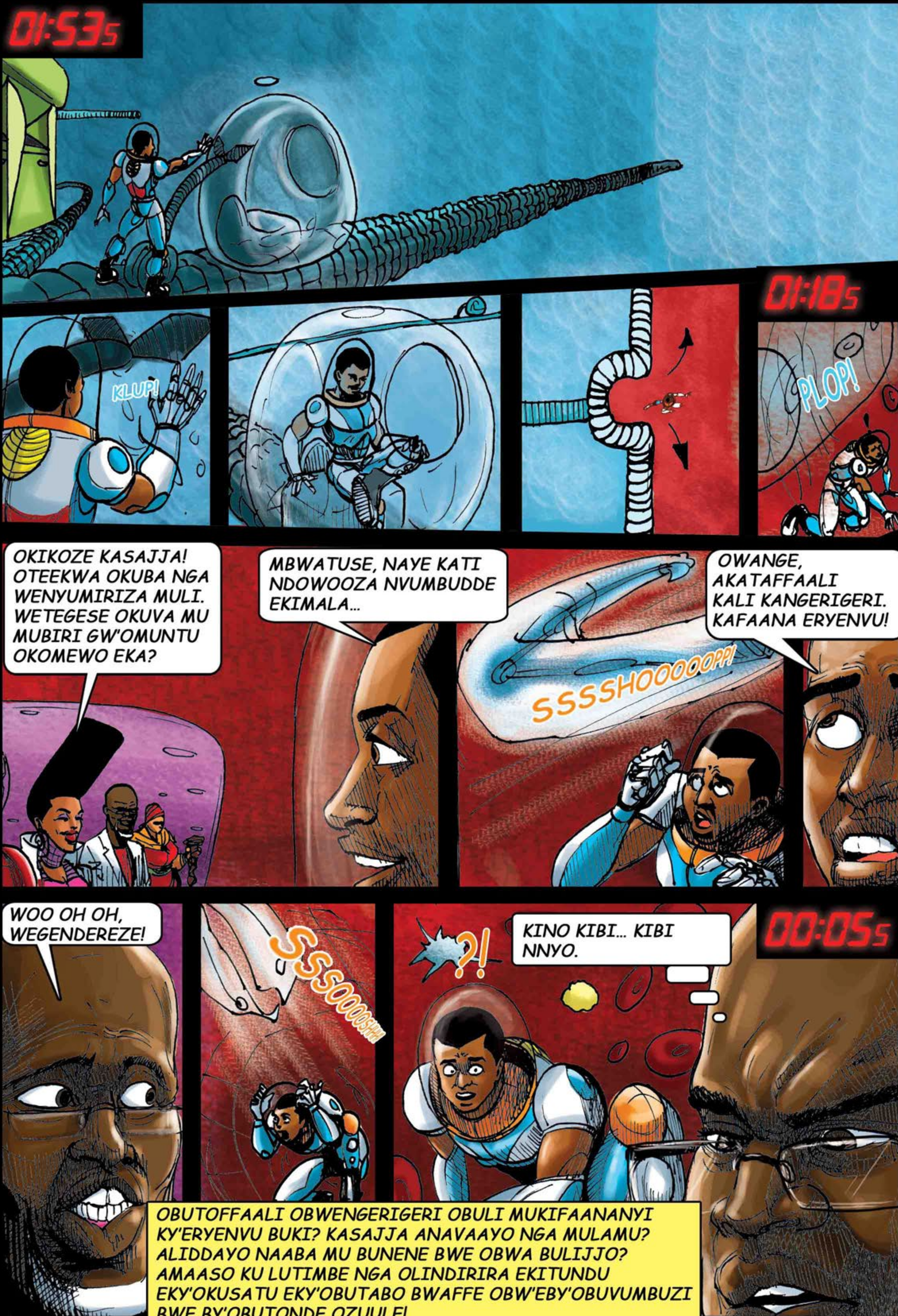
MAWULIRE MABI?
NNINA OKUFUNA ENGERI GYE NVA WANO. NAYE SSIMANYI NA WWA WENTANDIKIRA!
21:45s
KAANA GGWE, TEWERALIKIRIRA. KY'OLINA OKUKOLA KIRI KIMU KUGULA TIKITI.
OLABA AMAKOLERO AGO ERUDDA ERI? OYINZA OKUGULA EYO ETIKITI. OLABA AMAKOLERO AGO ERUDDA ERI? OYINZA OKUFUNA EYO ETIKITI.
ATM
MATALISI!
HAA, TIKETI YANGE! KAAKATI NSUUBIRWA KUGIGGYAYO NTYA?
OLINA KUYINGIZAAMU BUYINGIZA KAGAMBO AKAKUSIKE AKATUUFU.
AKAGAMBO AKAKUSIKE AK'ETIKITI EFULUMYA OKAMANYI?
NKWETEGULA. KYOKKA OSOBOLA OKUZUULA KYE KALI.
EKYO NKIKOLERA WA?
KU TTEREKERO LY'EBITABO, AWATALI KUWANJJAANYA!
ETTEREKERO LY'EBITABO?
KYEKYO, ENJU Y'OKUMANYA, OBWONGO OBUNENE, EWAVA BULI KIRAGIRO, MU NGERI ENDALA AWAMANYIDDWA NGA EKINYUSI.
KIJJUDDE EBIWANDIIKO EBY'AMAKULU N'ENGERO EZ'EWUUNYISA. MU MAZIMA, KABE KASINGE KY'EKIZIMBE EKISINGA OBUKULU MU KIBUGA KY'AKATOFFAALI KYONNA.
ABANGE, NJA KUSIIBANGA MU TTEREKERO LY'EBITABO. NNEYANZIZZA.


17:53s
NUCLEUS
15:34s
NKUYAMBYE NTYA?
NNOONYA EKIKUSIKE KY'ETIKITI EFULUMA.
EKYO KIRI MU NTUUMO ENKULU WAGGULU MU KALINA. KEBERA AKATAFFAALI AKAKOLA EKIRAMU KYONNA 2.67. GOBERERA NNAMBA ZOKKA.
13:06s
KIYITIRIVU!
SIII! NGEZAAKO KUSOMA.
WOO, NSONYIWA. ABAFFE, WALI OKIRABYE NTI AMASA GONNA OKUTEEKEBWA EBITABO GAFAANANA DNA?
SI KIPYA, TOSIRIWALA. MU KINYUSI MWE MUBEERA DNA YO. DNA ZONNA AWAMU ZIYITIBWA EBY'OBUTONDE BWO. OLI MUGGYA WANO, EEH?
YYEE.


WOO, NZE ŊŊENDA KUZUULA NTYA EKIKUSIKE KY'AKATAFFAALI AKAKOLA EKIRAMU KYONNA KA 2.67?
KYANGU OKUSINGA BW'OLOWOOZA! MU KINYUSI MULIMU ENKUMI N'ENKUMI Z'OBUTOFFAALI OBUKOLA EKIRAMU KYONNA, MAZIMA, NAYE BULI LUWUZI LUTEEKEDDWATEEKEDDWA MU MADAALA AMAKUMI ANA MU MUKAAGA (46)-AMAKUMI ABIRI MU SSATU OKUVA KU
BULI MUZADDE-EZIYITIBWA CHROMOSOMES. LABA NGA OSOBOLA OKUZUULA EDDAALA NAMBA BBIRI (2) OLWO OGOBERERE ENNAMBA OKUTUUKA KU KATAFFAALI AKAKOLA EKIRAMU KYONNA KA 2.67.
LIIRIRI WALI!
KIRUNGI, KATI ZUULA EKITABO KYA AKATAFFAALI AKAKOLA EKIRAMU KYONNA 2.67.ABANGE, EKYO KIBADDE KYANGU!
10:00s
LINDA KO! AKATAFFAALI AKAKOLA EKIRAMU KYONNA KANO KALINA ENNYUKUTA ZEEZIMU W ATSON NE CRICK ZEBAAFUNA LULI LWE BAAZUULA DNA—A, T, C, G!
AKO OKALOBYE BULUNGI! NGA BW'OLABA, AKATAFFAALI AKAKOLA EKIRAMU KYONNA KAKOMEKEREZA KAKOLEBWA ENNYUKUTA NNYA (4) EZA BULIJJO.
OLWO... KYE NNINA OKUKOLA KWE KUZZA EKITABO KINO MU MAKOLERO, NNYINGIZEEMU AKEKUSIFU, NSABE TIKITI YANGE ENZIZAAYO EKA
WEBALE NNYO!
NSONYIWA. TOYINZA KUFULUMYA BITABO KUVA MU TTEREKERO LY'ABITABO.
KYOKKA NNEETAAGA AKAKUSIKE KANO OKUDDA EKA!
OYINZA OKWOKESAAMU KOPI WALI.
07:58s


LINDA! LWAKI WALIWO ZI WU (U) ZONNA NGA TEWALI ZI TA (T)? EKYUMA KIFUDDE? MUKISA GWANGE!
BW'OYOKERAMU WANO ZI KOPI, EBIFO BYA ZI TA BYONNA BIDDIBWAMU ZI WU (U). WU (U) EYIMIRIRAWO MU KIFO KYA URACIL-ERA MUTUME MULUNGI NNYO OKUSINGA THIAMINE.
ABANGEE, WEBALE NNYO, NNYABO! OLI MUWONYA WA BULAMU!
TUUKA BULUNGI!
KASAJJA, NZIRAMU, SSINGA OSOBOLA OKUTUWULIRA, WATTU LAGA NTI OLI BULUNGI!
05:51s
TEMWEWANIKA MITIMA BANTU MMWE. NDI BULUNGI. BWE MBABUULIRA EKY'OKUVUMBULA KYE NKOZE TEMUYINZA KUKIKKIRIZA. MUYITEYITE MU KINO.
WAKAZUULA EBIYITIBWAMU OKUKOPPOLOLA-WEBALE OKOZE!
KIBADDE KYANGU! NNAAKAMALA OKUKOPPA OBUTOFFAALI OBUKOLA EKIRAMU KYONNA OBWA DNA.
ERA KOPPI ZINO ZIYITIBWA RNA.
KATI KYENSIGAZZA OKUKOLA KWE KUTWALA AKATAFFAALI AKAKOLA EKIRAMU KYONNA KANO MU MAKOLERO.
KYEKYO KYENNYINI! BW'OYINGIZA AKATOFFAALI KA RNA AKAKOLA EKIRAMU KYONNA KEWAKOPPOLODDE, EKKOLERO LIJJA KUMALIRIZA OMULIMU GW'OKUKYUSA ERA N'OKUFULUMYA EKIZIMBA OMUBIRI KY'OYAGALA-ETTIKITI GY'ONETAAGA OKUVA MU KATOFFAALI!
LYE EKKUBO ERY'OKUKWATA, KASAJJA!
04:14s

MUBUTUUFU NJA KUNAKUWALAMU BWE NNAAVA MU KIFO KINO. KIRUNGI NNYO, OKUSINGIRA DDALA, ETTEREKERO LY'EBITABO EEH... EKINYUSI.
BW'ODDANGAYO EWAMMWE OYITAAYITANGAKO MU TTEREKERO LY'EBITABO LY'EYO.
LINDA KO, ENO SI YE TIKITI YANGE ENZIZAAYO EKA! KIKI EKYAGUDDE WO?
OOOH KITALO, OYINZA OKUBEERA NGA WATONZE AKATAFFAALI KA RNA AKAKOLA EKIRAMU KYONNA AKAGINGIRIRE BWE WABADDE OYOKYAMU.
OKUGINGIRIRA KUBA KUKYUSA MU KATAFFAALI AKAKOLA EKIRAMU KYONNA—OKUKAGATTAKO, OKUKAKUTULAKO OBA OKUKYUSAAKYUSA MU NGERI GYE KATEGEKEBWAMU EKIKAVIIRAMU OKUBEERA EKIZIMBA OMUBIRI EKY'ENJAWULO DDALA.
KIYINZIKA OKUBEERA NTI WALIWO OMUKO GW'OLUPAPULA GW'OTOLINA! OJJA KWETAAGA OKUDDAYO MU TTEREKERO LY'EBITABO OKULUZUULA.
03:20s
LUNO LULWO?
WEBALE MAAMA OLI......
MUWONYA WA BULAMU? NKIMANYI.
KULIKA, KASAJJA. OKIKOZE! LALAMBALA NGA ODDA MU PAAKA AWASAABALIRWA.
B'ONOSANGA EYO BAJJA KUKUYAMBA OKUDDA EKA.
KASAJJA! OFUNYE TTIKITI YO! EKYOMBO KYO KIIKINO.
02:22s
YYEE, SSEBO.


01:53s
KLUP!
01:18s
PLOP!
OKIKOZE KASAJJA! OTEEKWA OKUBA NGA WENYUMIRIZA MULI. WETEGESE OKUVA MU MUBIRI GW'OMUNTU OKOMEWO EKA?
MBWATUSE, NAYE KATI NDOWOOZA NVUMBUDDE EKIMALA...
SSSSHOOOOOOPP!
OWANGE, AKATAFFAALI KALI KANGERIGERI. KAFAANA ERYENVU!
WOO OH OH, WEGENDEREZE!
SSSOOOOOSHH!
?!
KINO KIBI... KIBI NNYO.
00:05s
OBUTOFFAALI OBWENGERIGERI OBULI MUKIFAANANYI KY'ERYENVU BUKI? KASAJJA ANAVAAYO NGA MULAMU? ALIDDAYO NAABA MU BUNENE BWE OBWA BULIJJO? AMAASO KU LUTIMBE NGA OLINDIRIRA EKITUNDU EKY'OKUSATU EKY'OBUTABO BWAFFE OBW'EBY'OBUVUMBUZI BWE BY'OBUTONDE OZUULE!

EBINNYONNYOLA

EBIKOZESEBWA MU SSAAYANSI

ESSIGA- ESSIGA ERIZIMBIZIBWA ERYA DNA. AMASIGA ANA GE GA ADENINE, GUANINE, THYMINE, CYTOSINE.

OLUBUBI LW'AKATAFFAALI- AKABIRI KOOBUTONDE AKATONO AKAAWULA EBIRI MUNDA Y'AKATAFFAALI KU BIRI EBWERU WAAKO.

CHROMOSOMES- OBUWUZI OBUTEREEVU OBWA DNA OBUSANGIBWA MU KINYUSI KY'OBUTOFFAALI OBULAMU OBUSINGA, OMUBEERA AMAWULIRE G'EKY'EKYAMA EKIKUSIKE MU NKULA EY'OBUTOFFAALI OBUKOLA EKIRAMU KYONNA.

CYTOPLASM OLUZZIZZI- AMAZZI AGAFAANA AGE EGGI AGAJJUZA AKATAFFAALI ERA NEKASABIKIBWA AKABUBI KAAKO.

DNA- DEOXYRIBONUCLEIC ACID; ETTU OMUBEERA ENDAGIRIRO EZISINGA EZETAAGIBWA OLW'OKUKULAKULANYA N'OKUSOBOZESA OKUKOLA KW'EBINTU EBIRAMU OBUNYUSI-OBUSIGA OBUZIMBA DNA NE RNA.

EBY'OBUTONDE BW'EBINTU EBIRAMU- DNA YENNA ASANGIBWA MU CHROMOSOMES Z'EKINTU EKIRAMU AWAMU AYITIBWA EBY'OBUTONDE BW'EBINTU EBIRAMU.

GOLGI- AKAWULUNGWA, AKAKOLEBWA ENTUUMU Y'OBUSAWO OBUBYATATAZIBBWA, OBWENYIGIRA MU KUKYUSAKYUSA WAMU N'OKUTEGEKA EBIZIMBA OMUBIRI.

HELIX- EKIGUWA EKIZINGEZINGE EKYA DNA NGA KIKOLEBBWA OBUGUWA BWA DNA OBULALA OBUYUNGIBWA EBIYITIBWA EBIFUNDIKWA BYA HYDROGEN.

LYMPHOCYTES- EKIKA KY'OBUSIRIKALE, BW'OMUSAAYI OBUTALINA LANGI OBUKOLA OMULIMU OGW'AMAANYI MU KUTUKUUMA NGA TULI BALAMU.

OKUGINGIRIRA- KUBA KUKYUSA MU KATAFFAALI KA DNA AKAKOLA EKIRAMU KYONNA OKUKAGATTAKO, OKUKAKUTULAKO OBA OKUKYUSAAKYUSAAMU EKIVAAMU OKUKOLA EKIZIMBA OMUBIRI EKY'ENJAWULO.

EKINYUSI- AKAWULUNGWA AKEETOOLODDWA EMBUBI EBBIRI, AKASANGIBWA MU BUTAFFAALI OBULAMU OBUSINGA, AKABEERAMU EBIKOZESEBWA OBUTOFFAALI OBUKOLA EKIRAMU KYONNA EKYA DNA.

ORGANELLE- AKAWULUNGWA, AKAMU KUBUNTU OBUNGI OBUZINGIDDWA MU BUBUBI OBUKUGUKA MU KUKOLA EMIRIMU EGY'ENJAWULO MU LUZZIZZI LW'AKATAFFAALI.

EBIZIMBA OMUBIRI- BINO BIBA BIRIMBA EBIKOLEDDWA MU LUJEGERE OBA ENJEGERE Z'AMASIGA. ENSENGEKA Y'AMASIGA GEGASALAWO ENGERI OBUNYUSI GYE BUSENGEKEBAWAMU MU EKY'EKYAMA KYA DNA.

AMAKOLERO- EBYUMA EBIZIBU OKUNNYONNYOLA EBISANGIBWA MUNDA YA BULI KATAFFAALI AKALAMU OMUKOLERWA EKIZIMBA OMUBIRI.

RNA- RIBONUCLEIC ACID; EKIRUNGO EKIBEERA MU BUTOFFAALI BWONNA OBULAMU ERA NE BUWUKA OBUSIRIKITU OBUTALABIBWA YADDE GALUBINDI EZIZIMBULUKUSA EZA BULIJJO OBUSINGA OBUNGI, EKYETAAGIBWA MU KUKOLA EKIZIMBA OMUBIRI.

OKUKOPPOLOLA- OMUTENDERA OGUYITIBWAMU OKUKOLA EBIZIMBA OMUBIRI EDDANGO YA DNA WEKOZESEBWA OKUKOLA RNA.

OKUKYUSA- OMUTENDERA OGUYITIBWAMU OKUKOLA EBIZIMBA OMUBIRI MU MAKOLERO.

VESICLE- AKASAWO AKAKOLEDDWA MU MBUBI AKABA KATEEKEDDWA MU BUTOFFAALI BW'EBIMERA OBA OB'EBISOLO OMUTEREKEBWA OBA OMUYITIRA EBIVA MU MMERE EMEMENTEDDWAMENTEDDWA.

X-RAY CRYSTALLOGRAPHY- OKUKUBA OBUYINJA EKIFAANANYI KYA EKISULE
ENO NKOLA ENOONYA EKIFAANANYI KY'OBUYINJA OBA OBUTUTTWA BW'OBUTONDE OKUGEZA NGA DNA.

OKUMEMENTULA EKY'EKYAMA : KASAJJA AYITAAYITA MU
DNA NE MU BUTOFFAALI OBUKOLA EKIRAMU KYONNA.
EKYAWANDIIKIBWA MU NSI BOTSWANA MU KIRINIKA Y'ABAANA BOTSWANA-BAYLOR
OMUTENDERA OGUSOOKA (1.0), KYASOOKA KUFULUMIZIBWA MU 2015 OBWANNANYINI ©
BOTSWANA-BAYLOR CHILDREN'S CLINICAL CENTRE OF EXCELLENCE 2015

OKWEBAZA

ABATONDAWO PULOJEKITI N'ABAGIYIIYA: ABRAHAM MAMELA, ALBERT LEKGABA, EDWARD PETTITT

ABAWANDIISI B'OMUZANNYO: STEPHEN ALEXANDER MANNING, NATASHA MORAKA, JONATHAN STRYSKO, TSWELELOPELE MASUTLHA, TIERRA HOLMES, AAMIRAH MUSSA

ABAKUŊŊAANYA BE BY'OBUSAWO/BE BYA SSAAYANSI: MASEGO TSIMAKO-JOHNSTONE, SEBALD VERKUIJIL

ABAYAMBI MU PULOJEKITI: THATO REGONAMAYE, TAPIWA KANGWA

ABAVUBUKAABALINA KYE BASSAAMU: ANNAH KETLAARENG

ABANOONYEREZA MU CAFGEN (BOTSWANA-BAYLOR CHILDREN'S CLINICAL CENTRE OF EXCELLENCE): GABRIEL ANABWANI, MBCHB, MMED, MSCE, FRCPE; MOGOMOTSI MATSHABA, MBBCHEAO, BMEDSCI; KEOFENTSE MATHUBA; OLEKANTSE MOLATLHEGI; ABHILASH SATHYAMOORTHI; JOHN FARIRAI; LEANO PHETOGO; KENNEDY SICHONE; MASUTLHA TSWELELOPELE, CLINS MMUNYANE, PINKIE GOBUAMANG

AKAKIIKO AK'ABAWI BA CAFGEN AMAGEZI AB'OMUKITUNDU: SHEIK H. HASSAN (BOTSWANA MUSLIM ASSOCIATION); TIDIMALO DENNIS (BOPHA: BOTSWANA PUBLIC HEALTH ASSOCIATION); CINDY KELEMI (BONELA: BOTSWANA NETWORK ON ETHICS, LAW, AND HIVIAIDS; IRENE KWAPE (BOCAIP: BOTSWANA CHRISTIAN AIDS INTERVENTION PROGRAMME); PHENYO MAHUMA (BCC: BOTSWANA COUNCIL OF CHURCHES); ALICE MOGWE (DITSHWANELO: THE BOTSWANA CENTRE FOR HUMAN RIGHTS); KGORELETSO /NAKAYONDO MOLOSIWA (BONEPWA+: BOTSWANA NETWORK FOR PEOPLE LIVING WITH LLLV AND AIDS); ONKEMETSE MONTSHEKI (CHILDLINE BOTSWANA); JOB MORRIS (SAN YOUTH NETWORK); KAGO MOTEKETELA (YOUTH MEMBER); BUYANI ZONGWANI (MISA: MEDIA INSTITUTE OF SOUTHERN AFRICA)

OKKUVUNULA O'LUNGEREZA KWAKOLEBWA: JACQUELINE BALUNGI KANYWA, ISREAL KALYESUBULA
OKKUVUNULA O'LUGANDA KWAKOLEBWA: MUGEMBA JAMES KATUMBA, PATRICK MASEMBE

OKWETEGULA

YADDE TUKOZE EKISOBOKA OKULABA NTI SSAAYANSI AKOZESEBBWA YOOYO OMUTUUFU, EBIWANDIIKIBBWA MU KITABO KINO TETEGEEZA NTI MAGEZI AGAWEEBWAKU BY'OBULAMU. ETTEEKA GYE LIVA NE GYE LIKOMA, ABAWANDIISI N'ABAAKUBA MU KYAPA EKITABO KINO N'ABAKOZI BAABWE TEBAKKIRIZA OKUVUNAANYIZIBWA EBY'OBULABE, EBY'OKUFIIRIZIBWA OBA EBY'OKWONOONA BYONNA EBINATUUKA KU MUNTU EYESIGAMA ENNYO KU BYE TUWANDIISE.

EKITABO KINO TWAKISSAAKO ENVUMBO

TEWALI KITUNDU KY'EKITABO KINO EKIJJA OKUWANDIIKIBWA NATE, OBA OKUTEEREKEBWA MU BYUMA BI KALIMAGEZI OKUKISOBOZESA OKUGGULIBWAWO NATE MU BYUMA EBIRALA OBA OKUWEEREZEBWA MU NSABIKA EYA BULI NGERI OBA OKUYISIBWA MU MIKUTU EGITALI GIMU NGA OKUYITA KU MUTIMBAGANO, OKWETIKKIBWA, OKUKOPPOLOLWA, OKUKWATIBWA KU KATAMBI OBA MU KUYITA MUNGERI ENDALA ZONNA AWATALI KUWEEBWA LUKUSA OKUVA KIRINIKA Y'ABAANA EYA BOTSWANA ESANGIBWA KU KIBANJA 1836 KU LUGUUDO HOSPITAL WAY, MU DDWAALIRO PRINCESS MARINA HOSPITAL, KU NDAGIRIRO PRIVATE BAG BR 129, GABORONE, BOTSWANA

OBUVUMBUZI BWE BY'OBUTONDE BW'EBINTU EBIRAMU KYA KUYIIYA KYA COMMUNITY ENGAGEMENT INITIATIVE OF THE COLLABORATIVE AFRICAN GENOMICS NETWORK (CAFGEN) EKISASULIRWA WELLCOME TRUST. CAFGEN KIRI MU KIBIINA KYA HUMAN HEREDITY AND HEALTH IN AFRICA CONSORTIUM (H3AFRICA) ERA KIKUBIRIZIBWA AB'EDDWAALIRO LY'ABAANA ERIYITIBWA BOTSWANA-BAYLOR CHILDREN'S CLINICAL CENTRE OF EXCELLENCE (COE). OBUVUMBUZI BWE BY'OBUTONDE BW'EBINTU EBIRAMU KIKOZESA AMASOMO AGAFUULA ABANTU OKUBEERA AB'OBUSOBOZI, EMIZANNYO EGIYIGIRIZA, WAMU N'EMPULIZIGANYA EZ'OLUKALE OKUKUNGA ABATUUZE BE KIKWATAKO, BANNAMAWULIRE ERA N'ABANTU BONNA OKUTWALIRA AWAMU- OKUSINGIRA DDALA ABAVUBUKA- MU ESSOMO MU MUSOMO GW'ENKULA Y'EBINTU EBIRAMU NE MUKUNOONYEREZA KU BY'OBUTONDE BW'EBY'OBUSAWO. EKIGENDERERWA KY'OBUTABO BWAFFE OBW'EBYOBUVUMBUZI BWE BY'OBUTONDE BW'EBIRAMU KWE KUSOMESA ABASOMI EBYAFAAYO BY'ENSIKIRANO N'OMUSOMO GW'ENKULA Y'OMUNTU, ENKULA N'ENKOLA YA DNA N'OBUTOFFAALI OBUKOLA EKIRAMU KYONNA, OLUJEGERE OLUGATTA ESSOMO MU MUSOMO GW'ENKULA Y'EBINTU EBIRAMU N'OBULAMU, N'ENGERI Y'OKWEWANDIISA MUKUNOONYEREZA MU BY'OBUTONDE BW'EBY'OBUSAWO OBA ESSOMO MU MUSOMO GW'ENKULA Y'EBINTU EBIRAMU, NGA MW'OTWALIDDE AMATEEKA AGAFUGA OKUKOLA OKUNOONYEREZA AGEKUUSA KU KUKKIRIZA NGA OMAZE OKUTEGEEZEBWA/OKUNNYONNYOLWA, OKUTAMBUZA N'OKUTEREKA EBIGGYIDDWAKO OLW'OKUNOONYEREZA N'OKUSOBOZESA ABATUUZE B'OMUKITUNDU OKWENYIGIRAMU.

BW'OBERA NGA WANDIYAGADDE OKUMANYA EBISINGA EBITUKWATA KO, GENDA KU MIKUTU GY'EMPULIZIGANYA FACEBOOK, TWITTER:

- *GENOMEADVENTURES.WEEBLY.COM*
- *FACEBOOK.COM/GENOMEADVENTURES*
- *TWITTER.COM/GENOMEADVENTURE*
- *PINTEREST.COM/GENOMEADVENTURE*

Supported by

wellcome trust and NIH