



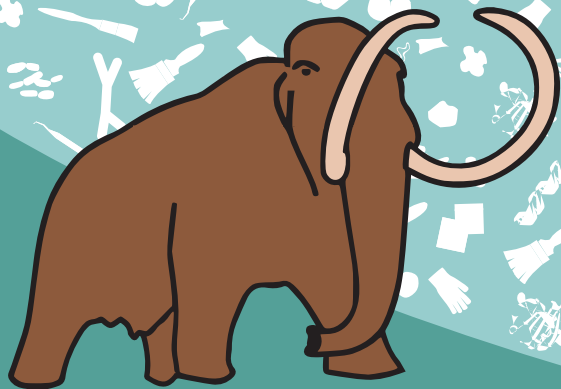
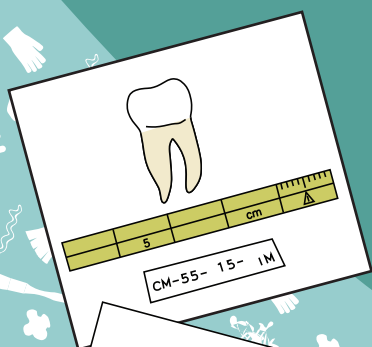
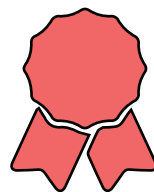
Kasada a

# ILMIN KUFAI

Wannan littafinsa ne:

Suna

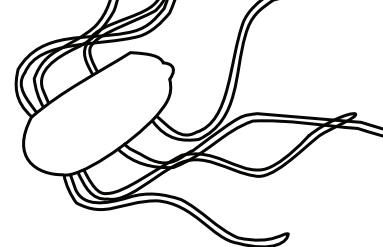
Masanin Ilimin Kufai  
da ake Horarwa  
domin Gaba



Littafin da za a shafe  
(cike) da launi wallafar

Cibiyar Max Planck da ke  
Nazarin Ilimin Juyin Halitta





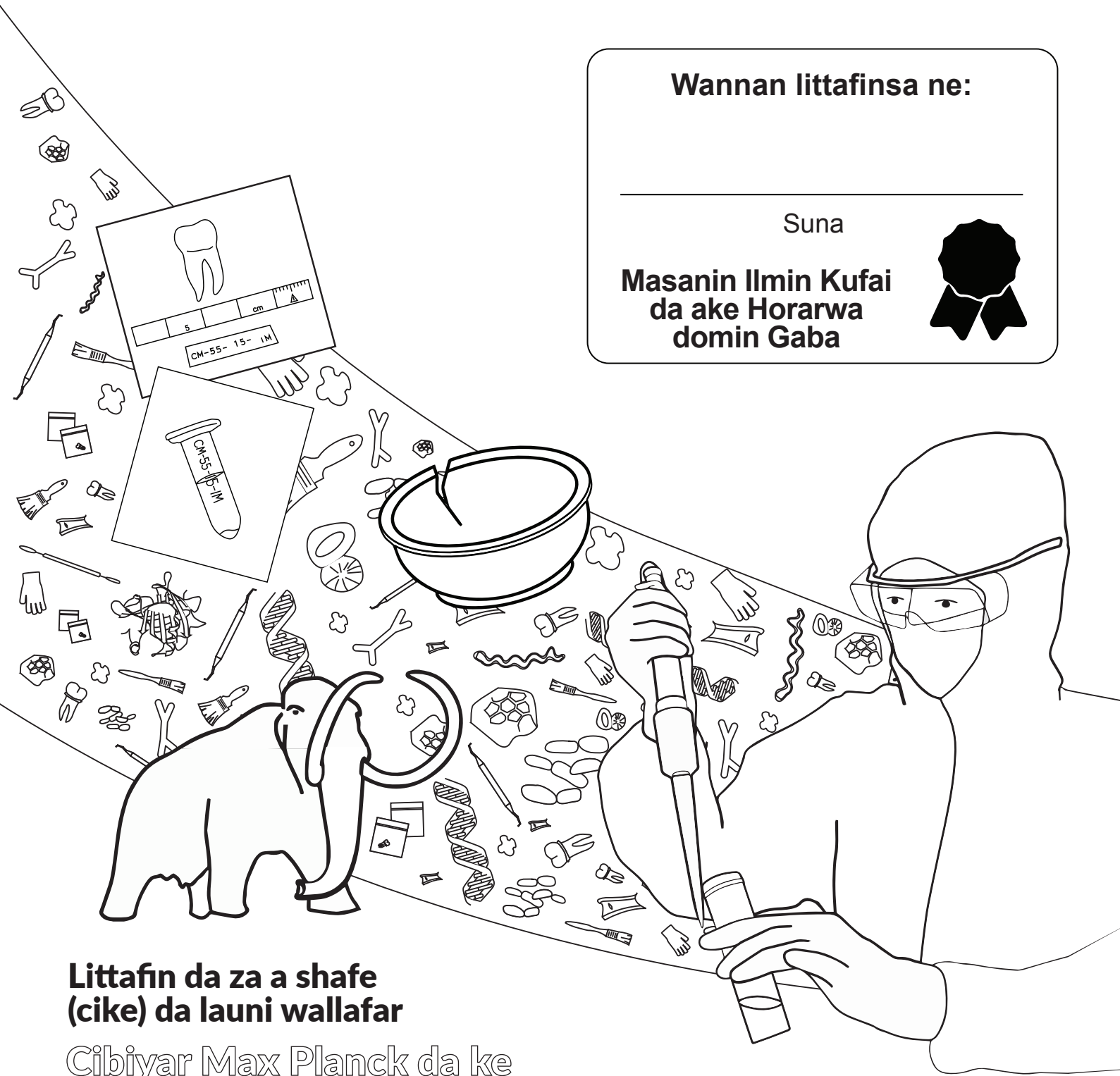
Kasada a

# ILMIN KUFAI

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Masanin Ilimin Kufai  
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Littafin da za a shafe  
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**Mawallafar:** Cibiyar Max Planck don Ilmin Juyin Halitta

**Mai tacewa:** Christina Warinner

**Mataimakin mai tacewa:** Jessica Hendy

**Gudummawar:**

Zandra Fagernäs

Jessica Hendy

Allison Mann

Åshild Vågene

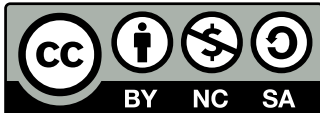
Ke Wang

Christina Warinner

Wannan littafi na shafewa (cikewa) da launi an samar da shi ne domin horo na ilmin kimiyya a aiwace.

**Fassara cikin Harshen Hausa daga:**

Aliyu Adamu Isa da Abubakar Ayuba



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2023



## WANE NE MU?

Masana Imin Kufai suna gudanar da bincike a kimiyyance, suna yin nazarin waƙansu tambayoyi da kan taimaka a fahimci tarihin rayuwar ɗan Adam da ta shuɗe.



Ma'aikaci

## A ɗakin bincike...

Yayin da ake nazartar tsohuwar kwayar halittar gado (DNA), masana kimiyya kan shiga ɗakuna masu tsabta sanye da kwat da wando da takalmi da safar hannu domin gudun kada tsofaffin samfurorin kwayar halittar gadon (DNA) su cudanya da na zamani. Masana kimiyya suna amfani da na'urori da sauran kayayyakin aiki daban-daban domin su yi nazarin tsoffin samfurori.



Magwajin ruwa ko sinadari mai ruwa-ruwa

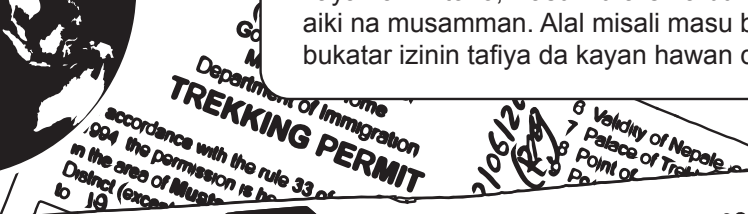
## A fili (na bincike ko nazari)...

Masana kimiyya suna aiki kafaɗa-da-kafaɗa da masu nazarin ilmin kufai wajen tonowa da tattara samfura da akan yi zuzzurfan bincike a kansu a ɗakin gwaje-gwaje. Abuɓuwan da aka birne a kasa na daga cikin samfuran da ake nazari, ana kuma tattaro ragowar tsofaffin tukwane na mutanen da, akan gano kasusuwan dabbobi a juji ko yadda ruwa da iska ke sauya waƙansu al'amura kamar tsiro irin na dauri da akan gani.



# TONA FILI

Masana ilmin kufai sukan zaga kusan ko'ina a duniya domin tattaro bayanai na tarihin dan Adam a farkon rayuwarsa. Baya ga kayan aikin tono, wasu wurare na bukatar kayayyaki da kayan aiki na musamman. Alal misali masu binciken kayan tarihi suna bukatar izinin tafiya da kayan hawan dutse a Himalaya.



**NATIONAL TRUST FOR NATURE CONSERVATION**  
**Entry Permit (ACAMCA/GCA)**  
 Schedule - 2 (Relating to Sub-Rule (1) of Rule 19)  
 Receipt No. **0281630**  
 Entry Permit No. \_\_\_\_\_  
 Full Name: \_\_\_\_\_  
 Date of Birth: \_\_\_\_\_  
 Passport No. \_\_\_\_\_  
 Nationality: \_\_\_\_\_  
 Purpose of Visit: \_\_\_\_\_

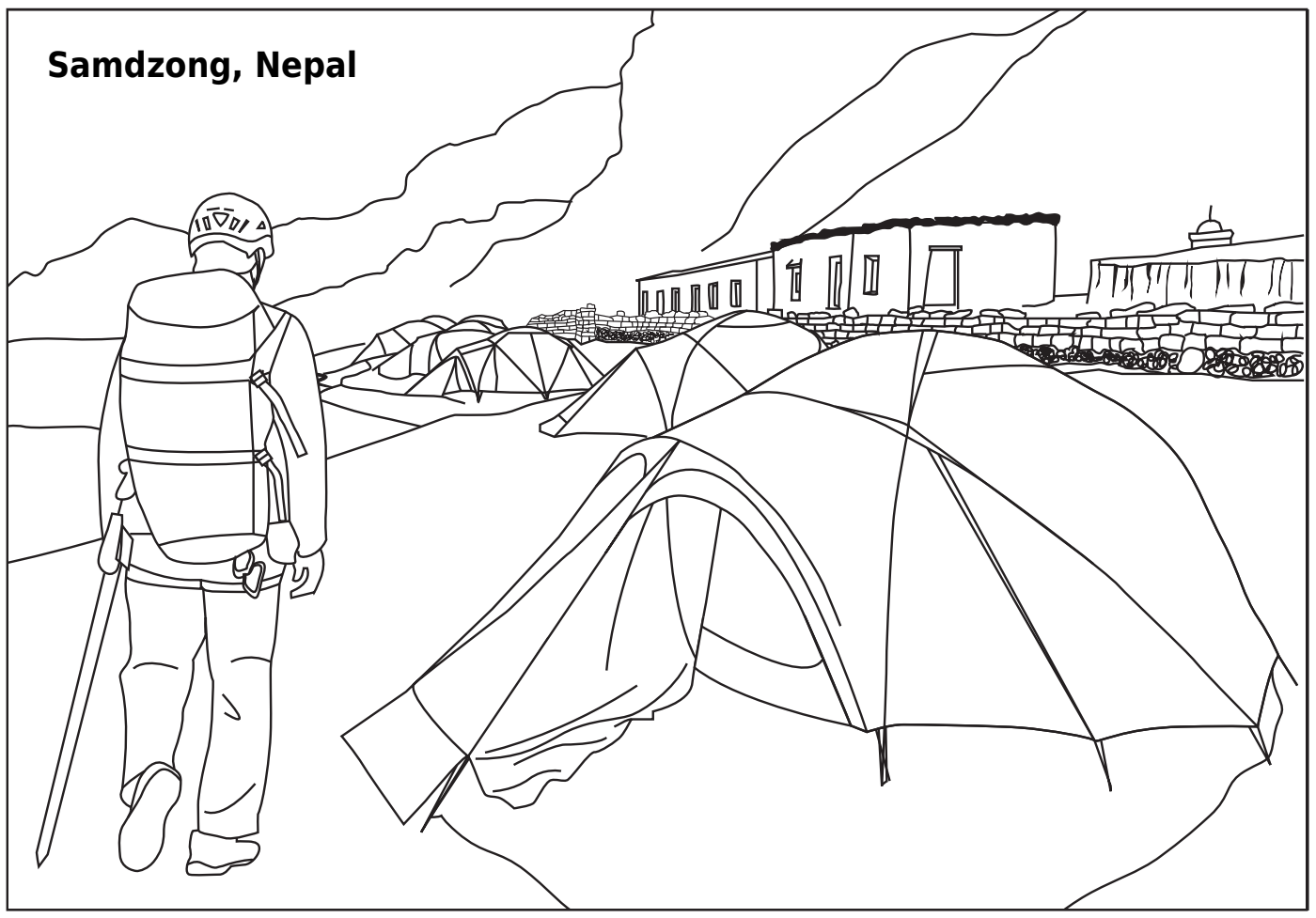
**NATIONAL TRUST FOR NATURE CONSERVATION**  
**NTNC-ACAMCA ENTRY FEE RECEIPT**  
 Ticket No. **0281630**  
 Date: \_\_\_\_\_  
 Nationality: \_\_\_\_\_  
 Agency Name: **SHERPA SHAIKUN-LA**  
 Authorized Signatory: \_\_\_\_\_

Department of Immigration  
**TREKKING PERMIT**  
 accordance with the rule 33 of  
 1994 the permission is granted  
 in the area of Mustang  
 District (except  
 to 19

**TOURIST COPY**

Immigration Officer  
do No

## Samdzong, Nepal





## Maga kida haurori da bambance su

An fi sanin magan kida haurori da bambance su da tartar haure, wato wani burbushi ne da ke bayar da kariya a jikin mutum yayin da yake raye. Yana riƙe abinci da kwayoyin cuta kuma ana iya amfani da shi domin sake gina lafiya da abinci.

## Kashi da Hakora

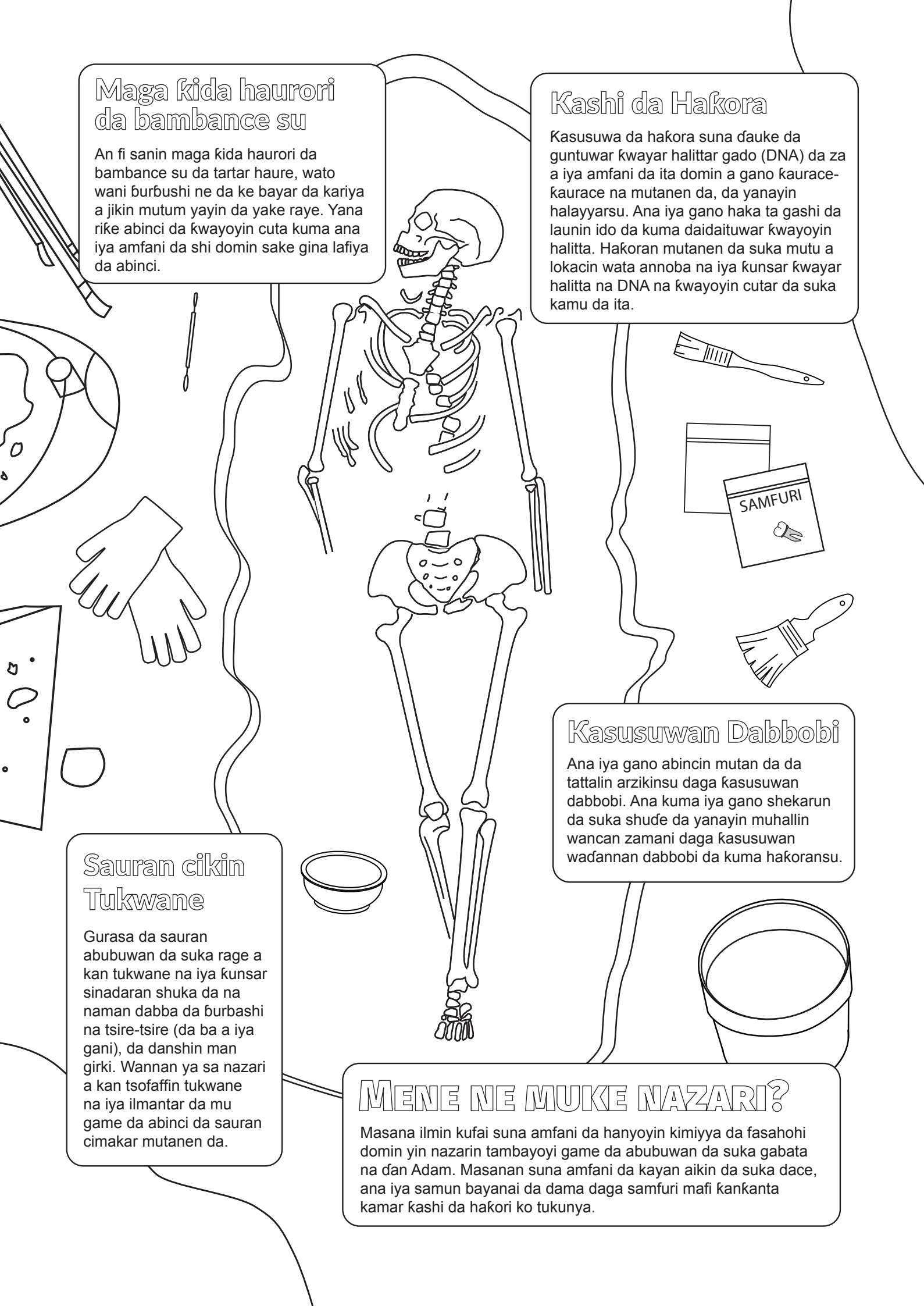
Kasusuwa da hakora suna ɗauke da guntuwar kwayar halittar gado (DNA) da za a iya amfani da ita domin a gano kaurace-kaurace na mutanen da, da yanayin halayyarsu. Ana iya gano haka ta gashi da launin ido da kuma daidaituwar kwayoyin halitta. Hakoran mutanen da suka mutu a lokacin wata annoba na iya kunsar kwayar halitta na DNA na kwayoyin cutar da suka kamu da ita.

## Sauran cikin Tukwane

Gurasa da sauran abubuwan da suka rage a kan tukwane na iya kunsar sinadaran shuka da na naman dabba da burbashi na tsire-tsire (da ba a iya gani), da danshin man girki. Wannan ya sa nazari a kan tsofaffin tukwane na iya ilmantar da mu game da abinci da sauran cimakar mutanen da.

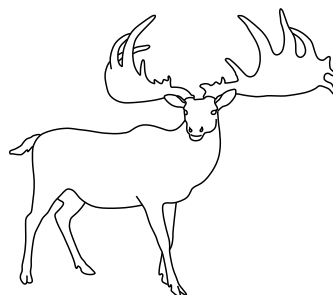
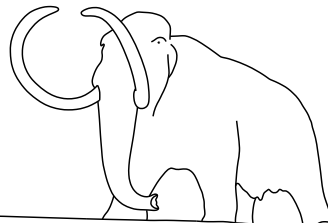
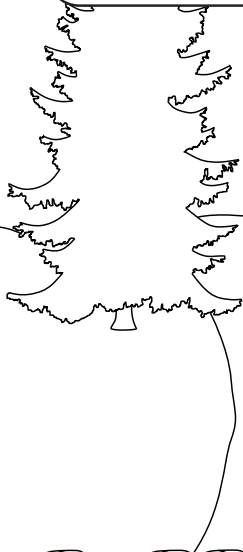
## MENE NE MUKE NAZARI?

Masana ilmin kufai suna amfani da hanyoyin kimiyya da fasahohi domin yin nazarin tambayoyi game da abubuwan da suka gabata na ɗan Adam. Masanan suna amfani da kayan aikin da suka dace, ana iya samun bayanai da dama daga samfuri mafi kankanta kamar kashi da hakori ko tukunya.



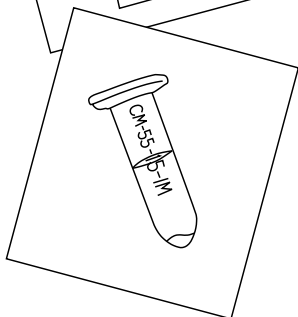
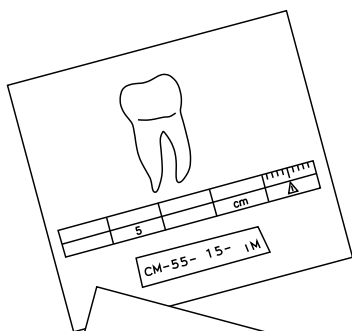
## KO KUN SANI?

Burbushin mutunen Neanderthals ya bace kimanin shekara 40,000 da ta wuce, amma kwayar halittar gadon (DNA) Neanderthal yana rayuwa a cikin kwayoyin halittar mafi yawan mutanen da ba na Afirka ba.



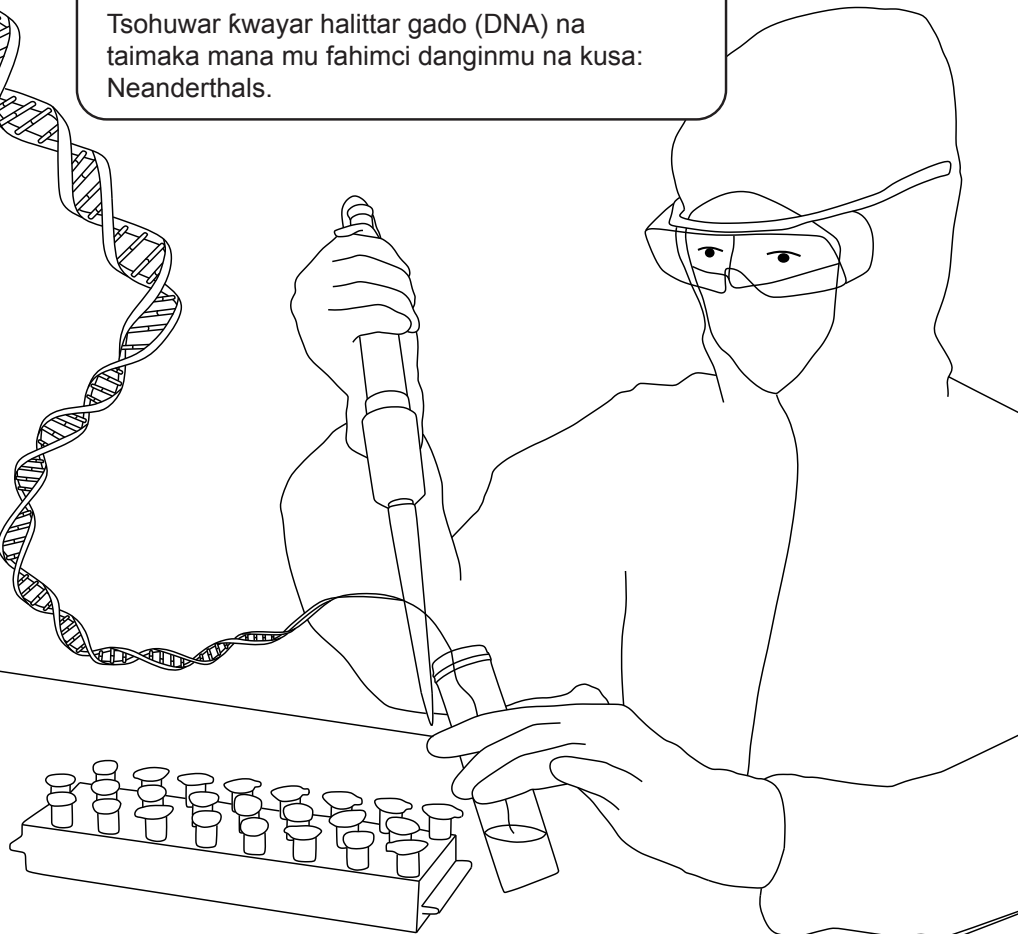
## ASALIN 'DAN ADAM

Tsohuwar kwayar halittar gado (DNA) na taimaka mana mu fahimci danginmu na kusa: Neanderthals.



## Juyin Halitta

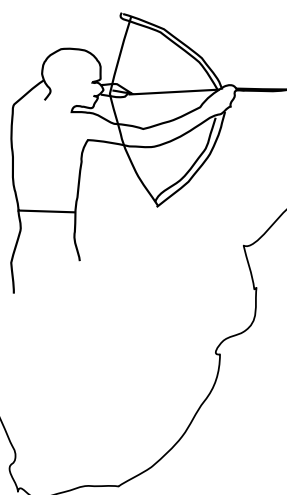
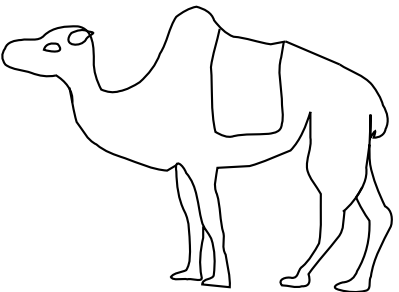
Ta yin nazarin hakora da kasuwan 'yan Adam na da, za mu iya gano yadda kakanninmu suka rayu, da yadda mu 'yan Adam muka zama daban-daban (nau'in da muke) a yau.



# KAURACE- KAURACEN DAURI

Tsohuwar kwayar halittar gado (DNA) da aka gano a kasusuwa da hakora kan zama ginshikin sake gina kaurace- kaurace da suka wanzu a farkon zamani. Idan an tashi kwankwance hadakar sinadarai, ana lura da lokacin da aka yi kaura da wurin da al'amarin ya faru, kuma ana dogaro da wuri da lokaci a tantance alamun sinadari a shekarun da suka shuƙe (radiocarbon dating) da alamun sinadaran karafa da ke wurin (strontium) da yanayin iskar wurin (oxygen).

**Scythians makiyayan da suka yi hirjira daga tsakiyar Asiya Shekara 700 kafin haihuwar annabi Isa (karnin da) aka gano karfe da amfaninsa**

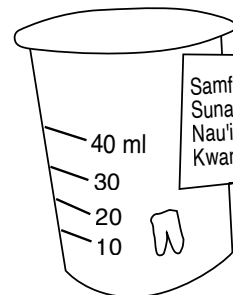


## KO KUN SAN?

Radiyokabon, ko  $^{14}\text{C}$ , ba tabbataccen burbushin sinadari ba ne na kabon, tsire-tsire kan dauke shi daga iska yayin fotosintesis (gudanar da canjin hasken rana zuwa sinadaran iska). Dabbobi suna amfana da radiyokabon idan sun ci tsire-tsire. A karshe, Radiyokabon na rubewa bayan wani lokaci.

Ana iya gano adadin  $^{14}\text{C}$  daga samfurin dauri, ana iya tantance tsawon zamanin da kwayar halitta ta rayu.

## Zamanin Radiyokabon



Samfurin ID:  
Sunan Ma'aikaci:  
Nau'in samfurin:  
Kwanan wata:

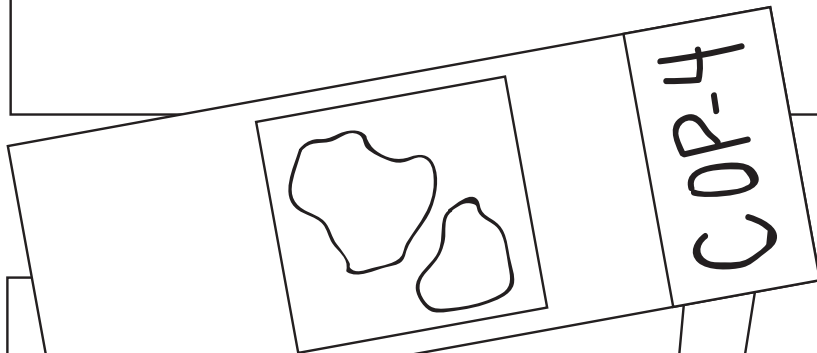
Zamanin Radiyokabon za a iya amfani da shi a tantance shekarun dabbobi da tsirrai har zuwa shekara 40,000.

# ABINCIN DAURI

Masana kimiyya na iya amfani da na'ura (microscopes) domin su gano burbushin abinci a jikin tukwane da hakoran dan Adam. Shi burbushin halittu (microfossil) yana nuni da abincin da Maya na Mesoamerica suka ci ne a da, wato sama da shekara 2,000.

## Kofan, Honduras

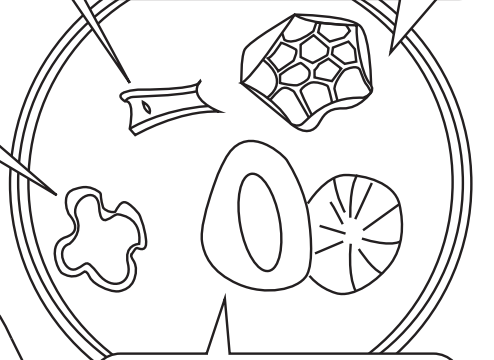
Gargajiyar Maya,  
shekara 300 miladiyya



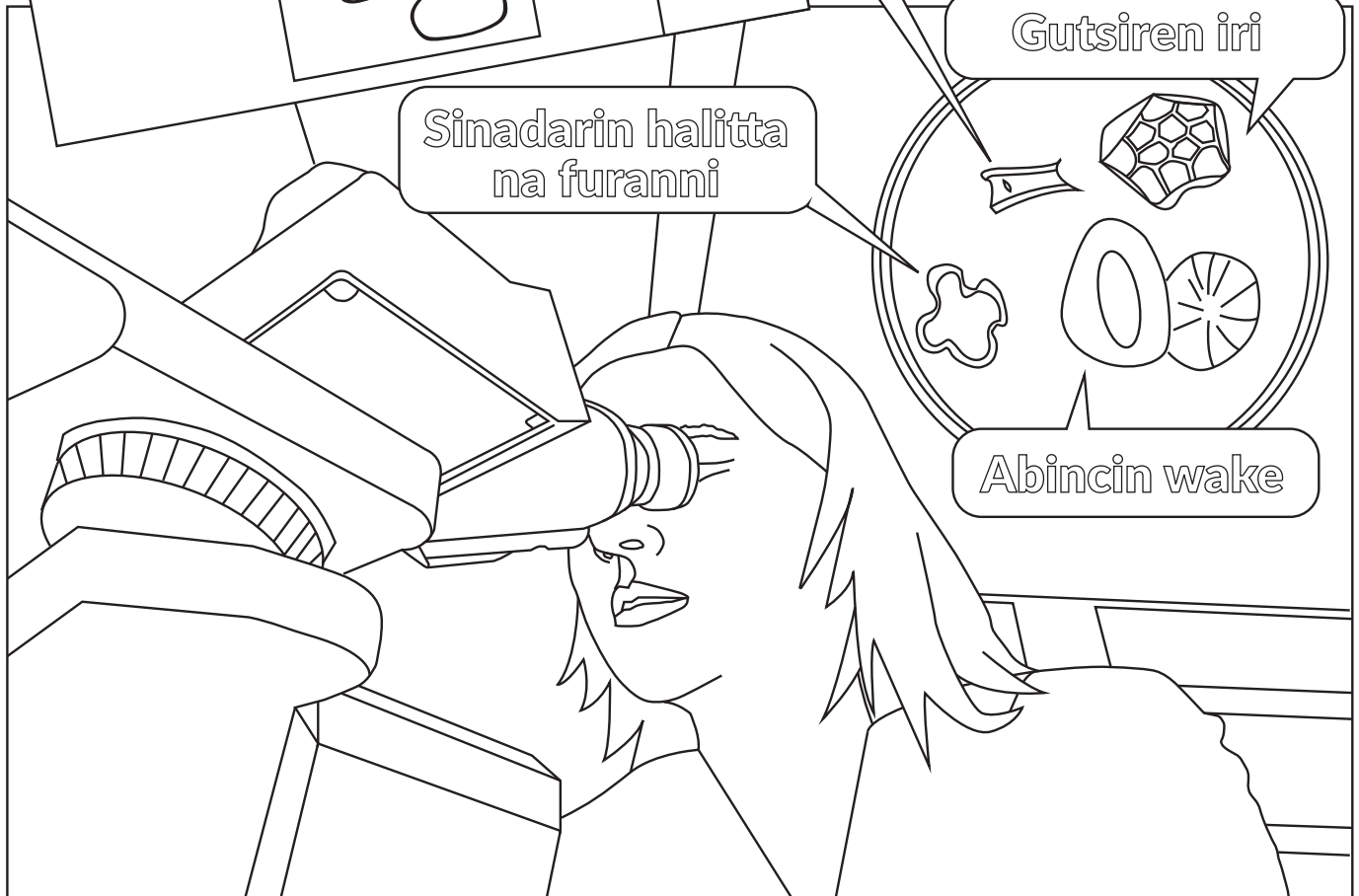
Birbishin haliita  
(phytolith) na Masara

Gutsiren iri

Sinadarin halitta  
na furanni



Abincin wake

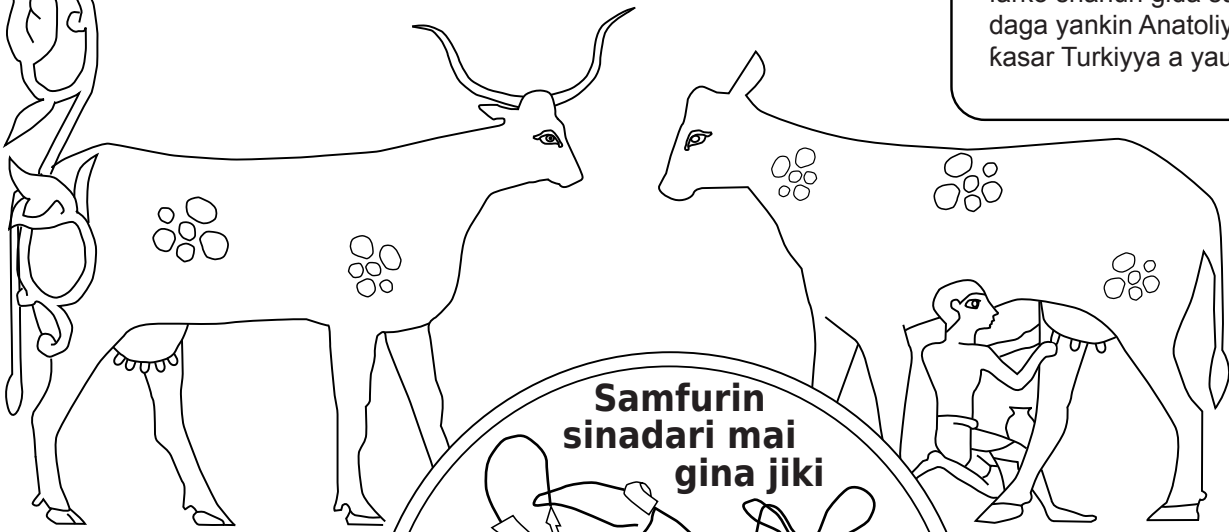


## NA GIDA

Fiye da shekara 10,000, mutane ke zaben tsire-tsire da dabbobi domin biyan bukatunsu. Shanu suna daga cikin dabbobin gida da ake cin namansu, kuma mutunen da kan dora wa shanu kaya, suna tatsar nononsu kuma suna amfani da kiragan shanun.

## KO KUN SAN?

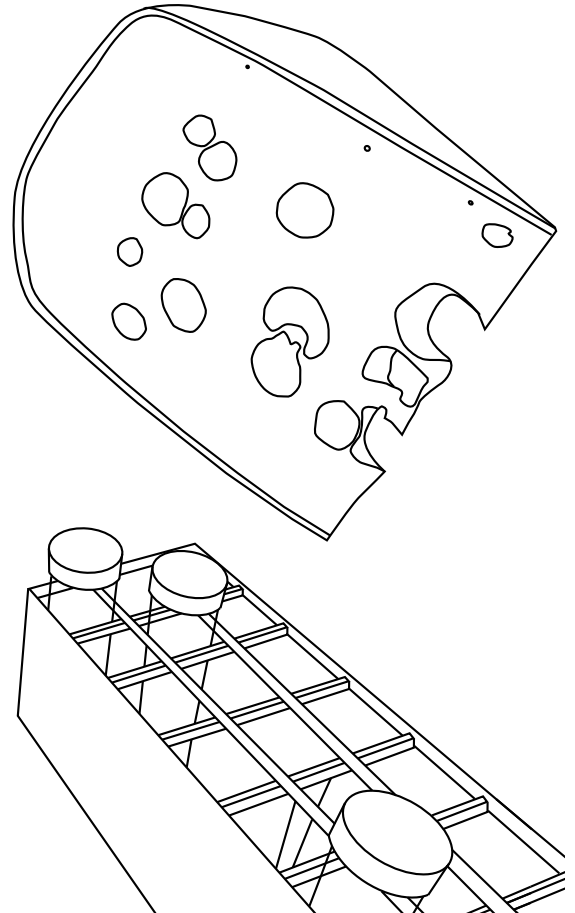
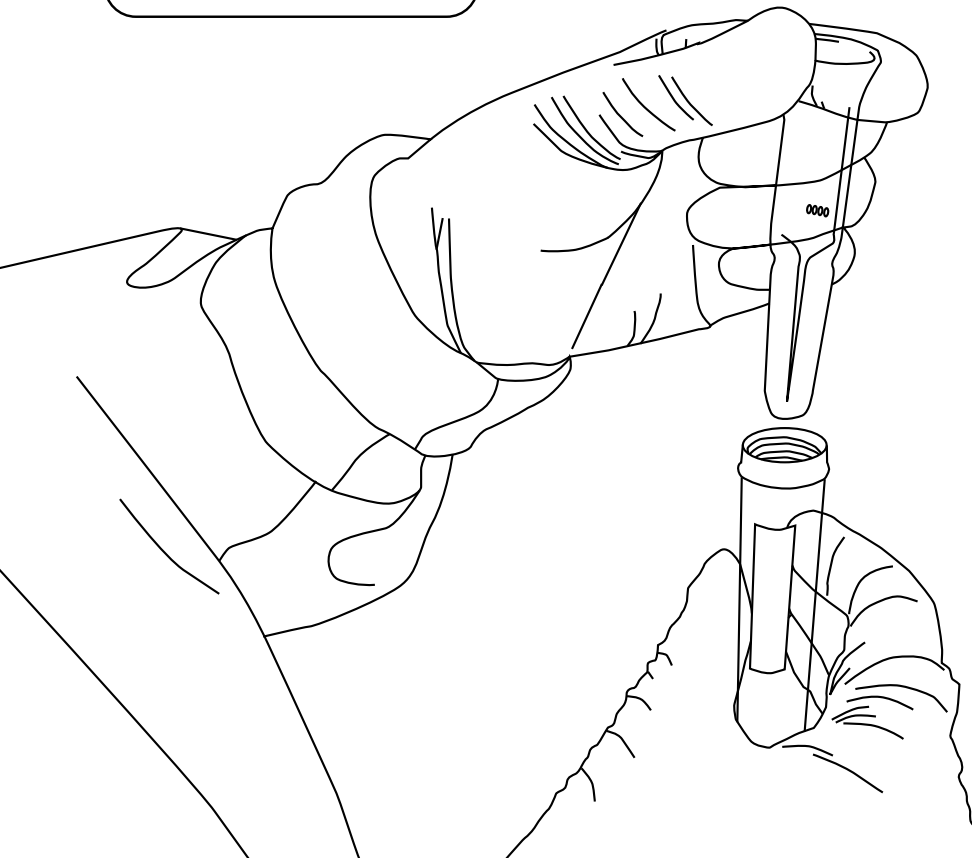
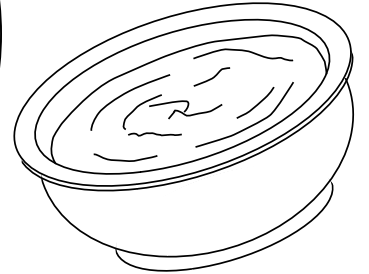
Asalin shanu daga aurochs suke, wato nau'in wannan (babban) naman dawa ya shude, daga baya ne suka zama dabbobin gida. Tun farko shanun gida sun faro daga yankin Anatoliya da ke kasar Turkiyya a yau.



Samfurin  
sinadari mai  
gina jiki

## Asalin kiwo

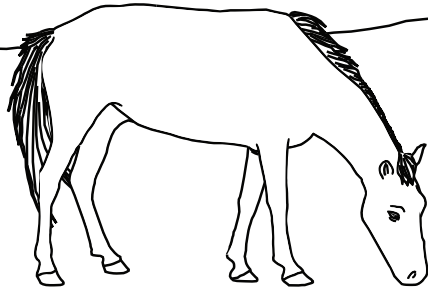
Allah ne masanin lokacin da kiwo ya samo asali, sai dai masana ilmin kufai sun yi amfani da na'urar masspektometri wajen gane sinadarai masu gina jiki a madara daga hakoran da ake da su tun a zamanin farko. Da wannan aka iya gina asalin tarihin kiwo.



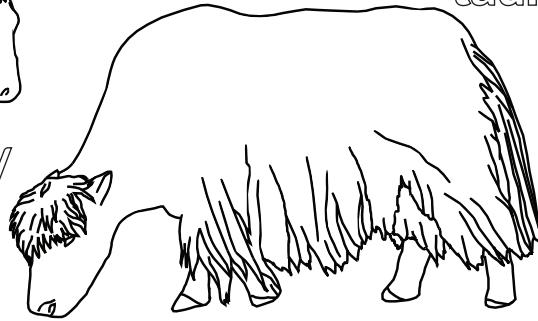
## Mongoliya

Dabbobi masu tarin yawa ciki har da dawakai da shanu da tumaki da awaki, da bareyi da rakuma da sauransu suna rayuwa a makiyayar Mangoliyawa. Makiyaya da ke yawo sun ci gajiyar wadannan dabbobi ciki har da dawakai da shanu da tumaki da awaki da bareyi da rakuma da sauransu.

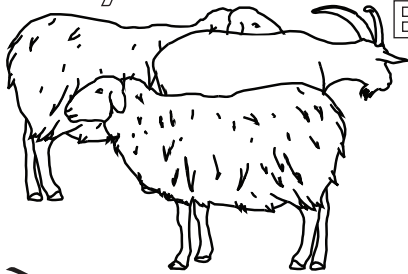
Doki



tauren Sa



Tunkiyya



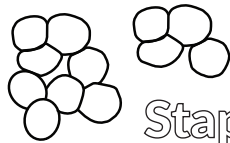
Bunsuru/  
akuya



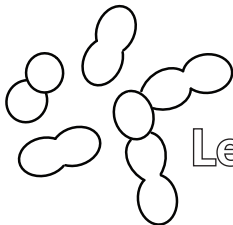
Saniya

## ABINCIN KIWO

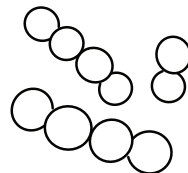
Abincin da ake samu ta hanyar kiwo na da muhimmancin gaske a rayuwar yau da kullun a Mongoliya. Binciken ilmin kufai ya sa mun fahimci wannan al'adar ta samo asali tun akalla shekara 3,500 da ta shude.



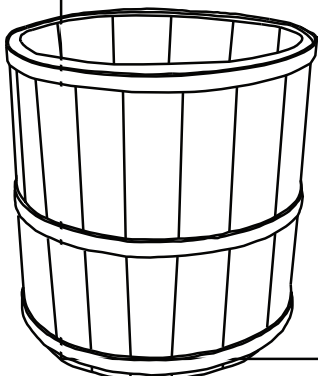
Staphylococcus



Leuconostoc

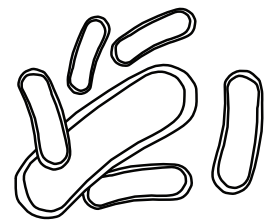


Lactococcus



## Kananan kwayoyin cuta masu nasaba da kiwo

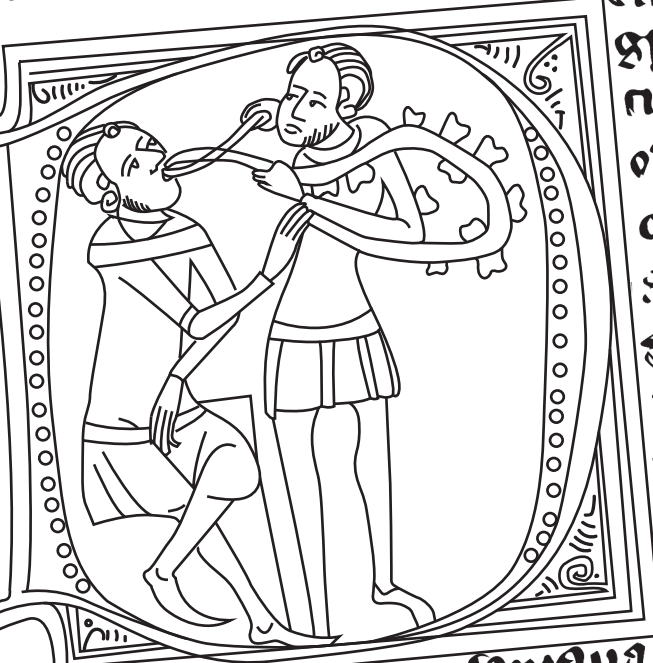
Kananan kwayoyin cuta - musamman masu rai suna taka muhimmiyar rawa wajen samar da nau'o'in abinci a gidan gona kamar sarraffiyar madara (yoghurt) da man shanu da cuku da kuma abincin da ba a san su ba, irin su aaruul (busasshiyar kindirmo) da airag (giyar madarar doki) a Mongoliya.



Lactobacillus

# CUTUTTUKAN DAURI

Kasusuwa da hakora da daudaf hakori, makunshin bayanai ne da ke da mahimmanci game da lafiyar mutanen da suka shude. Misali, masana kimiyya na iya sanin tarihin cutukan dasashi da ta rubewar hakori daga kwayoyin halittar gado (DNA) da kuma daudaf hakori.



## Omne Bonum

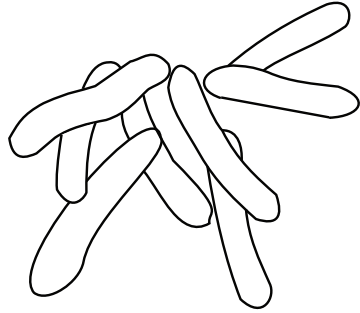
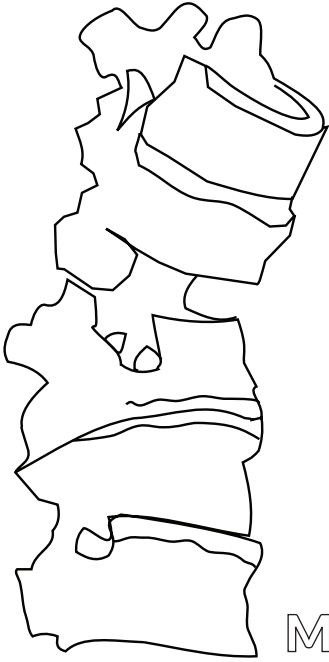
Omne Bonum, kundin tarihin Latin ne a karni na 14, kundin yana dakin karatu a Birtaniya kuma yana kunshe da bayanai game da rayuwa da ta shafi shekarun Tsakiyar zamani (Middle Ages) a Turai. Waɗansu daga cikin bayanai da kundin ya kunsu su ne al'amuran da suka shafi likitan hakora da kulawa da lafiya da ke taimaka mana wajen fayyace cutuka da harkar lafiya.



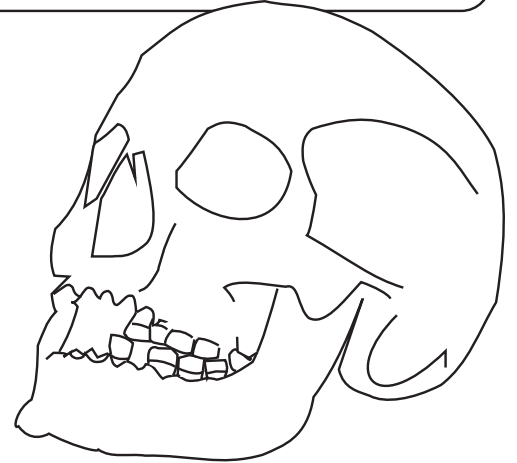
omni hilantia...  
 p dicitur in iohanni...  
 demib; p dicitur in iohanni...  
 entes fin...  
 gregos d...  
 nunt q...  
 odente...  
 omni...  
 aposto...  
 diuid...  
 res...  
 deute...  
 dicit p...  
 sunt deu...  
 tes fm a...  
 mesam plantia...  
 mofib; max...  
 illaz; 2 m...  
 gub; dam...  
 iadib; ma...  
 2 sut...  
 m...  
 en...  
 pe...  
 m...  
 az...  
 y...  
 n...  
 g...  
 quos priores...  
 p...  
 m...  
 f...  
 ad...  
 angendi...  
 tantis...  
 a dulcora sup...

## TARIN FUKA DA KUTURTA

Cutar tarin fuka da kuturta na samuwa ne daga kwayoyin cuta masu alaka: *Mycobacterium tuberculosis* da *Mycobacterium leprae* na iya cutar da kashi, kuma burbushin kwayar halittar gado (DNA) da ta kwarangwal na iya taimaka wa masana kimiyya su sake gina tarihin wadannan tsoffin cututtuka.

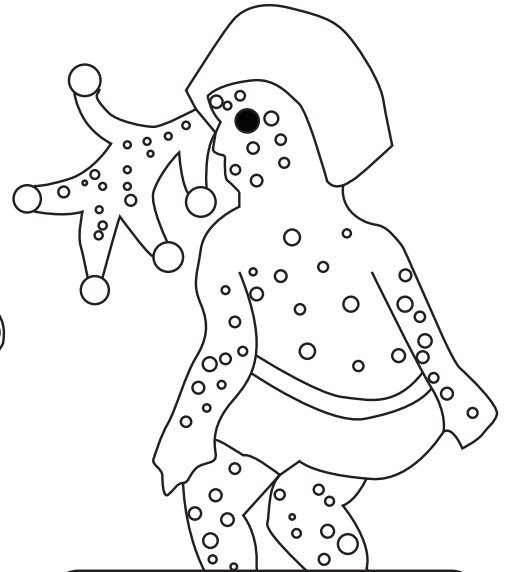


*Mycobacterium leprae*

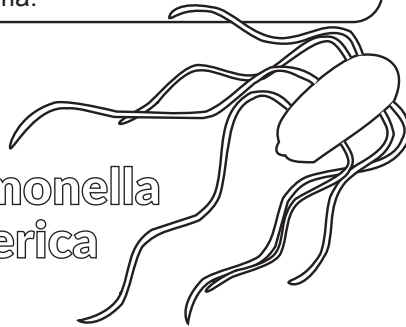


## COCOLIZTLI

Annobar da ba a tantance ba - mai suna *cocoliztli* in ji kabilar Aztec. Annobar cocoliztli ta ci ran kashi 60-90% na al'ummar Mexico a tsakanin shekarar 1545 zuwa 1550. Ba da dadewa ba, aka gano kwayar halittar gado (DNA) daga hakoran wadansu da cutar *Salmonella enterica* Paratyphi C ta kama.

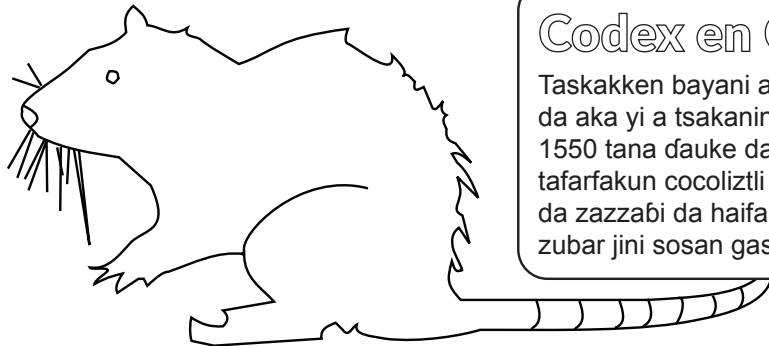


*Salmonella enterica*



## Dr. Schnabel

Likitocin da suka kula da waƙanda suka kamu da cutar a karni na 17 sun sanya takunkumin fuska (kamar tsuntsaye) domin kariya daga "gurbatacciyar iska."

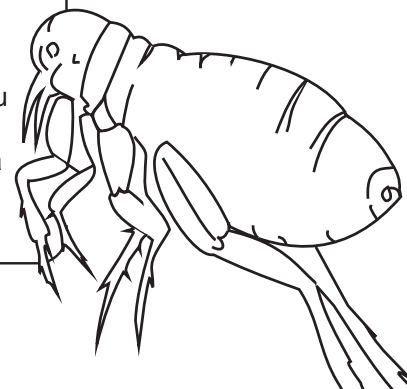


## Codex en Cruz

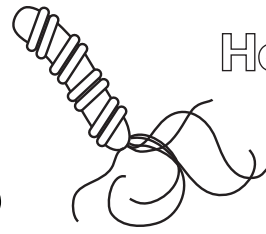
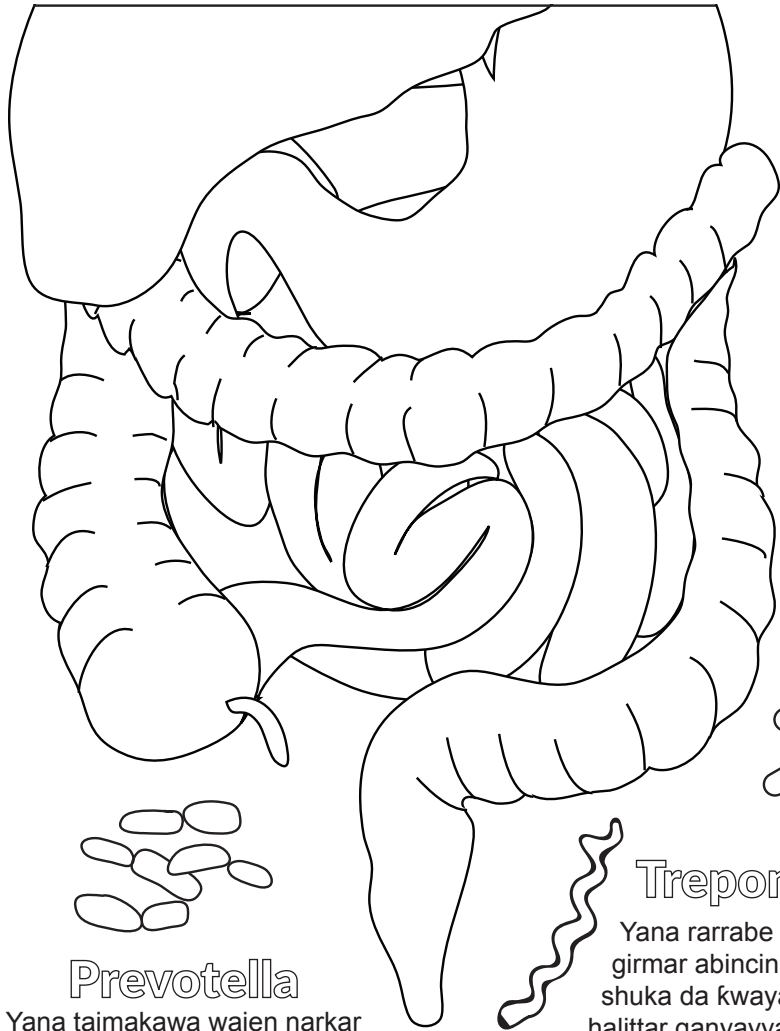
Taskakken bayani a kan Aztec da aka yi a tsakanin shekarar 1550 tana dauke da bayani a kan tafarfaƙun cocoliztli na somawa da zazzabi da haifar da kuraje da zubar jini sosan gaske.

## ANNOBA

Kwayoyin cutar *Yersinia pestis*, sun haifar da annoba, cutar ta yaɗu ne sakamakon kudajen da suka bi jikin beraye. Saboda haka, duk wanda kudajen suka cije shi ya kamu da cutar bubonik. Annobar ta yi sanadiyar asarar rayuka ba adadi a shekarar (AD 1346-1353), wato rabin mutanen Turai sun mutu a sakamakon wannan cuta.







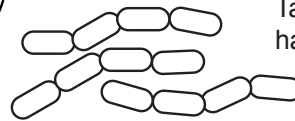
### Helicobacter pylori

A ciki take rayuwa, takan iya haifar da gyambon ciki (ulcers) da (ciwon) daji



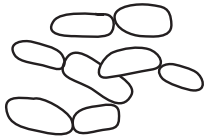
### Bifidobacterium

Taimaka wa nono ya narke idan jarirai suka sha



### Faecalibacterium

Taimaka wa kwayoyin halittar da ke cikin hanji



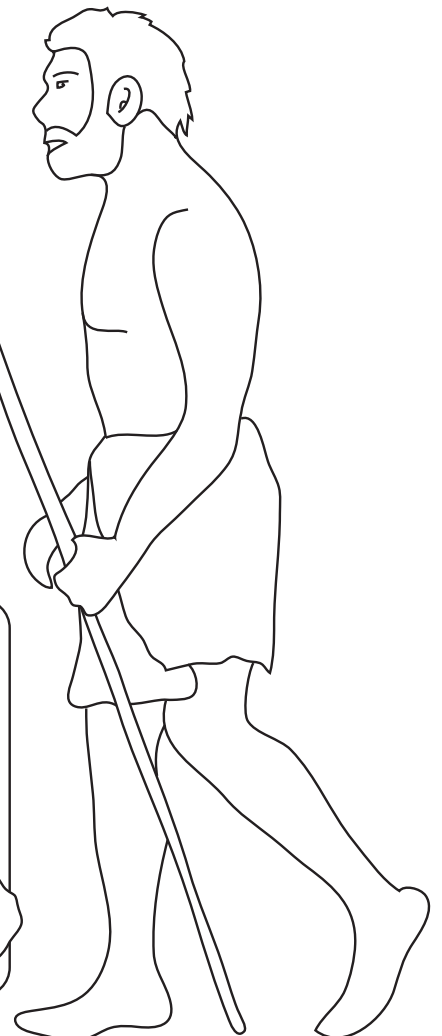
### Prevotella

Yana taimakawa wajen narkar da kwayar halittar ganyayyaki shuke- shuke (fibrous)



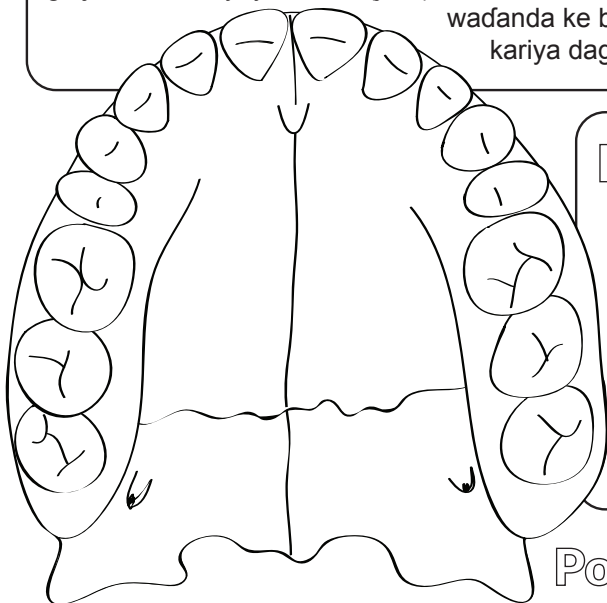
### Treponema

Yana rarrabe girman abincin shuka da kwayar halittar ganyayyaki (fiber) na abinci



## KANANAN KWAYOYIN CUTA TUN DAGA KAKANNINMU

Jikinku, mazaunin kwayoyin cuta ne da yawan su ya kai **tiriliniyoyi**. Kwayoyin da ke rayuwa a hanjinku suna taimaka wa abinci ya narke kuma kariya ce ga jikinku. Kwayoyin da ke (jikin) fata na taimakawa wajen tsaftace ta, kuma waɗanda ke bakinku na taimakawa a sami kariya daga ɗaukar cututtuka.



### KO KUN SAN?

Masana kimiyya suna nazarin lissafin hakori da bahaya domin fayyace kananan kwayoyin cuta da ake gado a dangi (kakanni) da kuma fahimtar abubuwan da ke haifar da cututtuka.



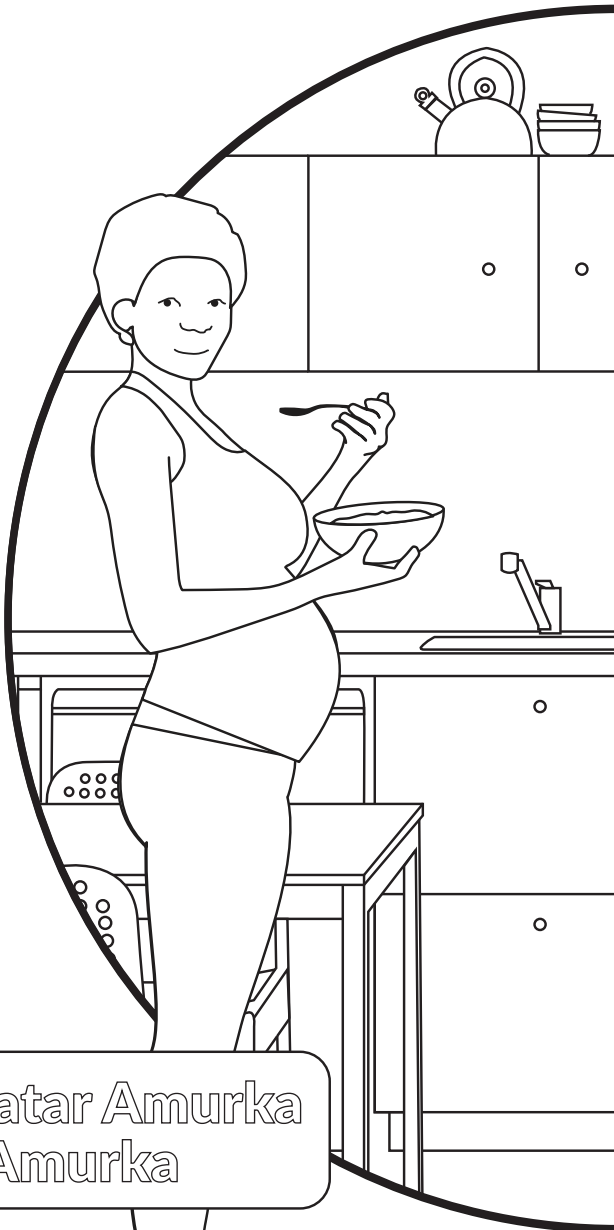
### Porphyromonas

# MAKIYAYAN DABBOBI

Makiyayan dabbobi na iya zama mafarauta, sukan ci daga 'ya'yan tsirrai a dawa, kuma sauƴin yanayi na iya shafar abincinsu.

Kafin noma ta kankama a wurin shekara 10,000 da ta wuce, mutanen duniya sun kasance masu neman abin da za su ci.

Makiyaya dabbobi a yau suna da nau'o'in kananan kwayoyin cuta daban-daban fiye da mutanen da ke cikin al'ummomin da ke da masana'antu.



Matar Amurka  
a Amurka



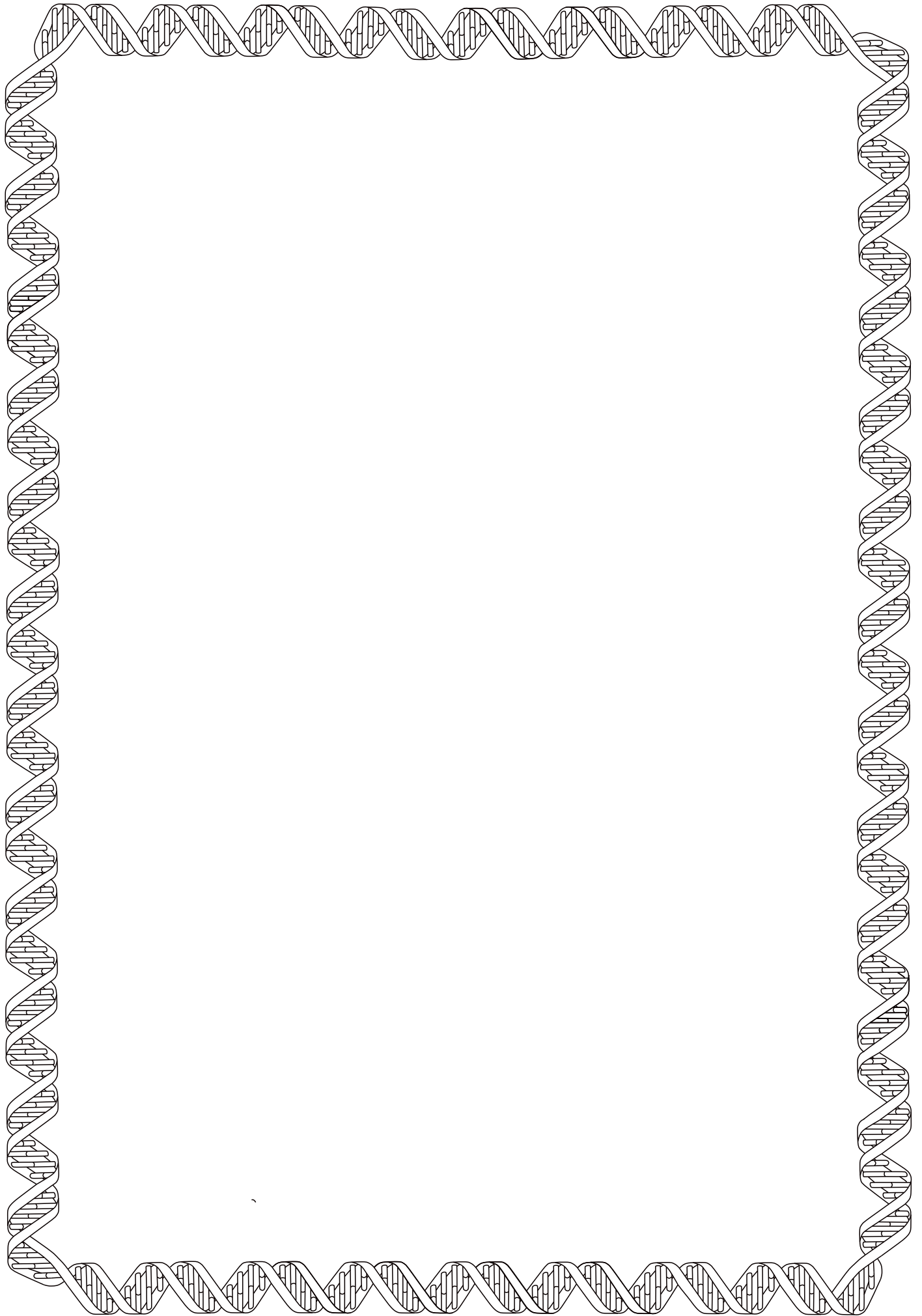
Mace da jariri yar  
Kabilar Hadza a  
Tanzaniya

# AL'UMMAR DA KE DA ARZIKIN MASANA'ANTU

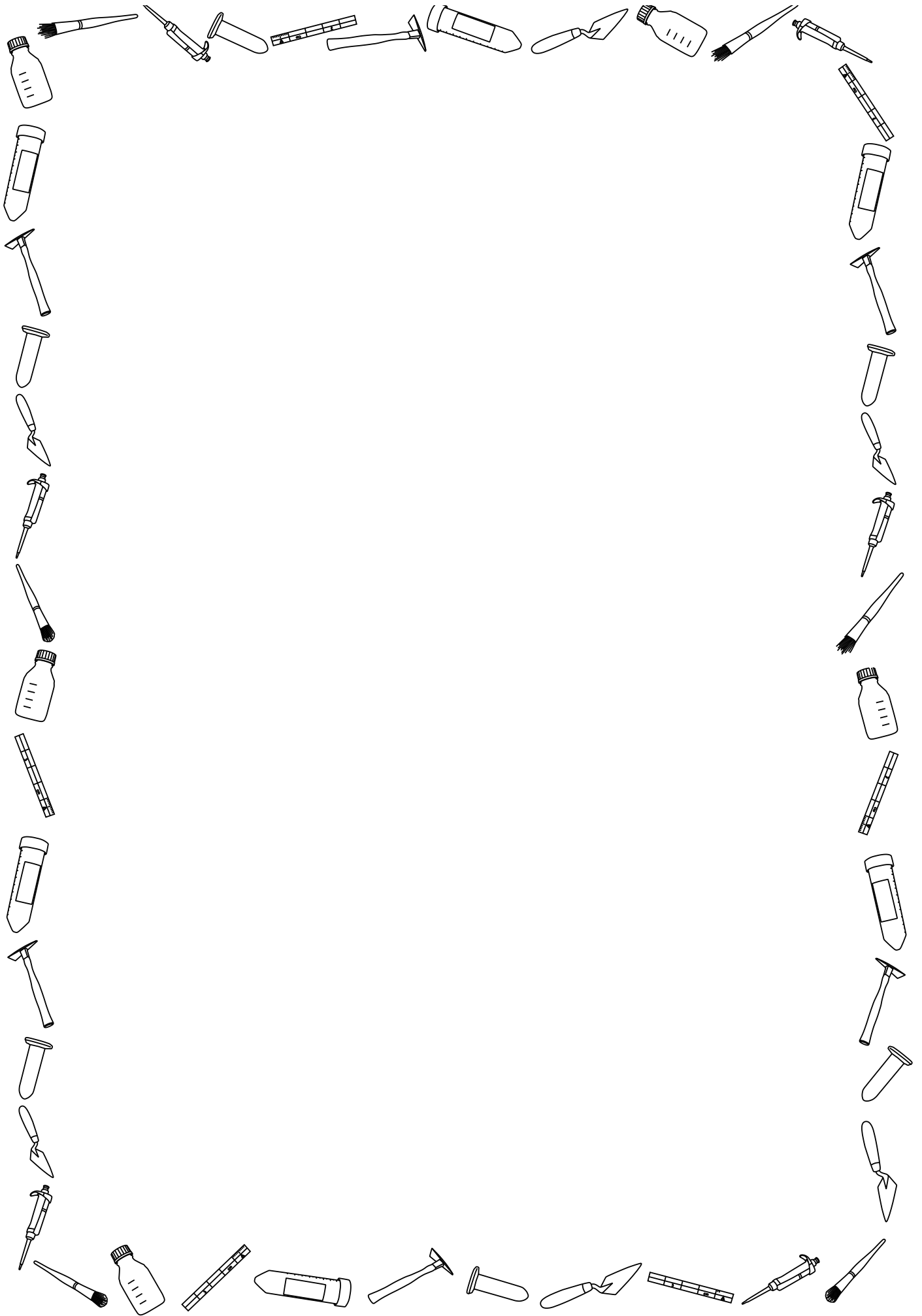
Amfanin gona shi ne abincin akasarin al'ummomin da ke da ci gaban masana'antu, noma ita ce sana'a da mutane suka kware a kai, ko da yake ba kowa ne manomin ba sai kaƴan daga cikin mutane da suke da kwarewa.

Sarrafa na'ura wajen samar da abinci da sanya masa sinadarai da zai daƴe bai lalace ba da adana shi domin a kai shi wurare masu nisa saboda mabukata su same shi.

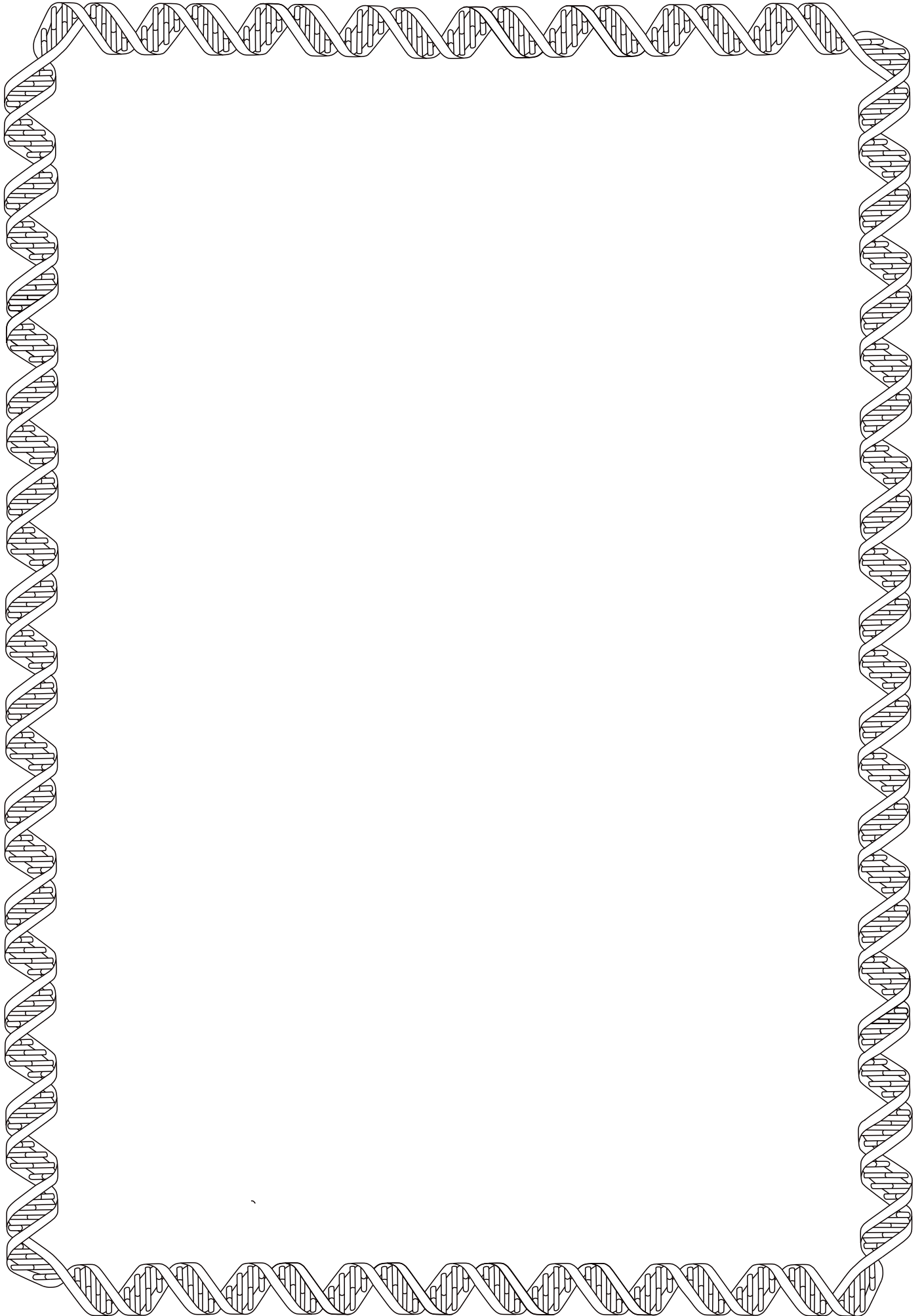
Mutane a al'ummomi masu arzikin masana'antu a yau suna fama da kananan kwayoyin cuta na hanji, waƴanda ka iya sanya su cikin haƴari mai girma na waƴansu cututtuka masu haifar da kumburi.





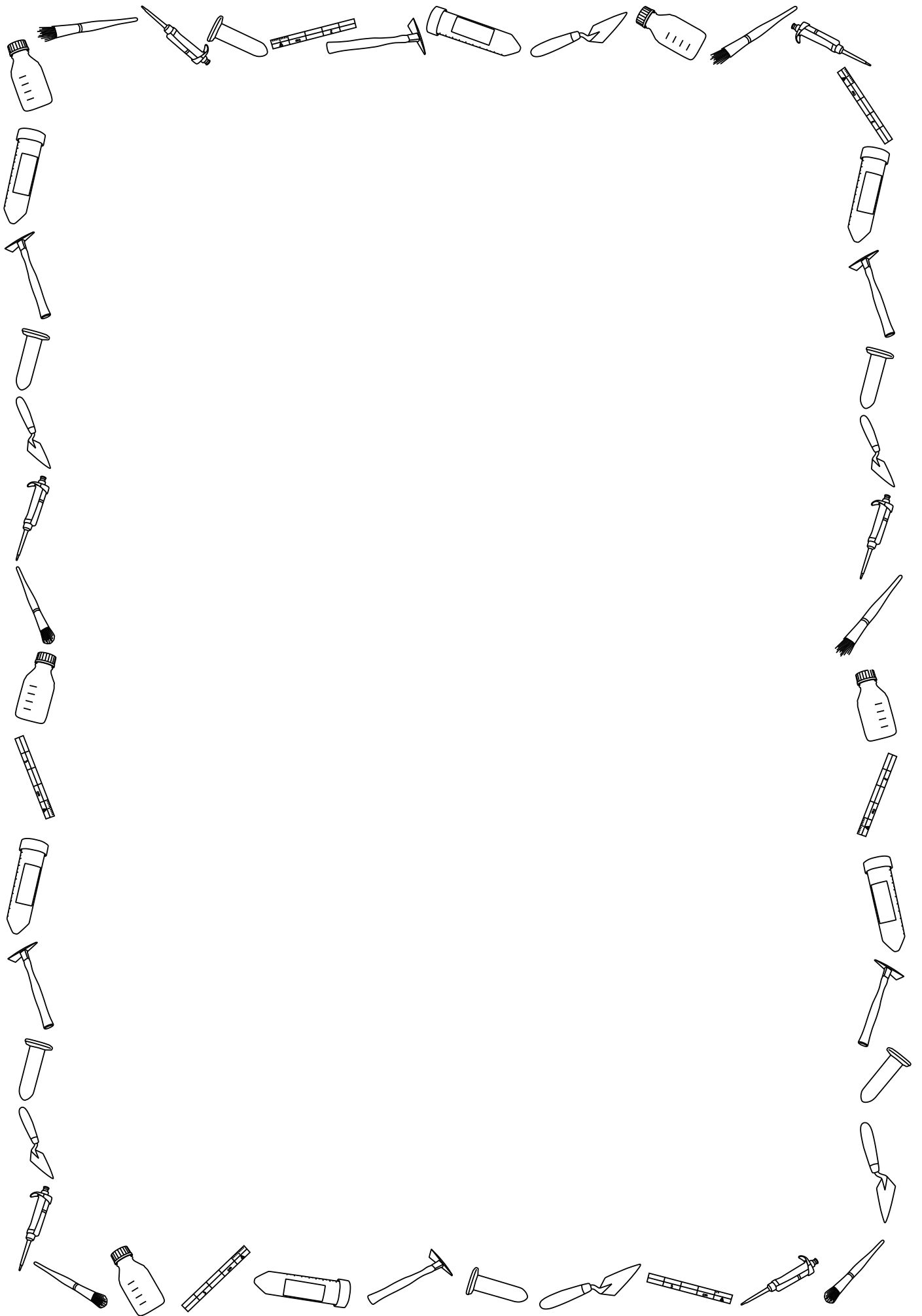




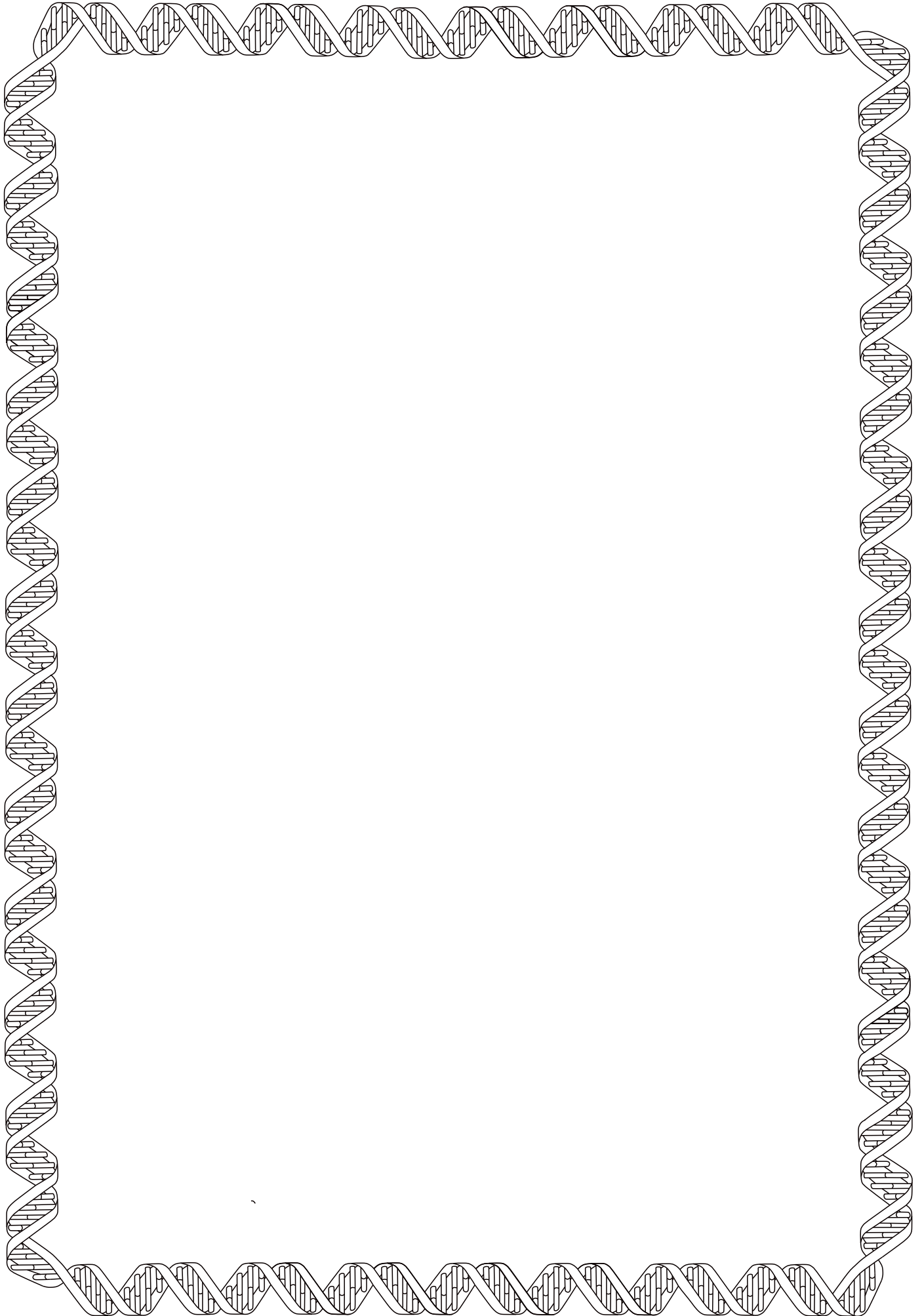






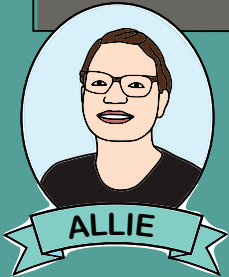




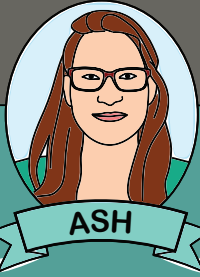




## Cibiyar Max Planck domin Ilmin Juyin Halitta



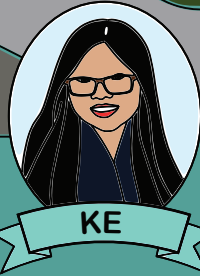
ALLIE



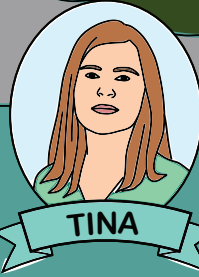
ASH



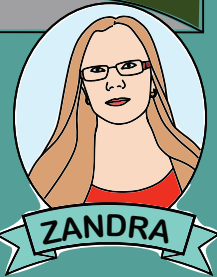
JESSIE



KE



TINA



ZANDRA

## Kasada a

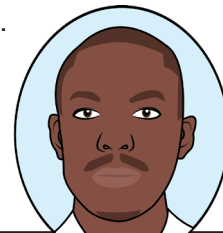
# ILMIN KUFAL

## Littafin da za a shafe (cike) da launi

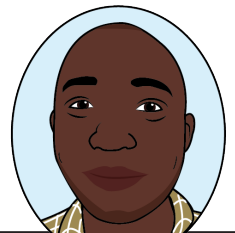
Koyi yadda masana ilmin kufal da na kimiyya ke aiki tare domin amsa tambayoyi a kan al'amuran dan Adam da suka shuƙe! Kasance da mu yayin da muke bayyana **ko su wane ne mu da abin da muke nazari** game da **asalin mutane zuwa annobar tsakiyar zamani**. Dubi yadda **kaurace-kauracen dauri** da gudumuwar **gwajin shekaru na radiyokabon**. Yi nazarin yadda masana kimiyya suka farfado da **abincin mutan da** daga ragowar tsire-tsire, suka gano yadda aka **turke wasu dabbobi a gida** da kuma kimiyyar da ke bayanin abincin da ake samu a **harkar kiwo**. Haka kuma, za a iya lura da yadda suka bincika **tsofaffin cututtuka** da annoba tare da gano **kananan kwayoyin cuta na kakannin dan Adam**.

Masana kimiyya ne suka samar da shi a Cibiyar Max Planck domin Ilmin Juyin Halitta.

Fassara cikin Harshen Hausa daga:  
Aliyu Adamu Isa da Abubakar Ayuba



ALIYU



ABUBAKAR