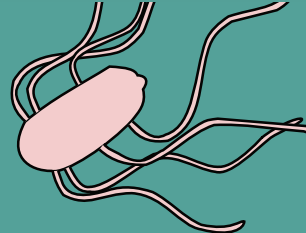


Náaysaj óol ti'

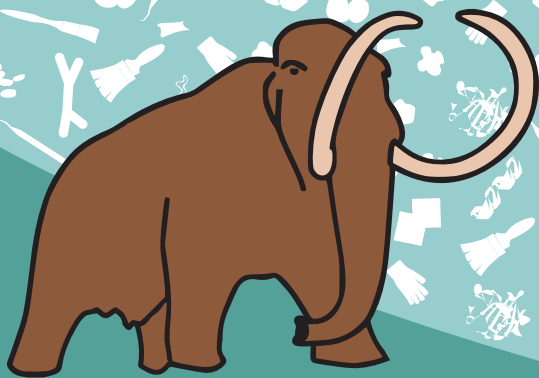
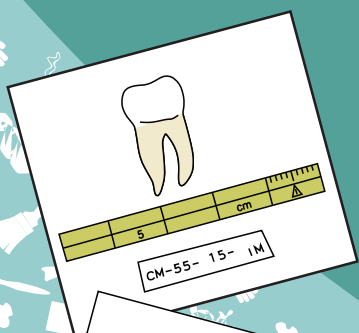
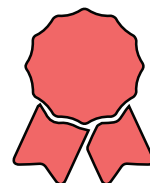
U XOOKIL YO'OSAL U XAAK'ALIL ÚUCHBEN BA'ALOB TI' U KUXTAL MÁAK



Máax u yuumil le áanaltea':

k'aaba'

Táan u kanik u xaak'alil
úuchben ba'alob ti' u
kuxtal máak



Jump'éeel áanaltea' tia'al
boonbil tumen

U nu'ukbesajil Max Planck u tia'al
u k'ajlayil wíiniko'ob

Náaysaj óol ti'



U XOOKIL YO'OSAL U XAAK'ALIL ÚUCHBEN BA'ALOB TI' U KUXTAL

MÁAK

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Táan u kanik u xaak'alil
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U nu'ukbesajil Max Planck u tia'al u
k'ajlayil wíiniko'ob

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This coloring book was produced as part of a training course in scientific illustration.



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2018
DOI: 10.17617/2.3365990

MÁAXÓONT'

Le máax ku xaak'altik úuchben ba'alob ti' u kuxtal máak, ku xak'altko'o jejelas ba'alob ucha'antak yéetel u jaajil, u túumbenil tia'al kaj k'akolt bix máako'ob ka'achij.



U núukulil ulóocha'al lu'um

Ti' k'áax

Le ku xaak'al úuchben ba'alob ti' u kuxtal máak, ku meyajo'ob yéetel le máako'ob ku xaak'alo'ob tio'olal úuchbem baáolo'ob tia'al u páantiko'ob yéetel u ch'akob jump'ít ba'ax tu kaxto'obi' yo'osal u xak'altiko'ob ti' u kúuchil u meyajo'ob.

Je'el u táakpajal ichil le meyaja' k xak'altik muka'an máako'ob, núukulil, wáaj u baakel ba'alcheo'ob tia'an túux ku pu'ulul ta' míis wáaj xak'al u xiixel pak'alo'ob.

Tu kúuchil k meyaj

Le ken meyajnako'on yéetel u yúuchbenil u ch'iibal wíinik (ADN), k'abet bíibíilki tu'ux yano'on; k bukintik nook, xaanab yéetel pix k'ab u tia'al le je'elo'; yo'osal kanantik ma' u xa'akpajal yéetel u túumbenil ADN.

Le máaxoob jach chuka'an u naát to'olal xook ku meyajo'ob yéetel jejelas nu'ukulil yo'osal u xak'altiko'ob úuchbem ba'alo'ob.



U núukulil u máansa'al jump'ít ja' ti' u láak' tu'ux



U PÁANTL

Le máako'ob ku xaak'altiko'ob úuchben ba'alob ti' u kuxtal máak ku bino'ob yok'ol kab tia'al u yojeltiko'ob yo'osal ba'ax ucháantak tio'olal máak. Ma' chéen yéetel u núukulil u meyajobi', ba'ale' yaan k'iine' k'abet jela'an ba'alob. Je'el bix ti' Himalaya, le máako'ob ku xaak'alo'ob tio'olal úuchbem baáolo'ob k'abetio'ob u nu'ukulil utia'al u na'akalo'ob yéetel u kátko'ob wáa je'el u beeytale'.

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Schedule - 2 (Relating to Sub-Rule (1) of Rule (19))
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Entry Permit No.
Full Name:
Date of Birth:
Passport No.
Nationality:
Purpose of Visit:

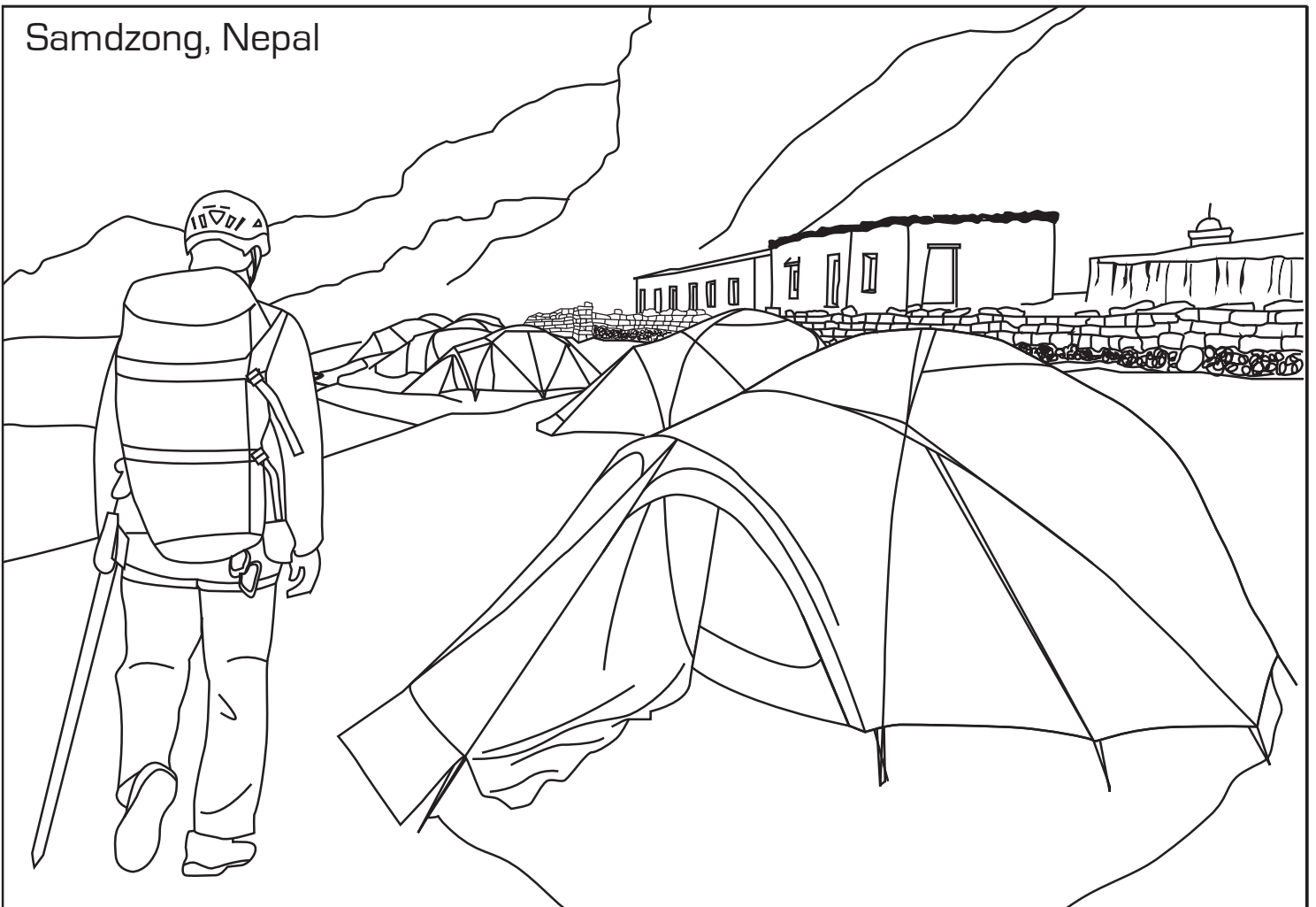
NATIONAL TRUST FOR NATURE CONSERVATION
ENTRY FEE RECEIPT
Ticket No. **0281630**
Date
Received with the amount of Rs. **1000/-**
Nationality
Authorized Signatory

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Signature
Full Name:
Designation:

gration Officer
No

Samdzong, Nepal



U ta'il koj

Ti' u ta'il koje' ti' yaan jejeláas xixelo'ob janli' yéetel u yik'elo'obi'. Le je'ela' je'el u páajtal u xakalta'ale' tia'al u yojeta'al báax ku jáantik u yuumil yéetel wáa toj u yóol.

Baak yéetel koj

Ti' baak yéetel koje' ti' yaan u xix u yúuchbenil u ch'íibal wíiniki'(ADN) tia'al u xakalta'al tu'ux seten máan máaki' yéetel tia'al yojeta'al bix u yicho'ob, u tso'otseel u poolo'ob. Wáa u yuumil kíim tio'olal yaaj koja'anile', je'el u kaxta'al bix u úuchik u tsaayati'.

Xixel ti' k'at

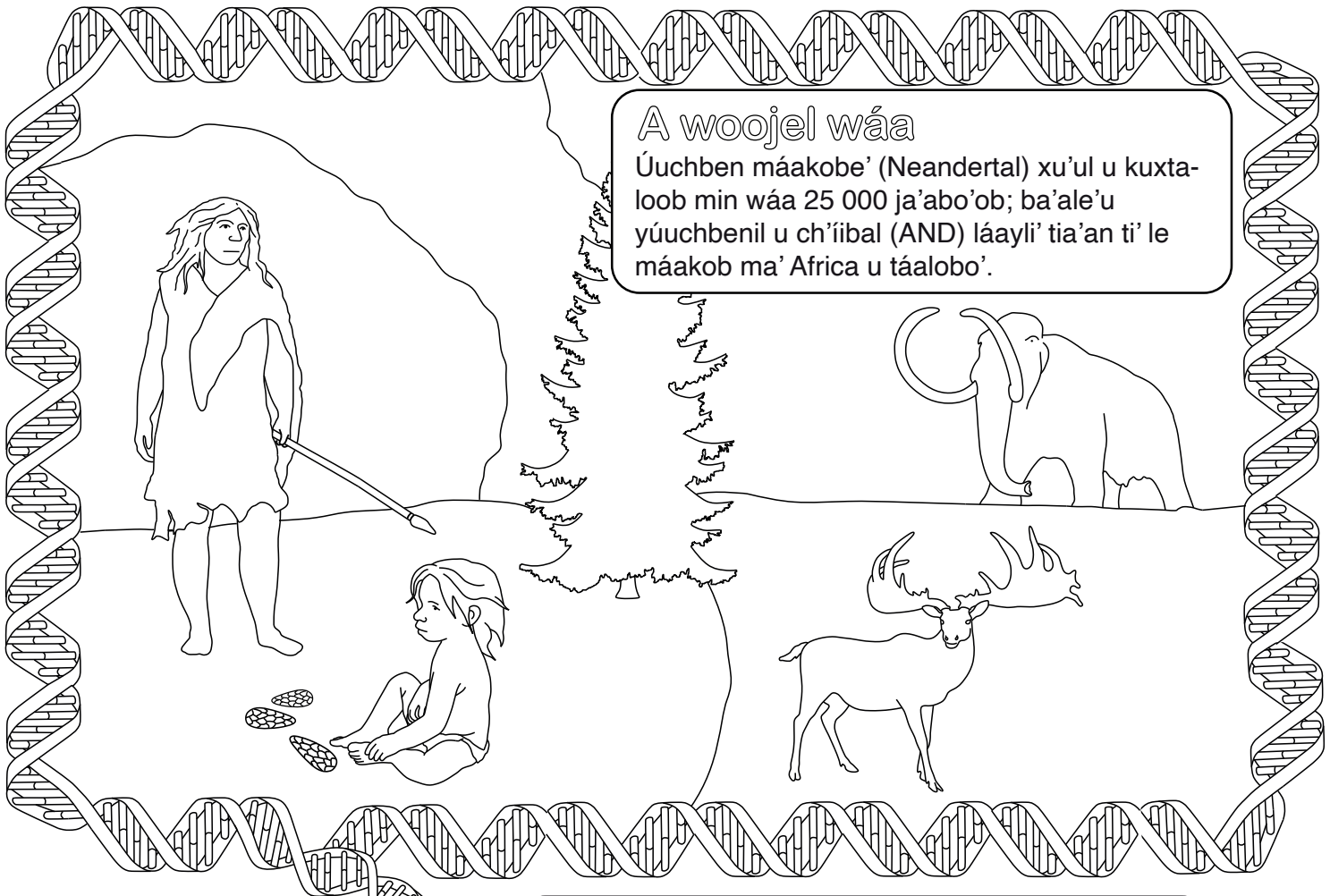
U xiixel janal p'atal ti' k'at je'el u beyta'al u xakalta'al tia'al u kaxta'al u jejeláasil yik'elo'ob ku tal ti' ba'alcheo'ob wáa ti' che'o'ob, je'e bix u ch'ach'alkil le janalo'ob. Le kan xak'altake' je'el u chikpajal ba'ax ku jantiko'ob yéetel bix u beetiko'ob yóocho'ob ka'ache'.

U baakel ba'alcheo'ob

U baakel ba'alcheo'ob je'el u meyaj tio'olal ojeeltik ba'ax ku jaantiko'ob yéetel bix ku kanáantalo'ob ka'ach. Layli' u beeytal u xakaltaal tio'olal u yojelta'al bix ka'ach yok'ol kab.

BA'AX XAK'ALTIK

Le máaxo'ob ku xak'altikoob úuchben ba'alob ti' u kuxtal máak k meyaj yéetel u jejeláasil núukulilo'ob beyxan yéetel u túumbenil k'aj óolal tia'al kaxtik máaxoni' yéetel tia'al ojeeltik tio'olal k ch'íibal way yok'ol kabe'. Yéetel u nu'ukul jach k'a'anan tio'olal, je'el u beytale'; ya'abach ba'alob je'el kanik chéen yéetel jump'éeel koj, baak wáa jump'éeel kuum.

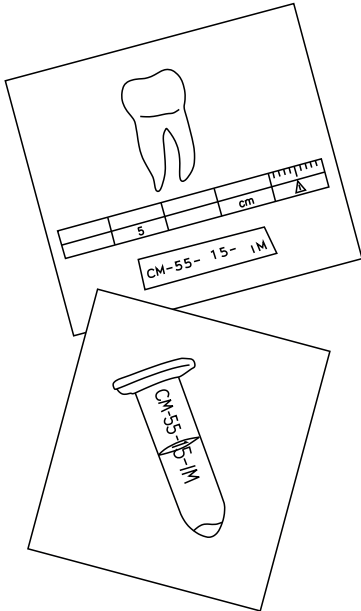


A woojel wáa

Úuchben máakobe' (Neandertal) xu'ul u kuxta-
loob min wáa 25 000 ja'abo'ob; ba'ale'u
yúuchbenil u ch'iibal (AND) láayli' tia'an ti' le
máakob ma' Africa u táalobo'.

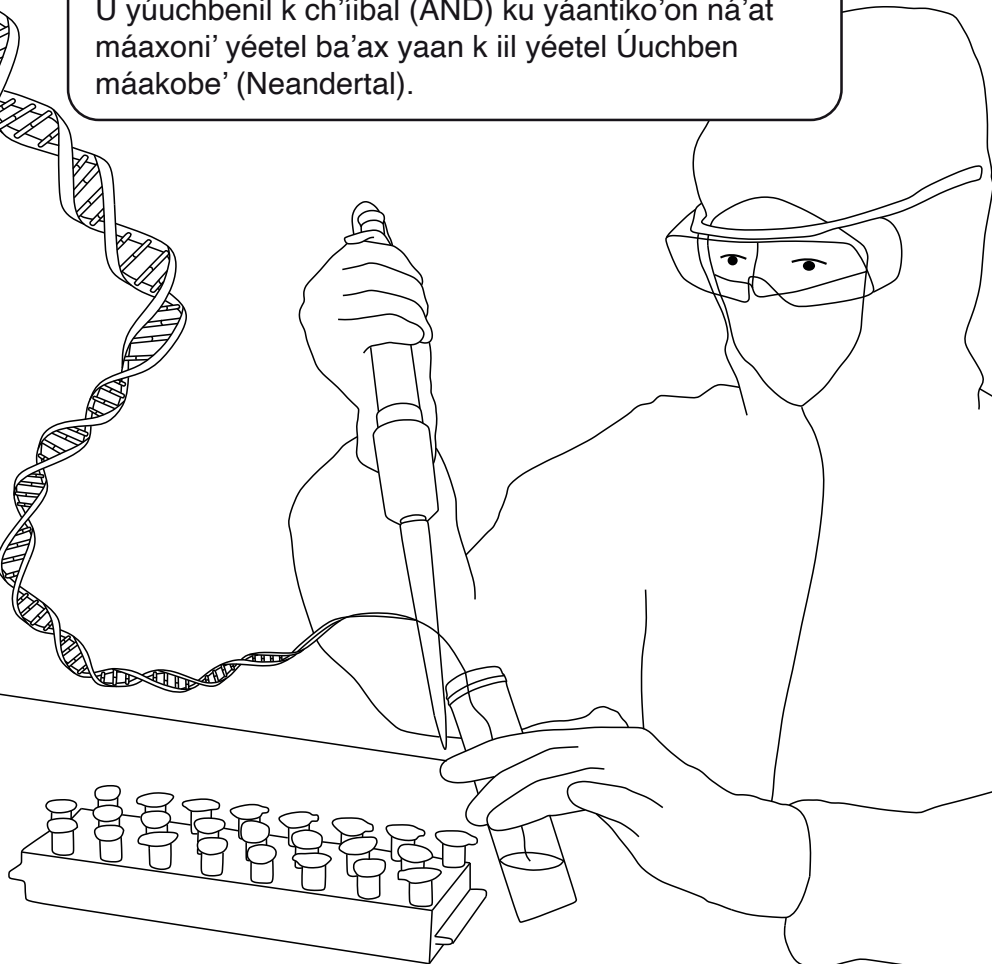
TU'UX U TAAL WÍINIK

U yúuchbenil k ch'iibal (AND) ku yáantiko'on ná'at
máaxoni' yéetel ba'ax yaan k iil yéetel Úuchben
máakobe' (Neandertal).



U K'expajal wíinik

Je'el u páajtal kaambal tio'olal
úuchben wíinike' chéen yéetel
u xak'alil u koj yéetel u
baakelo'obe'. Le je'ela' je'el u
yáantiko'on na'at bix úuchik
p'ataj je'e bix yaniko'on bejlae'.



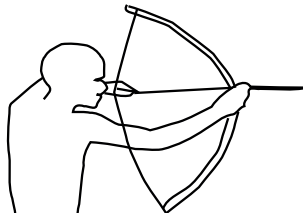
LE KA'AJ JO'OP'OL U MAAN ÚUCHBEN WITNIK JEJELÁAS TU'UX

U yúuchbenil k ch'íibal (AND) ku kaxta'al ti' baak yéetel ti' kojo'obe' ku meyaj yo'osal u yila'al tu'ux seten maanja'an máakobi'. Le ken xak'alta'ak yéetel u jeelasáasil núukuliloób tial yoojeta'al buka'aj u yúuchbenil; je'el u beeytal k ojéeltik ba'ax k'iin bin le máakobo' yéetel bix úuchik u bino'ob.

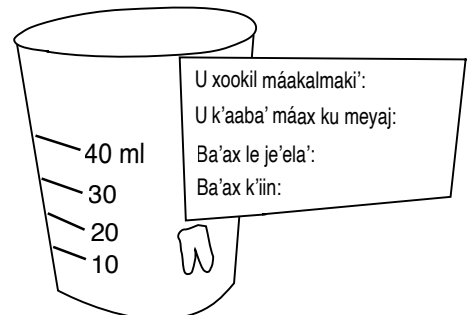


A woojel wáa

Le ku ya'alal radiocarbono, ku ch'abal ti' iik' tumen xiwo'ob táan u beetiko'ob u yocho'ob tumen. Ku yantal ti' u w'iinklilil ba'alcheo'ob le kan u jaanto'ob xiwo'ob. Ba'ale' ti' ku p'atali', leo'olale' le ken máanak k'iine', je'el u páajtal u yiilale' wáa uuch kimik wáa ba'ax kinsej.



Bix ku jets'el u yúuchebenil yéetel radiocarbono

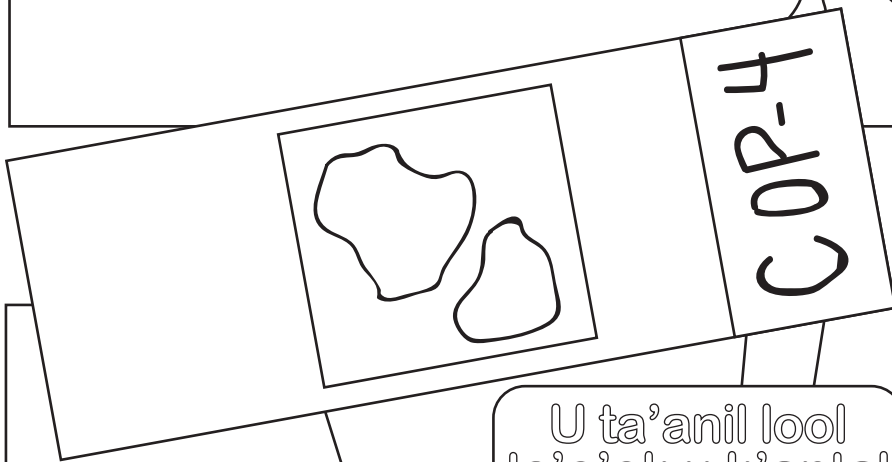


U jets'el buka'aj úuchben ba'alche'ob yéetel che'o'obe' ku beetal yéetel jump'eel ba'al ti' yan je'e ba'axak kuxa'ane' (carbono), tumen ku ye'esik tak 40.000 ja'ab u yúuchbenil.

BA'AX KU JANTA'AL ÚUCHIJ

Copán, Honduras
Ja'ab 300 AC

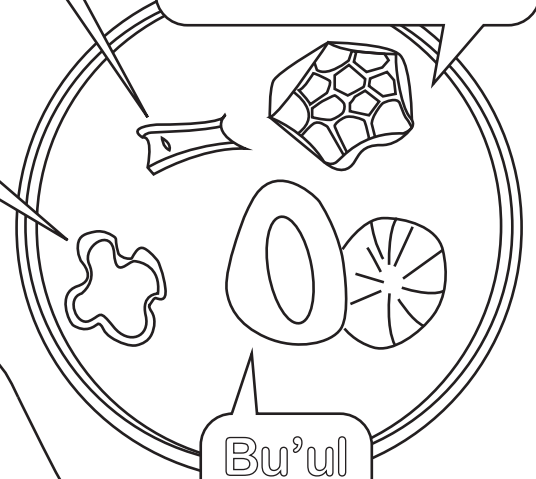
Yaan k'iine' le máako'ob ku xak'alo'ob tial u kaxtix túumben na'ato'ob ku k'abetkunsiko'ob jumpéel núukul tial u yiko'ob mejen balo'ob (microscopio). Le je'ela' tial u yiko'ob u mejen xéexet'al janal ti núukul wáa ti kojo'ob. Yéetel le je'elo' je'el u beytal u yila'ale' ba'ax tu janto'ob úuchben Mayab wiiniko'ob maanaj ti 2.000 ja'abo'ob.



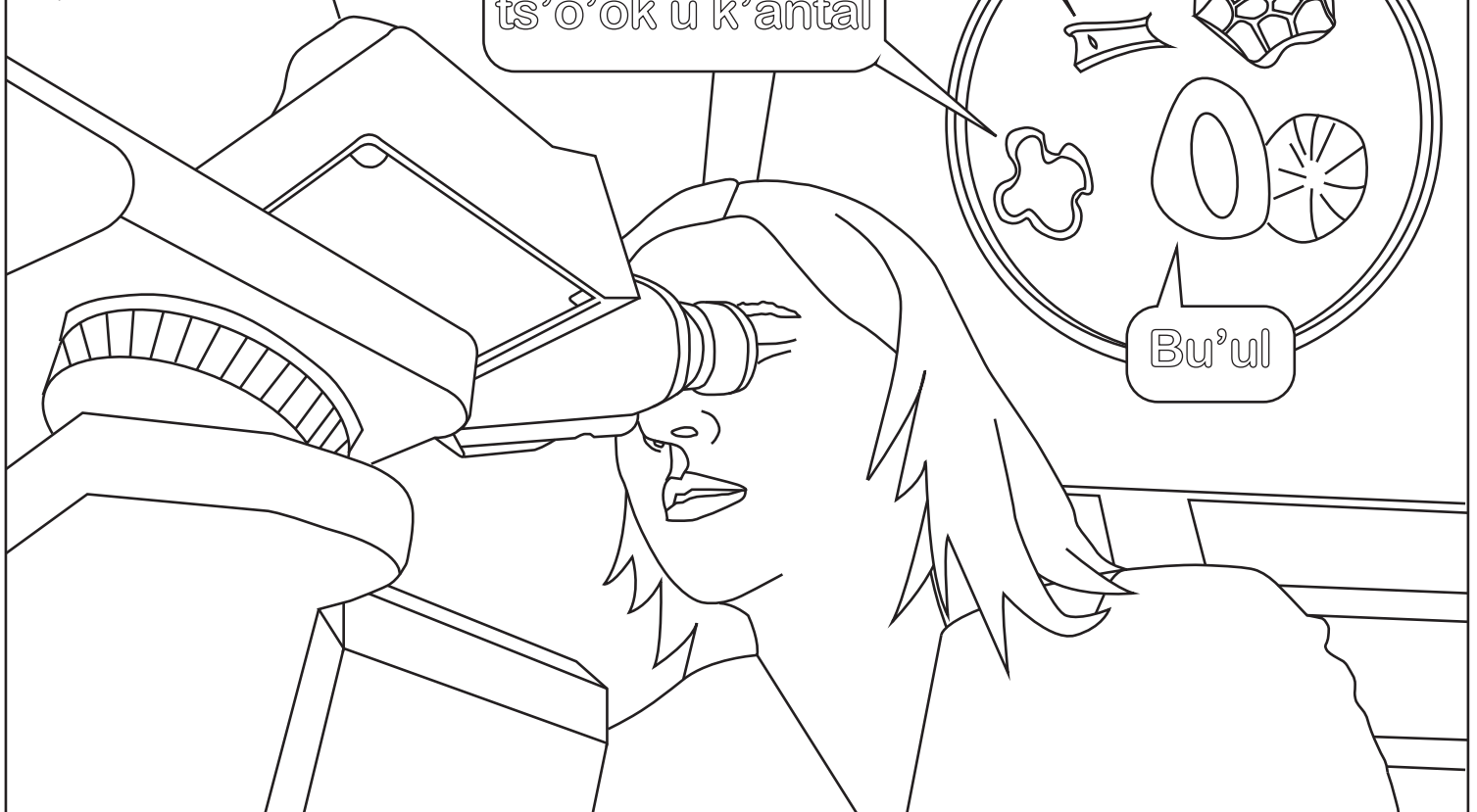
Jump'íit ixi'im

Junxéet' neek'

U ta'anil lool
ts'o'ok u k'antal



Bu'ul

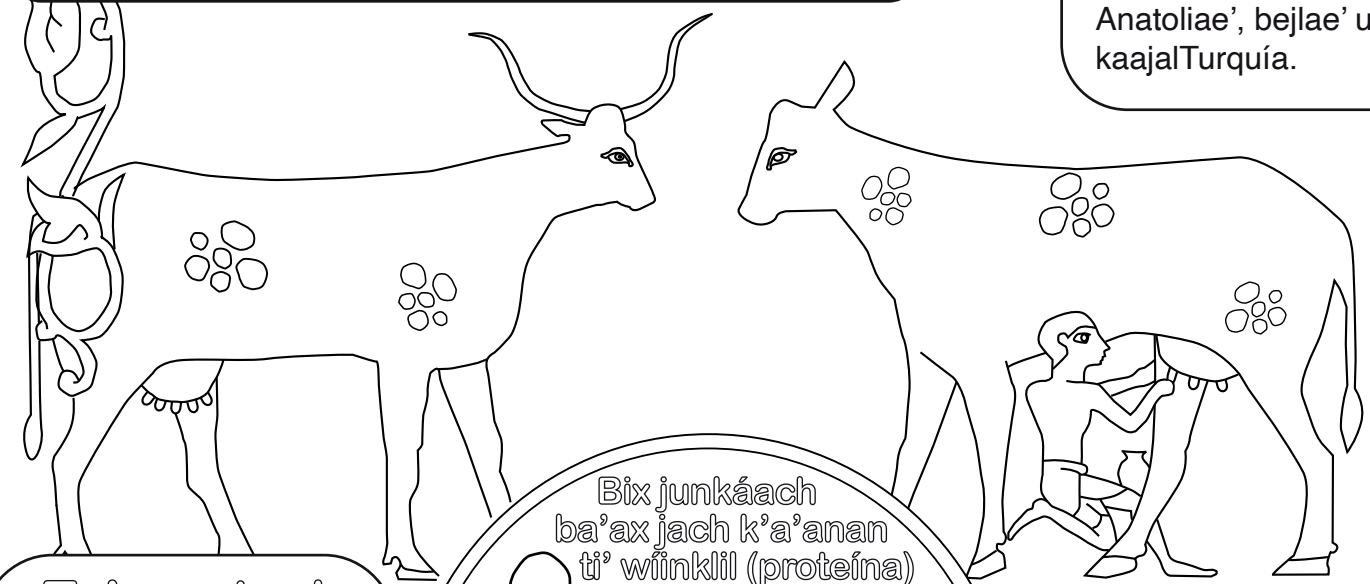


ALAK'T BA'ALCHE'O'OB

Ts'ok u máan mas ti' 10 000 ja'abo'ob, wíinik jo'opol u pak'al yéetel u alak't ba'alche'ob tial jejeláas beelalo'ob. Táanile' wakax, le yaax kanan wakaxo'obo' ku ts'aako'ob kuuch, yéetel ku ch'a'abal u bak'el, yéetel u k'aab u yiimo'ob.

A WOOJEL WÁA

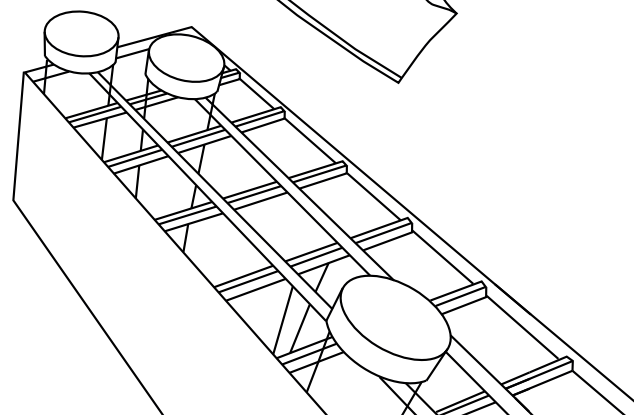
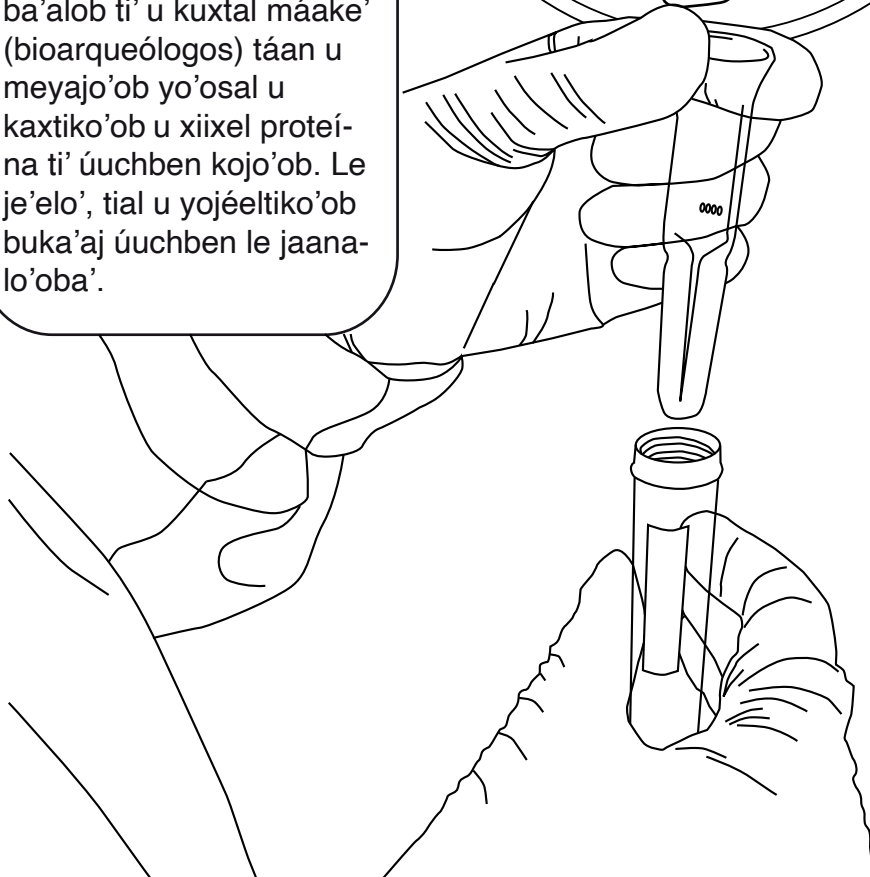
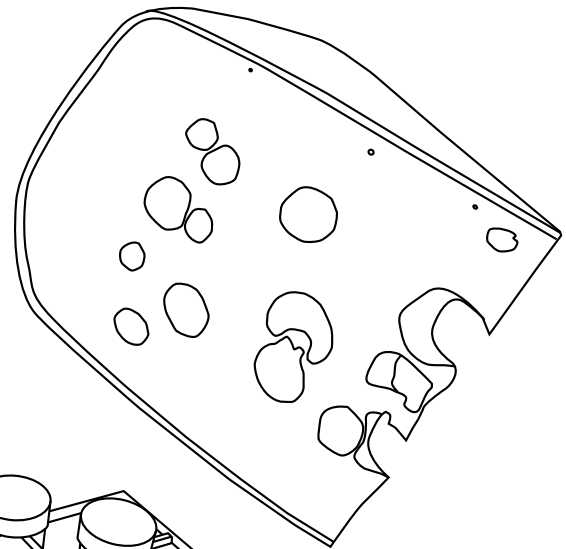
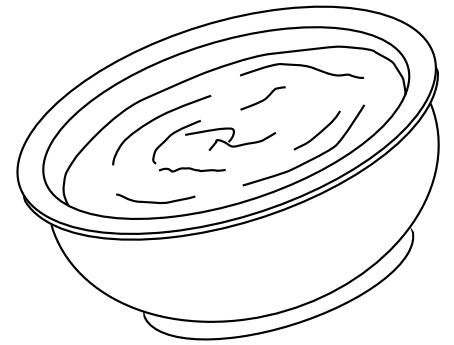
Wakaxe' alak'tabi' je'el bix úuchik yéetel le ba'alche'o' u k'abatik bisonte. Je'el beey wakaxe' ba'ale maas. Nojoch ojeela'an tumen u maas úuchbenile' ti' ku taal Anatoliae', bejlae' u noj kaajalTurquia.



Bix junkáach ba'ax jach k'a'anan ti' wíinklil (proteína)

Tu'ux u taal janal beeta'an yéetel u k'aab u yiim wakax

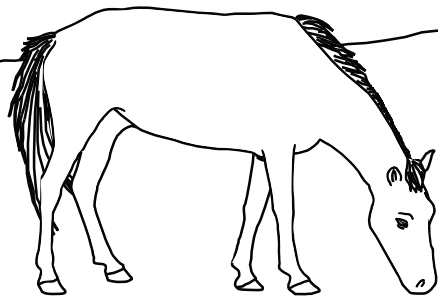
Mixmáak yojel tu'ux u taal janal beeta'an yéetel u k'aab u yiim wakax, ba'ale', le máako'ob ku xaak'altiko'ob úuchben ba'alob ti' u kuxtal máake' (bioarqueólogos) táan u meyajo'ob yo'osal u kaxtiko'ob u xiixel proteína ti' úuchben kojo'ob. Le je'elo', tial u yojéeltiko'ob buka'aj úuchben le jaanaloba'.



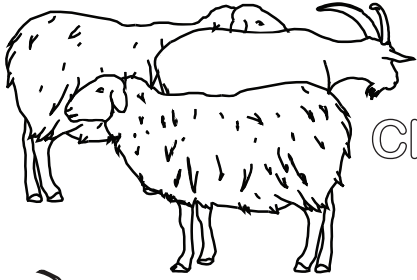
Mongolia

Ya'ab ba'alche'o'ob yaan tu'ux óoli ma' tu k'axa ja' ti' u noj lu'umil Mongoliae'. Yaan tsíimini' wakaxo'obi', taman, yéetel chivo. Máako'ob chéen bey u máanobo' yéetel ma' u jets'kunmo'ob u yotoch ti' junp'éeel kúuchili' ku beetiko'ob jejeelas jaanal yéetel u káb u yim le ba'al che'oba'.

Tsíimin

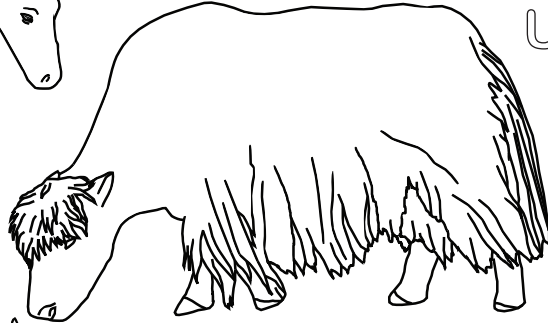


Taman

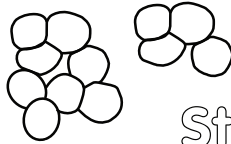
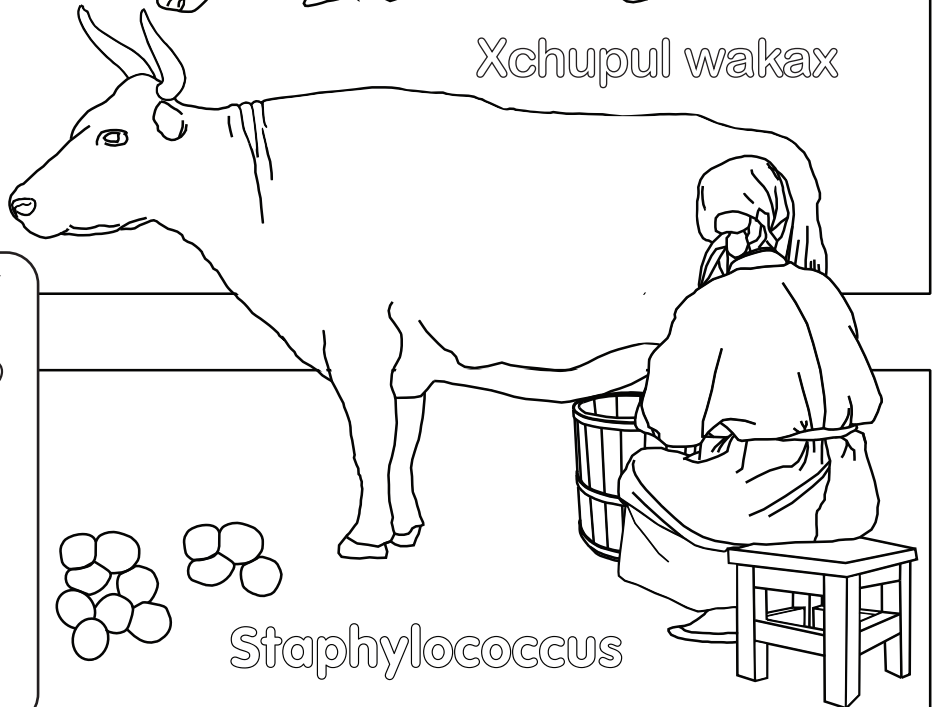


Chivo

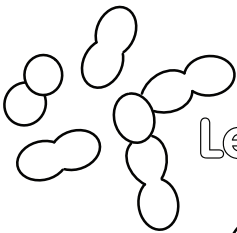
U wakaxil u noj luumil Tibet



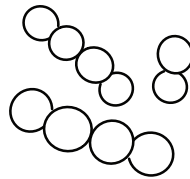
Xchupul wakax



Staphylococcus



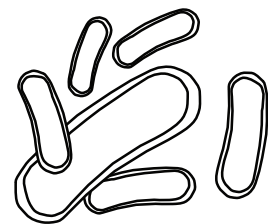
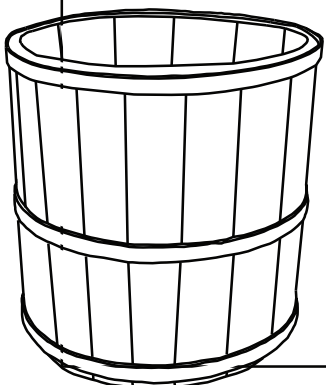
Leuconostoc



Lactococcus

U yik'el k'aab iim

Ik'elo'obe' jach k'ana'an tial u beta'al jejeelasil Janal yéetel u k'aab u yim wakax je'el bix yogurt, mantequilla yéetel. Yan xan ma' k'ajólani' je'el bix queso, aaruul (chokoj k'aab iim) wáa airag (u k'aab u yim tsíimin) ti' Mongolia.



Lactobacillus

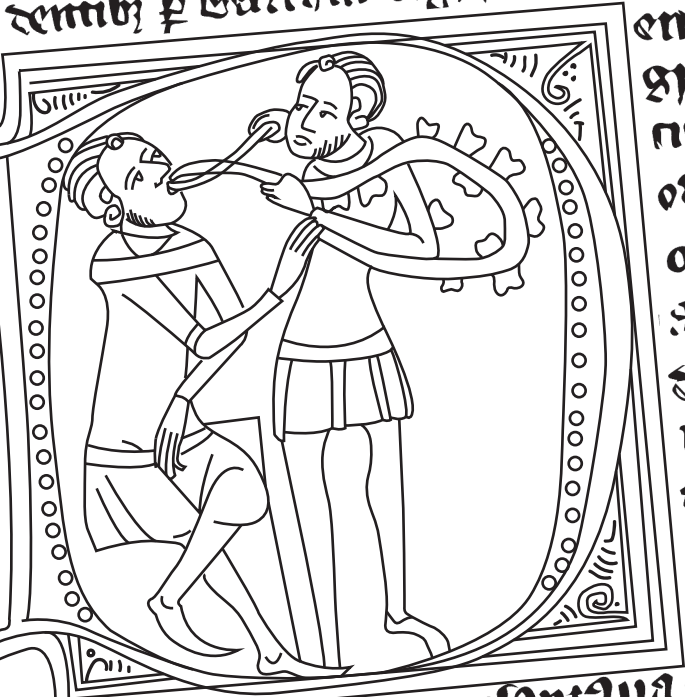
JANAL BEETA'AN YÉETEL U K'AAAB U YIIM WAKAX

Ti' Mongloliae' le Janal beeta'an yéetel u k'aab u yim wakaxo' jach k'a'anan. Ts'ok u xak'alta'ale' yéetel ojéeltalé máanja'an 3.500 ja'abo'ob jo'op'ol u beetal.

ÚUCHBEN K'OJA'ANLIO'OB

Koj yéetel baakelo'obe' jach k'a'anan tial u yojéetal bix u tooj óolal úuchben máako'ob. Je'el bix yéetel ADN je'el u páajatal u yila'al ba'axten luub u koj wáa máax.

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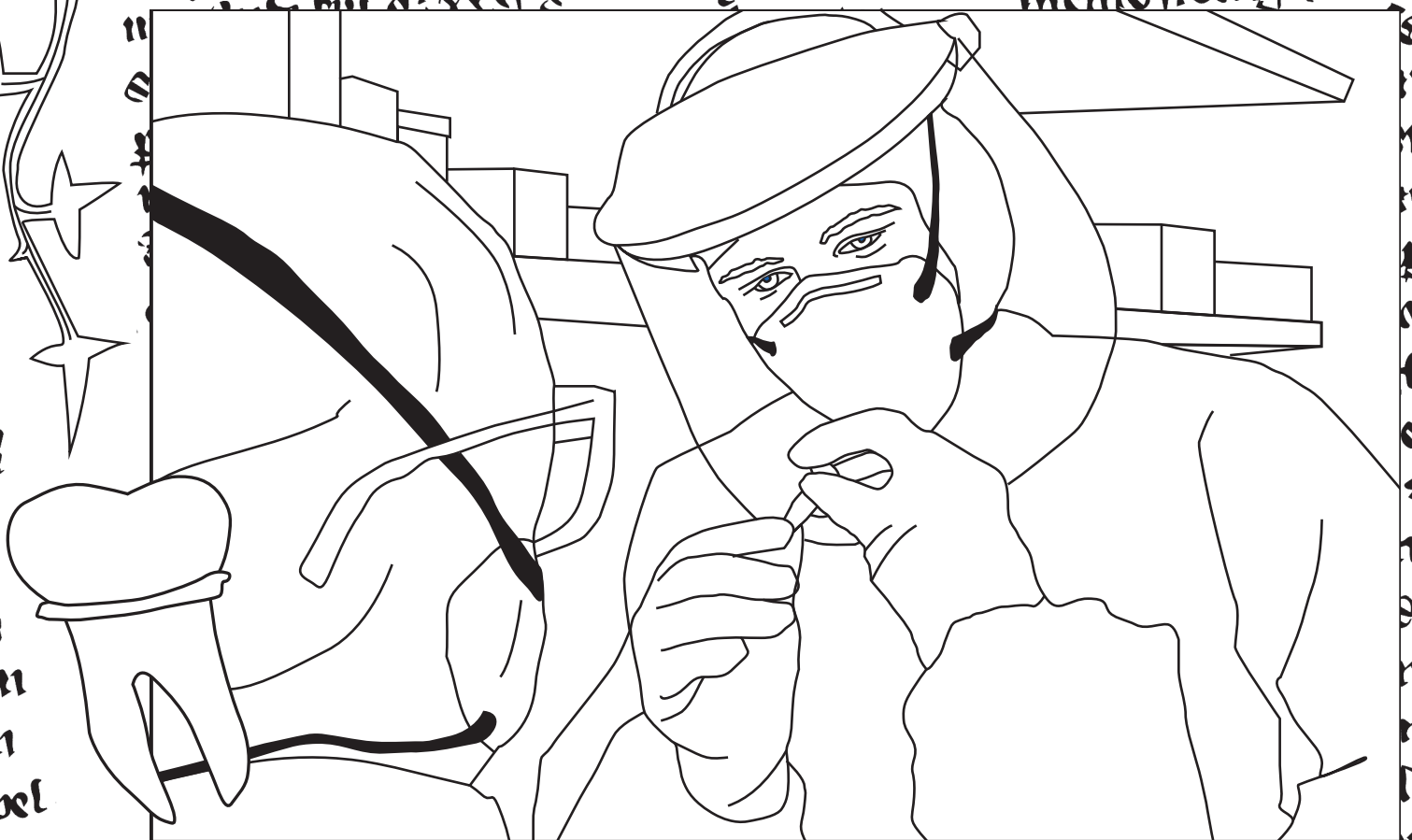
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Omne Bonum

Jump'éeel úuchben áanalte' ts'íibta'an ich Laatin, ku tsikbaltik yo'osal kuxtal ti' u noj lu'umil Europa. Ku t'aan yo'osal kanan koj yéetel bix ku kananta'al wíinklil tial ma' u k'oja'antalo'ob ka'ach, min 500 ja'abo'ob yak.

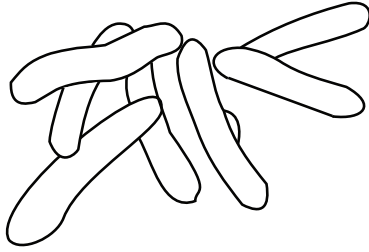
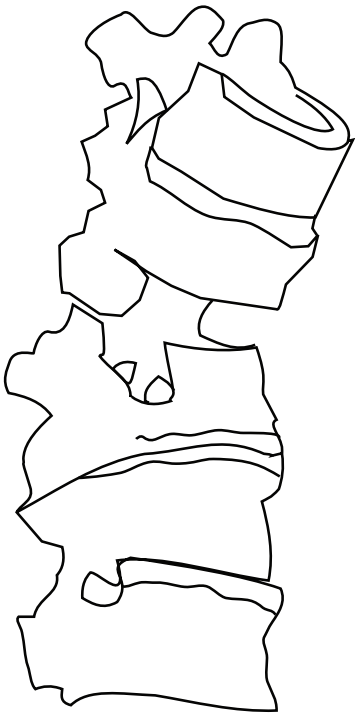
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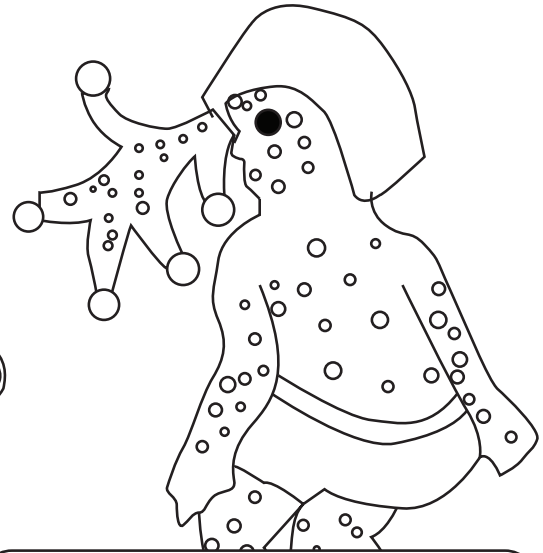
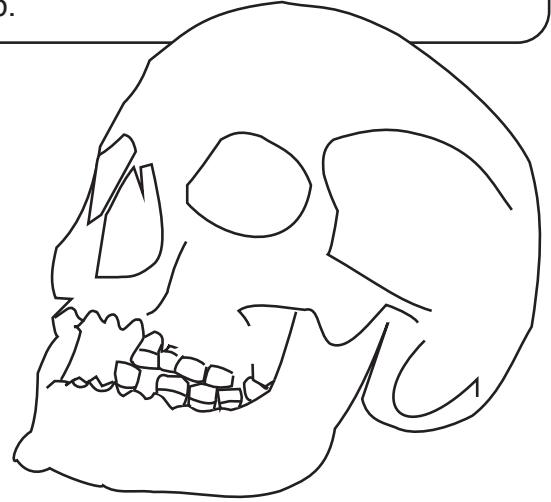
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JÁAWAY YÉETEL YAJ SE'EN (TUBERCULOSIS)

Jáaway yéetel yaj se'en (tuberculosis) ku tasa'al tumen yik'el *Mycobacterium tuberculosis* yéetel *Mycobacterium leprae*. Je'el u páajtal u k'oja'an-sik baakele', leo'olale' le máako'ob ku xak'alo'ob yo'osal úuchbem kuxta-lo' yaan k'iine' ku kaxtiko'ob u xiixel baakel; yéetel le je'eolo' ku yojéel-tiko'ob yo'osal úuchben yaj óolalo'ob.

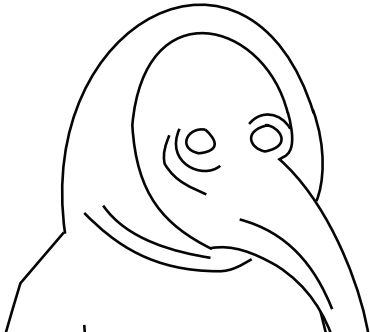


Mycobacterium leprae

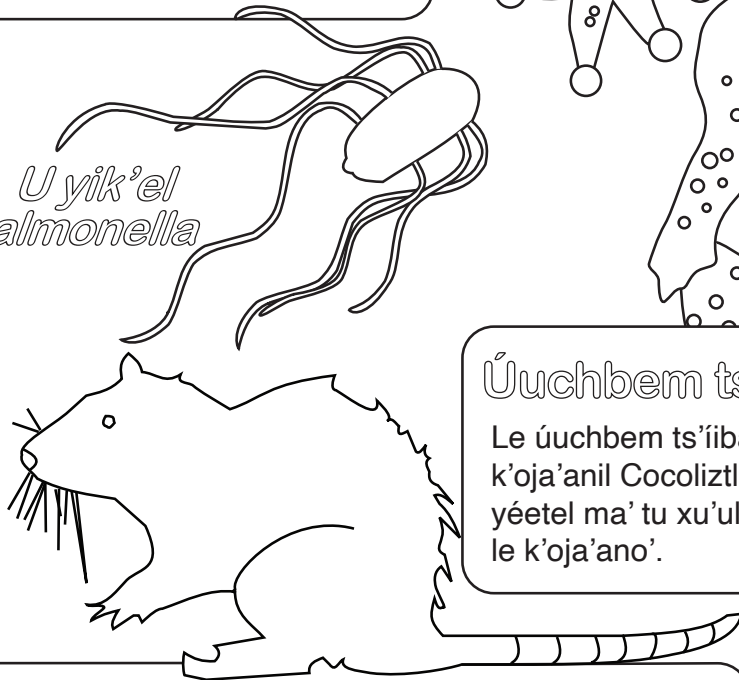


COCOLIZTLI

Jump'éel ik'el ma' k'ajóola'an ka'achi', ku ya'alal Cocolitz tumen le aztekaso'ob tu kiimsaj jach ya'ab máako'ob ti' u noj lu'umil Mexico ichil 1545 wáa 1550 (ts'ok u síijil Cristo) DC. Le' ma' úucha'a ti' u xak'allil u koj le máako'ob kimo'ob yo'osal le k'oja'ana', kaxta'ab le k'ak'as yik'el *Salmonella enterica Paratiphya C*.



U yik'el *Salmonella*



Ts'ak yaj Schnabel

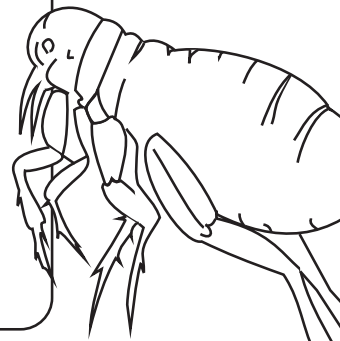
Ka'ache' ts'akyajoóbe' ku pixik u yicho'ob yéetel jump'éel ba'al beey u pool ch'iich'e' tial ma' u chuklo'ob tumen k'as iik'.

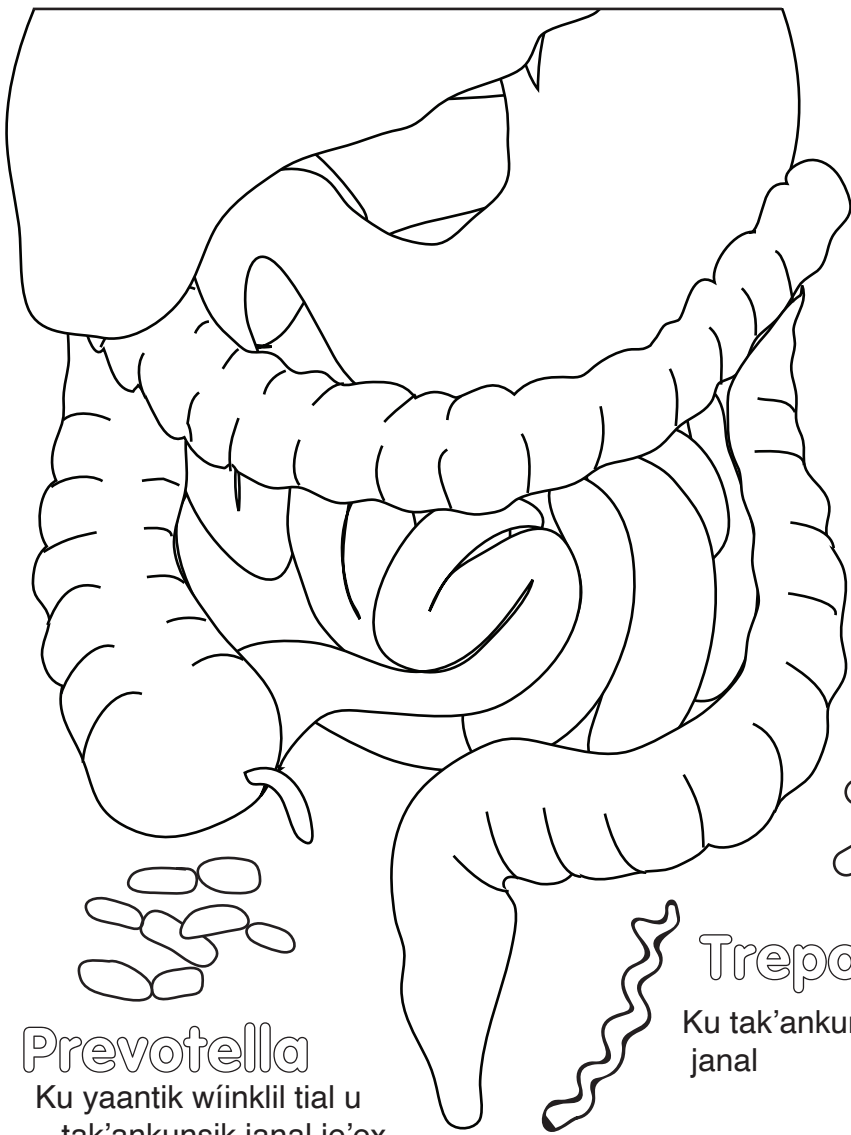
Úuchbem ts'iib ti' Cruz

Le úuchbem ts'iiba' yo'osal bix u k'oja'anil Cocoliztli: chokwij, we'ech yéetel ma' tu xu'ulul u k'i'ik'ankil le k'oja'ano'.

K'OJA'ANIL KU MEENTIK U YANTAL BÁAN KIIMILIL

Le k'as yik'el *Yersinia pestis*, leti' ku taasik k'oja'anil ku kiinsik ya'ab máako'ob, ku máan ti' ch'ik yaan ti' ch'o'. Le máax ku chi'ibil men le ch'ika' ku tsa'aya ti' k'ak'as k'oja'anil. Le kója'ana' ku beetik u yantal báan kiinil, je'el le bix k'ajoóolta'an beey Muerte Negrae' tu kinsaj táanchumuk u kajil u noj lu'umil Europa ti' ja'ab 1346 taak ti' 1353.





Helicobacter pylori

Kuxa'an ti' u nak' máak, je'el u beetik u tsa'ayal ulcera wáa yaj k'oja'anil

Bifidobacterium

Ku yáantik mejen paalal ma' u k'ojáantalo'ob le kan u yuk'o'ob u k'ab iim

Faecalibacterium

Ku tsentik jejeláas báalta-ko'ob ti' ba'ax jach k'a'anan ti' wiinkliil (células)

Prevotella

Ku yaantik wiinkliil tial u tak'ankunsik janal je'ex xiwo'obo'

Treponema

Ku tak'ankunsik janal

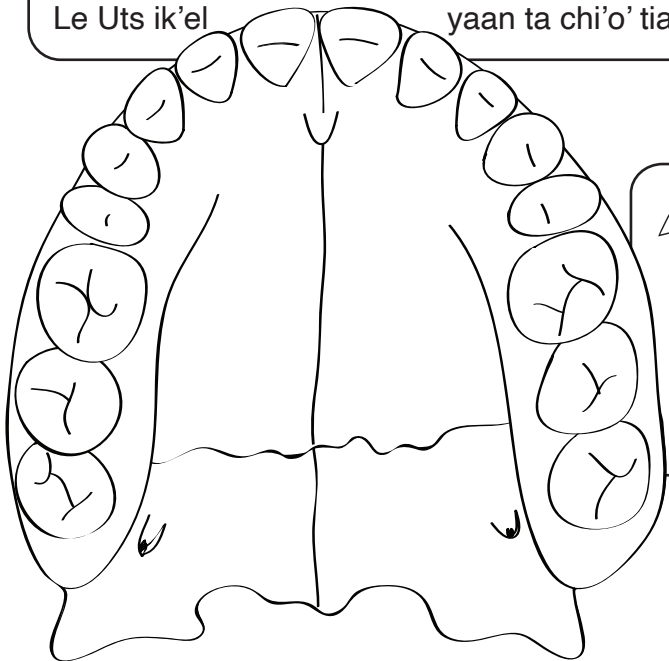
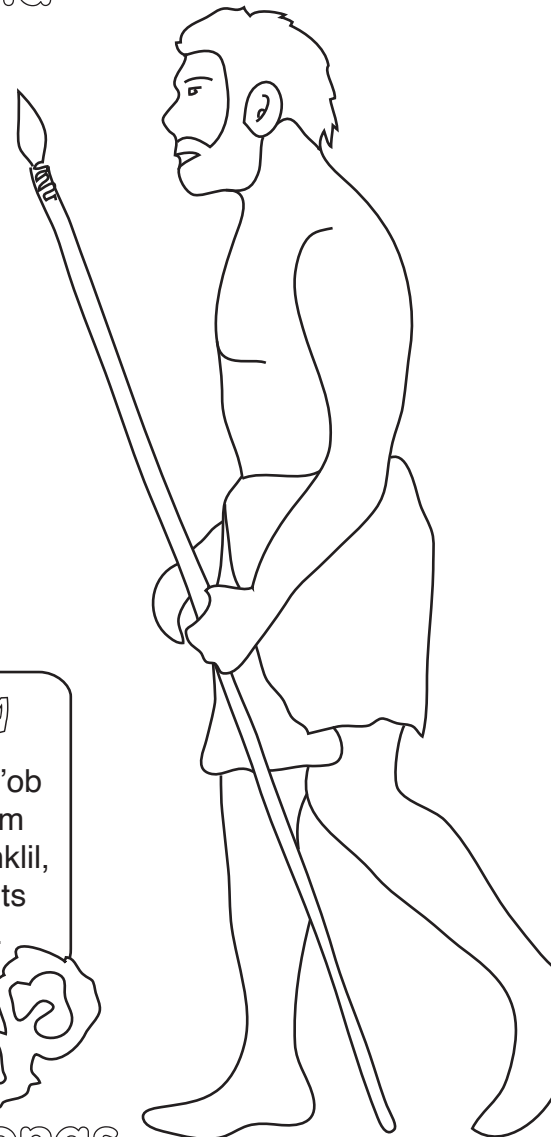
UTS YIK'EL YAAN TI' A WIINKLIIL

Ti' u wiinkliil máake' manja'an u ya'abil uts yik'elo'ob yaani', kajóolta'an beey microbioma. Le uts ik'elo'oba' ti' yano'ob ta naak'e' tial u yantik a tak'ankusik a wo'och yéetel tial a tooj óolal. Le Uts ik'el yaan ta chi'o' tial ma' seen k'oja'antal.

A WOOJEL WÁA

Le máako'ob ku xak'alo'ob yo'osal u kaniko'ob túum ben ba'alo'ob utial wiinkliil, ku meyajo'ob yéetel iuts yik'el yaan ti' k wiinkliil.

Porphyromonas

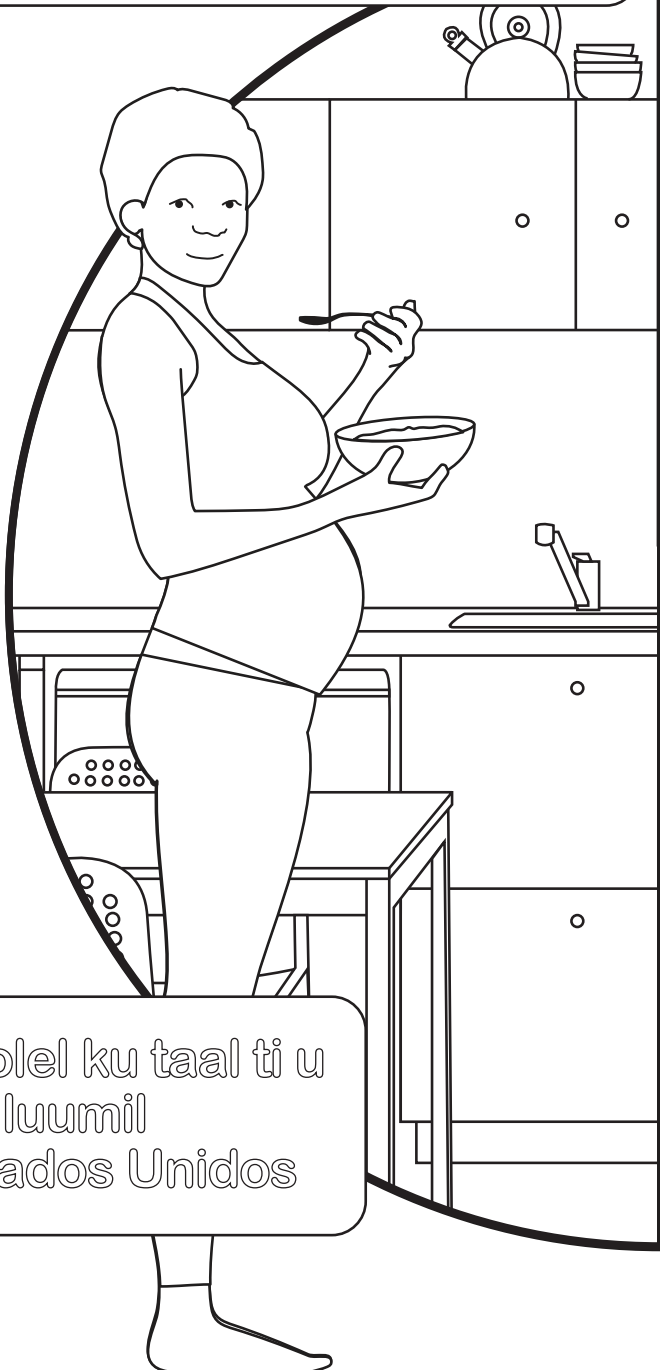


MÁAKO'OB KU MÁAN U MOOL YO'OCHO'OB

K'ajóolano'ob ku máano'ob ts'on yéetel u mool yo'ocho'ob. Leti'obe' ku jantiko'ob ba'ax yaan k'áax, yéetel ba'ax k'iin yano'ob.

Le ma' tu yuuchul pak'ale', tuláakal máake' ku máan u mool yo'och. Min ts'ok 10 000 ja'abo'ob.

Máako'ob ku máan u mool yo'ocho'ob tak bejlae' yaan máas u yutsil u yik'el ti' u wiinklilio'obe' tak ti' le kaja'ano'ob tu'ux yaan túumben baáolo'ob.



Koolel ku taal ti u
noj luumil
Estados Unidos



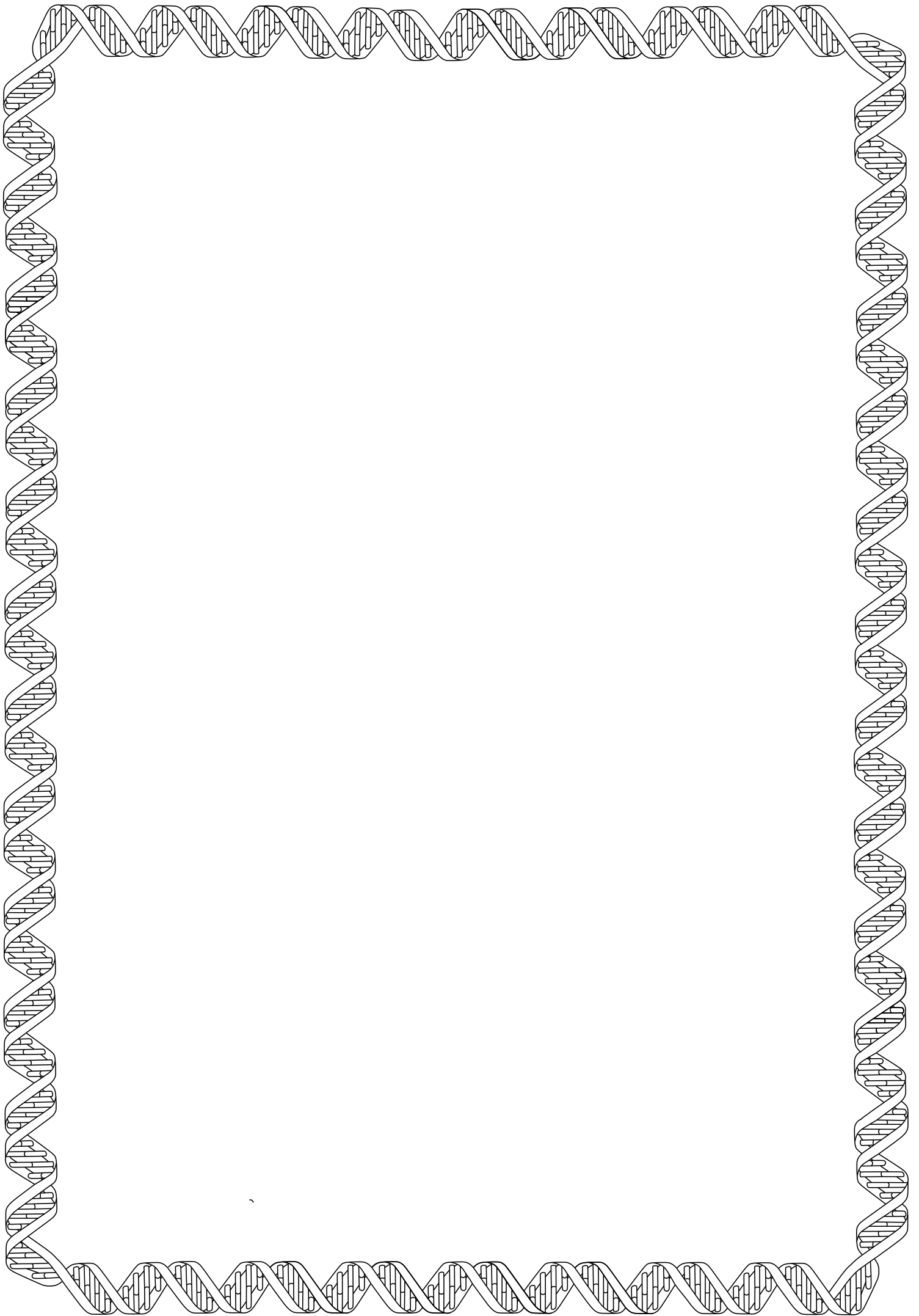
Ko'olel yéetel
chaambal, ti'
Tanzania

MÚUCH'TÁAMBAL TU'UX TULÁAKAL TÚUMBEN

Tu'ux tuláakal túumben ku jantiko'ob ba'ax ku tal ti' k'áax, ba'ale óoli mixmáak ku beet u kool.

Tial u ko'onol te'elo', ku ts'abal xa'ak' tio'lal ma' u kástal. Le janalo' úuchn beta'ak, yéetel ya'ab tu'ux ku máan tumen ku bisa'al tu'ux kun konbil.

Le máax kaja'an tu'ux yaan túumben ba'alo'ob óoli minaán u yutsil u yik'el u naak'e', yo'osal ba'ax ku jaantiko'ob. Leo'lal le kan k'oja'an-cháako'obe' yaan k'iin ma' tu se'eb uts talo'ob.

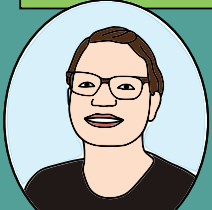




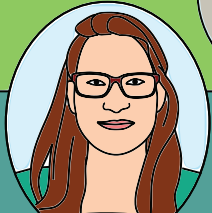




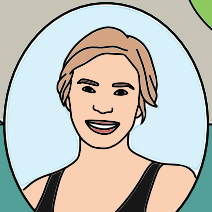
U nu'ukbesajil Max Planck u tia'al u k'ajlayil wíiniko'ob



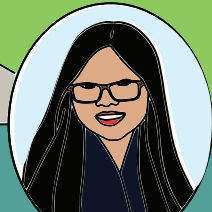
ALLIE



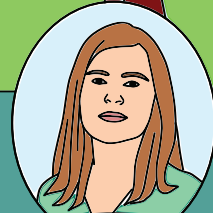
ASH



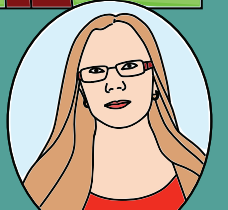
JESSIE



KE



TINA



ZANDRA

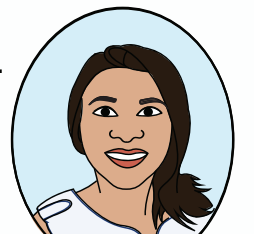
Náaysaj óol ti'

U XOOKIL YO'OSAL U XAAK'ALIL ÚUCHBEN BA'ALOB TI' U KUXTAL MÁAK

Áanalte' tial boonbil

¡Kan ba'ax k beetik yo'osal na'atik bix úuchben wíiniko'ob. Láak'into'on tial k ilik máaxoni'. Ba'ax seten betik tial ojéeltik le ba'alo'ob ucháantak le ka síij wíinik tak le ka'aj uch le k'oja'anil tu beetaj u yantal báan kíimilil. Kan bix úuchik u máan wíinik yok'ol kab yéetel yo'osal bix ku beta'al xak'al tiolal k ojéeltik ba'ax kíins wáa máax; yéetel jejeelas núukulil je'el bix Radiocar-bono .Il a wil bix k xak'al yo'osal ba'ax ku jaantik úuchben wíiniko'ob. Kan bix úuchik u suuktal ba'alche'o'ob yéetel máak. Kan yoosal jejeelas úuchben k'ojanilo'ob yéetel ba'ax uts ik'elo'ob yaan tak bejlae' ichil máak tial ma' k se'eb k'oja'antal.

U nu'ukbesajil Max Planck u tia'al u k'ajlayil wíiniko'ob
Su'ut ich Maaya t'aan tumen Mirna Canul Aké



MIRNA