



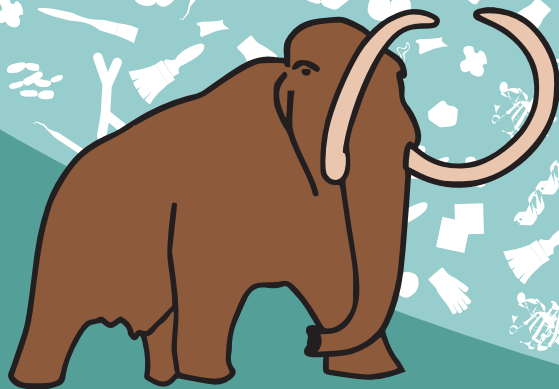
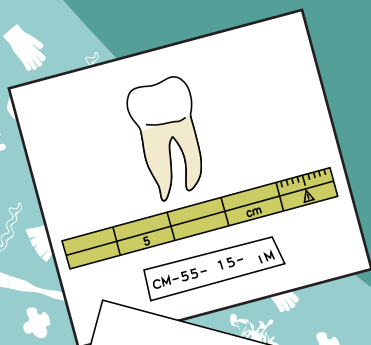
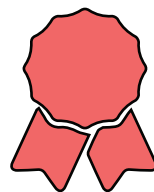
# ARXEOLOGIYA OLAMIGA SAYOHAT

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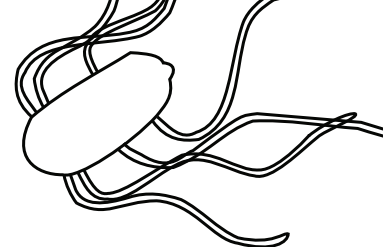
kitobi

Bo'lajak arxeolog



Bo'yash kitobi  
Maks Plank evolyutsion  
antropologiya instituti





# ARXEOLOGIYA

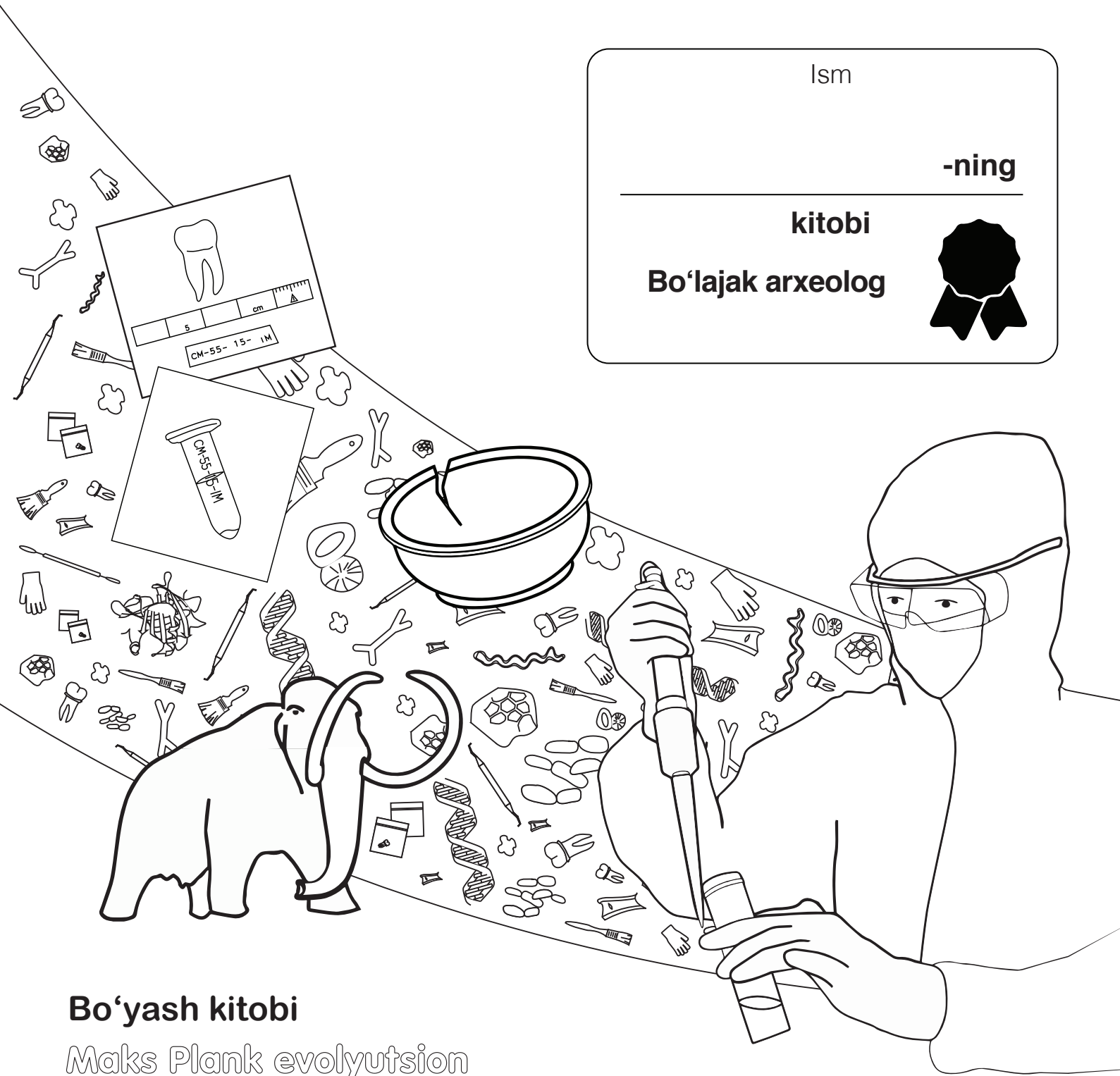
## OLAMIGA SAYOHAT

Ism

-ning

kitobi

Bo'lajak arxeolog



**Bo'yash kitobi**

Maks Plank evolyutsion  
antropologiya instituti



**Nashriyot:** Maks Plank evolyutsion antropologiya instituti

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**Mas'ul muharrir yordamchisi:** Jessica Hendy

**Loyiha ishtirokchilari:**

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Jessika Hendy

Allison Mann

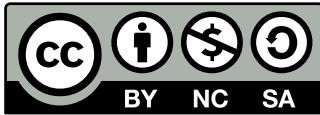
Ashild Vagene

Ke Vang

Kristina Varinner

O'zbek tiliga **Niyoz Rashidov** tomonidan tarjima qilindi.

Ushbu bo'yash kitobi ilmiy illyustratsiya bo'yicha o'quv kursining bir qismi sifatida tayyorlangan.



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2024

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## BIZ KIMMIZ?

Arxeolog olimlar bu – ilmiy usublardan va eng zamonaviy texnologiyalardan foydalan-gan holda insoniyat o'tmishini o'rganuvchi tadqiqotchilardir.



Kurakcha

## Arxeologik qazishmada

Olimlar dalada namunalarni qazib olish va to'plash uchun arxeologlar bilan yaqindan hamkorlik qilishadi va keyinchalik laboratoriya sharoitlarida tadqiqotlarini yana davom ettiradilar.

Bularga qabr ichidan namuna olish, eski sopol idish tubidan organik qoldiqlarni to'plash, qadimgi chiqindixonaga tashlangan hayvon suyaklarini qaysi hayvonga tegishli ekanligini aniqlash yoki o'simlik qoldiqlarini topish uchun tuproqni elash kabilar kiradi.

## Laboratoriyada

Olimlar qadimgi DNK (Dezoksiribonuklein kislota) bilan shug'ullanish jarayonida qadimgi namuna bilan zamonaviy DNK namunasini aralashtirib yubormaslik uchun toza xonalarda ishlashlari, maxsus kiyim, qo'lqop va oyoq kiyim kiyishlari kerak bo'ladi.

Olimlar qadimgi namunalarni o'rganish uchun bir qator asbob-uskunalardan foydalanishadi.



Tomizg'i asbobi



# ARXEOLOGIK QAZISHMA

Arxeolog olim insoniyat o'tmishini tadqiq qilish uchun dunyo bo'ylab sayohat qiladi. Ba'zan oddiy asboblardan tashqari maxsus uskunlar kerak bo'ladi. Masalan, Himolay tog'larida arxeologga to'g'ra ko'tarilish ruxsatnomasi va alpinistlar anjomlari kerak bo'ladi.

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

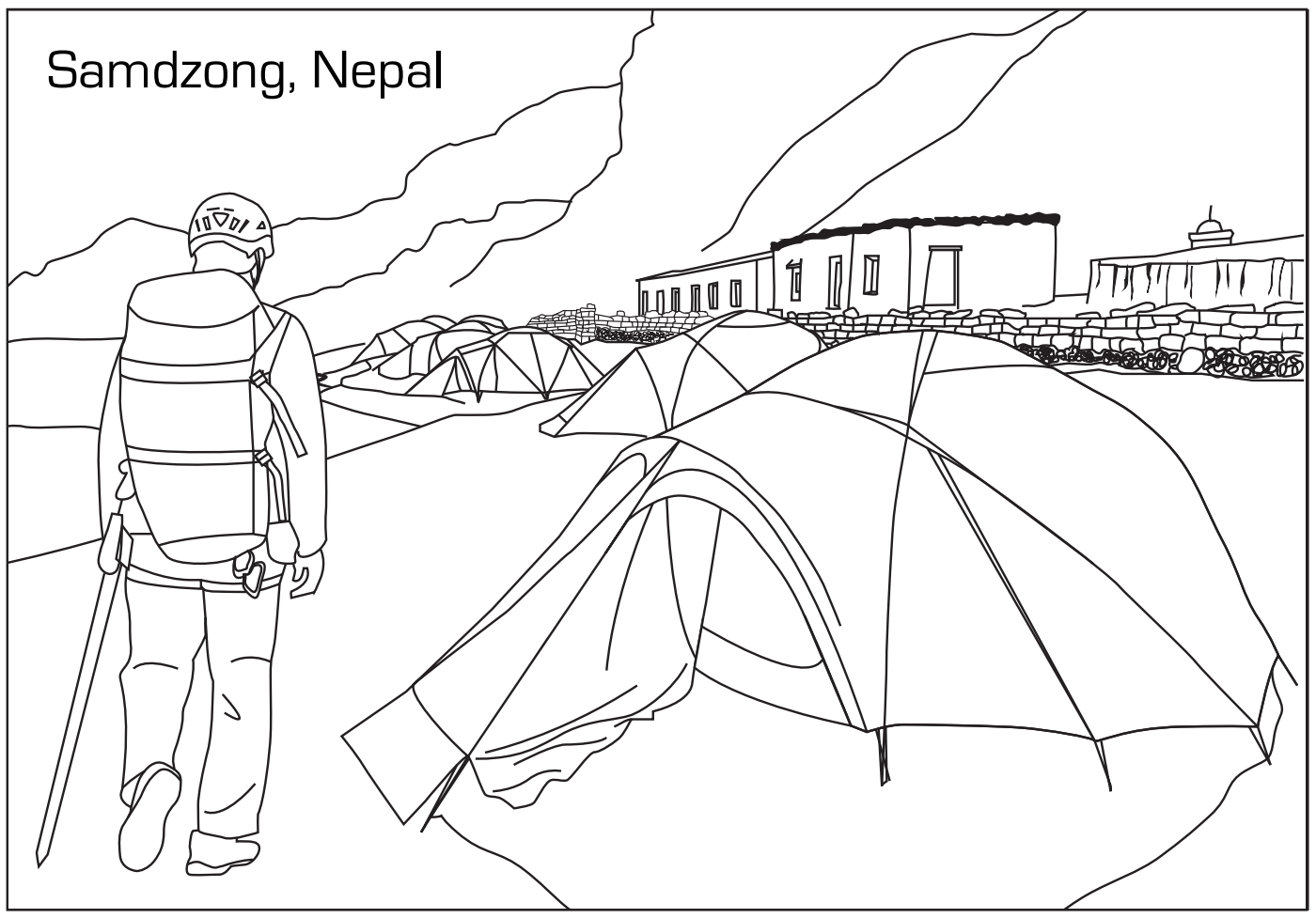
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**Entry Permit (ACAMCA/GCA)**  
Schedule - 2 (Relating to Sub-Rule (1) of Rule 19)  
Receipt No. **0281630**  
Entry Permit No.  
Full Name:  
Date of Birth:  
Passport No.  
Nationality:  
Purpose of Visit:

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

**TOURIST COPY**

Immigration Officer  
No

## Samdzong, Nepal





## Tish toshi

Tish toshi, sizning tanangizda tirikligingizdayoq toshqotmaga aylanadigan yagona tarkibiy qismdir. Unda siz yegan ovqat qoldiqlari va bakteriyalar mavjud bo'ladi va tish toshlaridan inson qanday oziqlanganligi va sog'lig'i haqidagi ma'lumotni olishda foydalanish mumkin.

## Suyaklar va tishlar

Suyak va tishlarda DNK parchalari qolgan, undan qadimgi odamlarning hududlar bo'ylab ko'chishlarini tadqiq qilish, sochlari va ko'zlarining rangi, irsiy moslashuvchalligini aniqlashda foydalansa bo'ladi. Agar biror kishi epidemiya vaqtida vafot etgan bo'lsa, shu kishini kasal qilgan qo'zg'atuvchi DNK si uning tishidan ham topilishi mumkin.

## Hayvon suyaklari

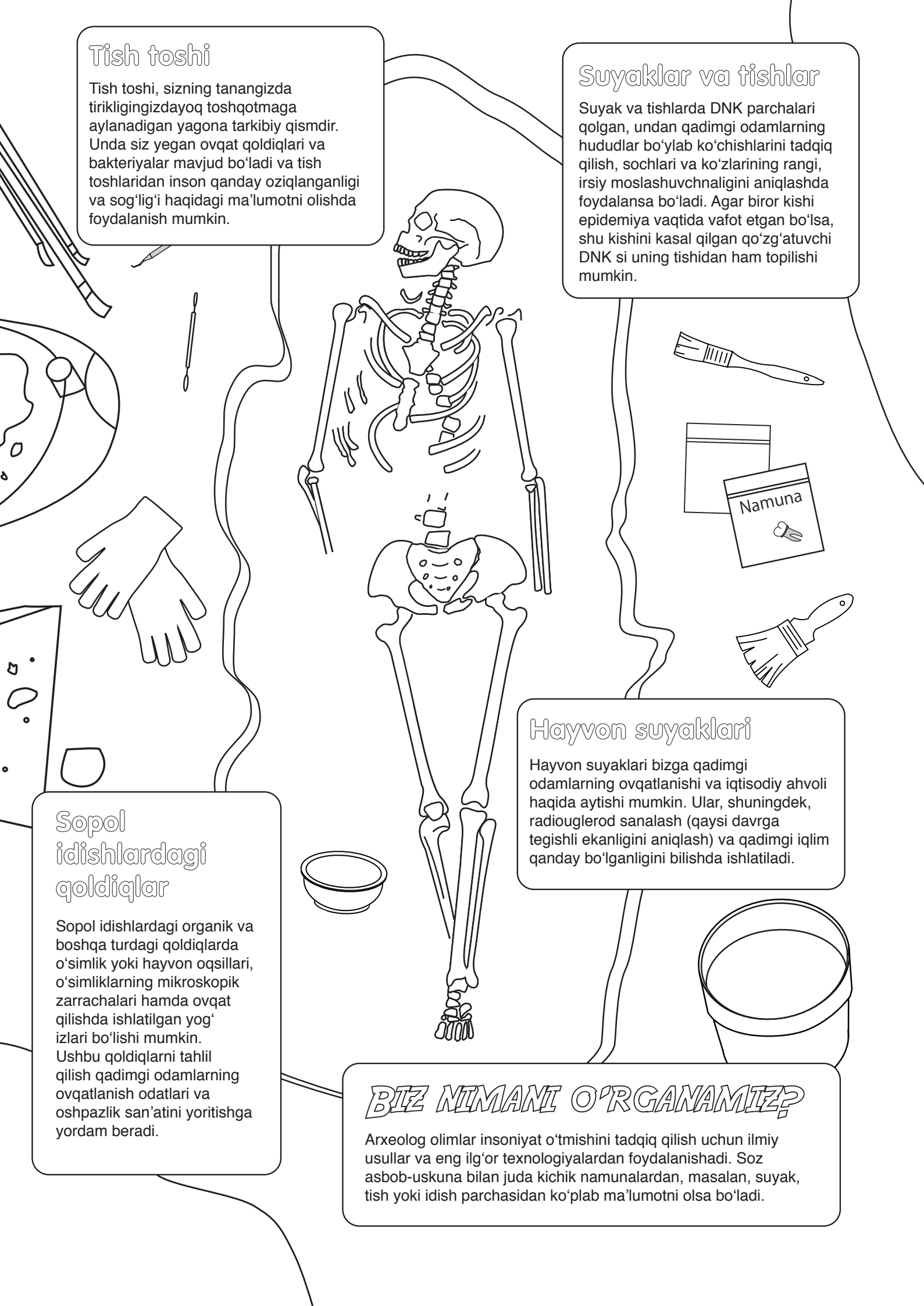
Hayvon suyaklari bizga qadimgi odamlarning ovqatlanishi va iqtisodiy ahvoli haqida aytishi mumkin. Ular, shuningdek, radiouglerod sanalash (qaysi davrga tegishli ekanligini aniqlash) va qadimgi iqlim qanday bo'lganligini bilishda ishlatiladi.

## Sopol idishlardagi qoldiqlar

Sopol idishlardagi organik va boshqa turdagi qoldiqlarda o'simlik yoki hayvon oqsillari, o'simliklarning mikroskopik zarrachalari hamda ovqat qilishda ishlatilgan yog' izlari bo'lishi mumkin. Ushbu qoldiqlarni tahlil qilish qadimgi odamlarning ovqatlanish odatlari va oshpazlik san'atini yoritishga yordam beradi.

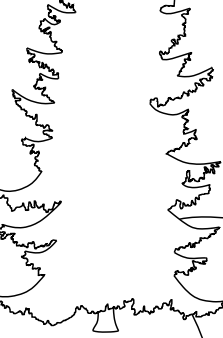
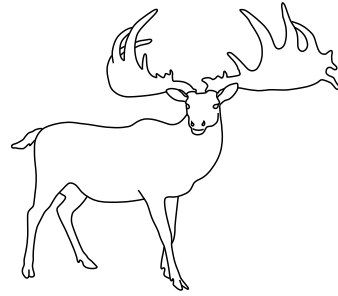
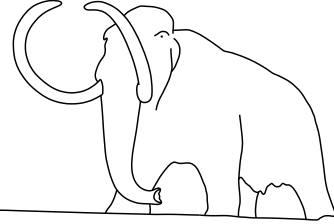
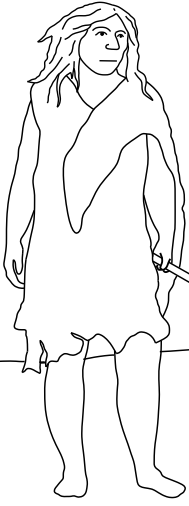
## **BIZ NIMANI O'RGANAMIZ?**

Arxeolog olimlar insoniyat o'tmishini tadqiq qilish uchun ilmiy usullar va eng ilg'or texnologiyalardan foydalanishadi. Soz asbob-uskuna bilan juda kichik namunalardan, masalan, suyak, tish yoki idish parchasidan ko'plab ma'lumotni olsa bo'ladi.



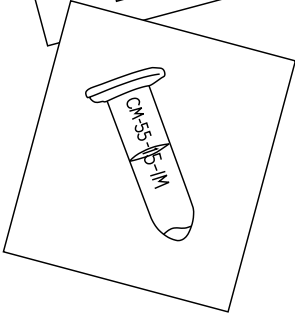
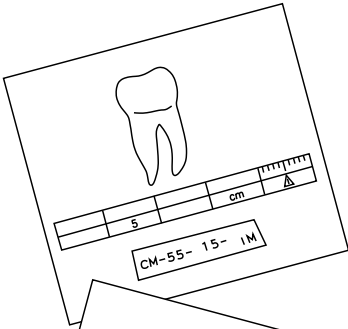
## BILARMIDINGIZ?

Neandertallar 40 ming yil oldin yo'qolib ketgan, biroq ularning DNK si ko'plab afrikalik bo'lmagan odamlarning genlarida hali ham mavjud.



## INSONNING KELIB CHIQISHI

Qadimgi DNK evrilish (evolutsiya) jarayonidagi eng yaqin qarindoshimiz Neandertallarni tushunishga yordam bermoqda.



## Evrilish (evolutsiya)

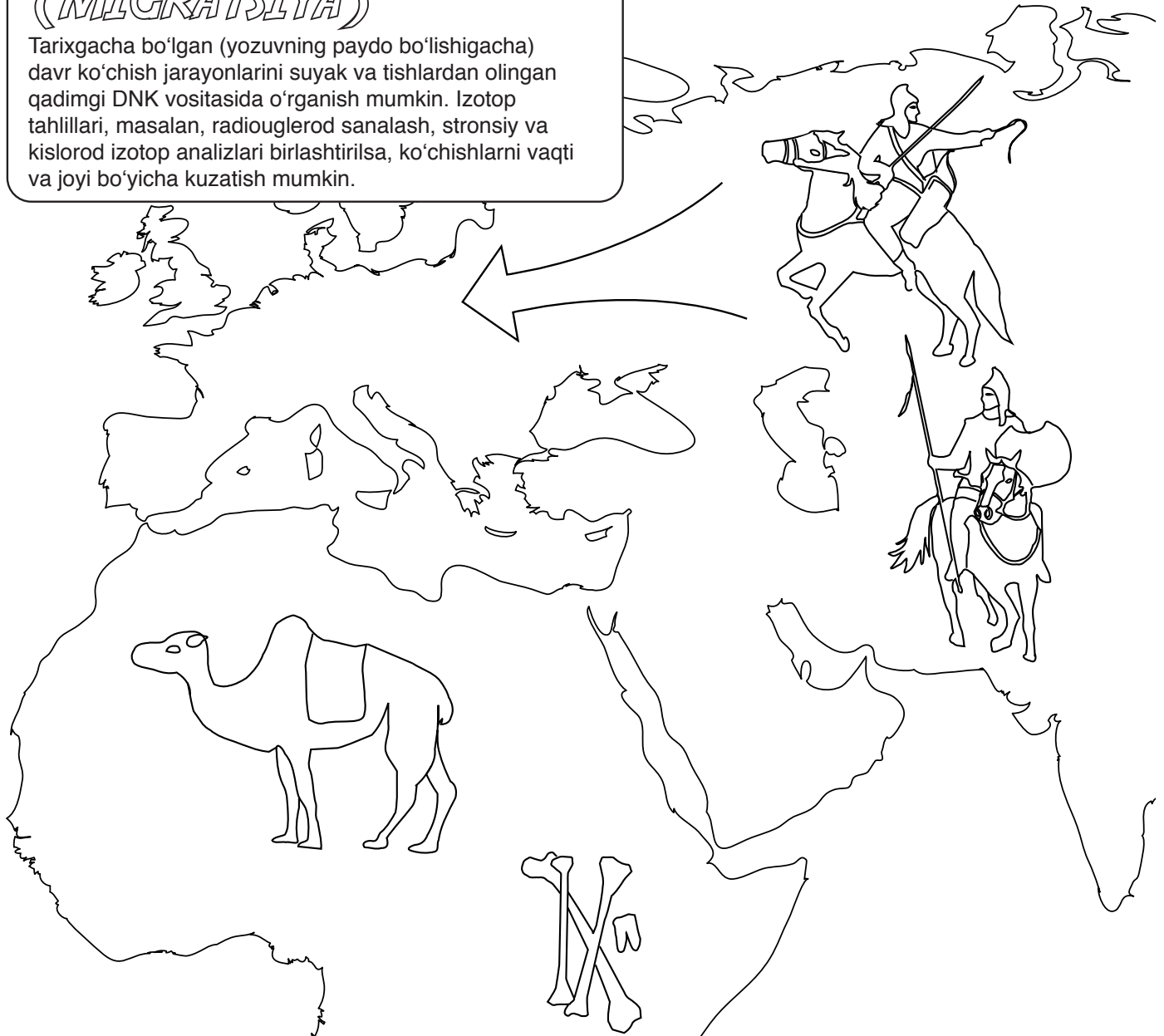
Qadimgi odamlarning tishlari va suyaklarini o'rganish orqali ajdodlarimiz qanday yashaganligi va bugungi ko'rinishimiz qanday shakllanib kelganligini bilib olishimiz mumkin.



## QADIMGI KO'CHISHLAR (MIGRATSIYA)

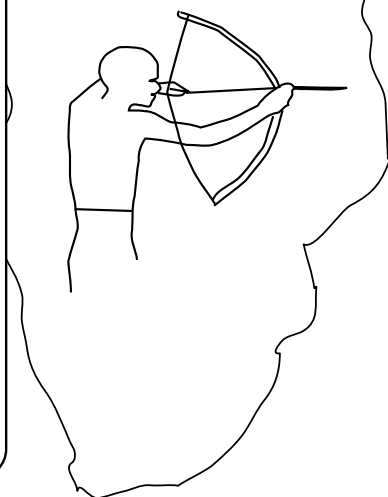
Tarixgacha bo'lgan (yozuvning paydo bo'lishigacha) davr ko'chish jarayonlarini suyak va tishlardan olingan qadimgi DNK vositasida o'rganish mumkin. Izotop tahlillari, masalan, radiouglerod sanalash, stronsiy va kislorod izotop analizlari birlashtirilsa, ko'chishlarni vaqti va joyi bo'yicha kuzatish mumkin.

Skiflar, Markaziy Osiyo  
Temir davri, eradan 700 yil oldin

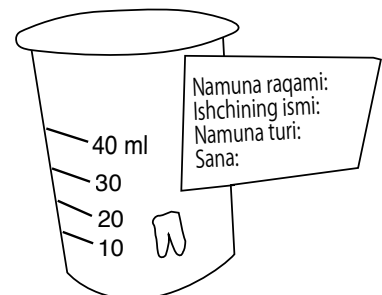


## BILARMIDINGIZ?

Radiouglerod yoki  $^{14}\text{C}$ , bu uglerodning barqaror bo'lmagan izotopi bo'lib, o'simliklar tomonidan fotosintez jarayonida havodan o'zlashtirib olinadi. Hayvonlar o'simliklarni yeganida radiouglerod ularning ham tanasiga tushadi va vaqt o'tishi bilan parchalanib boradi. Shunga binoan, qadimgi namunada  $^{14}\text{C}$  ning miqdorini hisoblasak, o'sha organizm qancha vaqt oldin yashaganligini taxmin qilish mumkin.



## Radiouglerod sanalash (davrlashtirish)

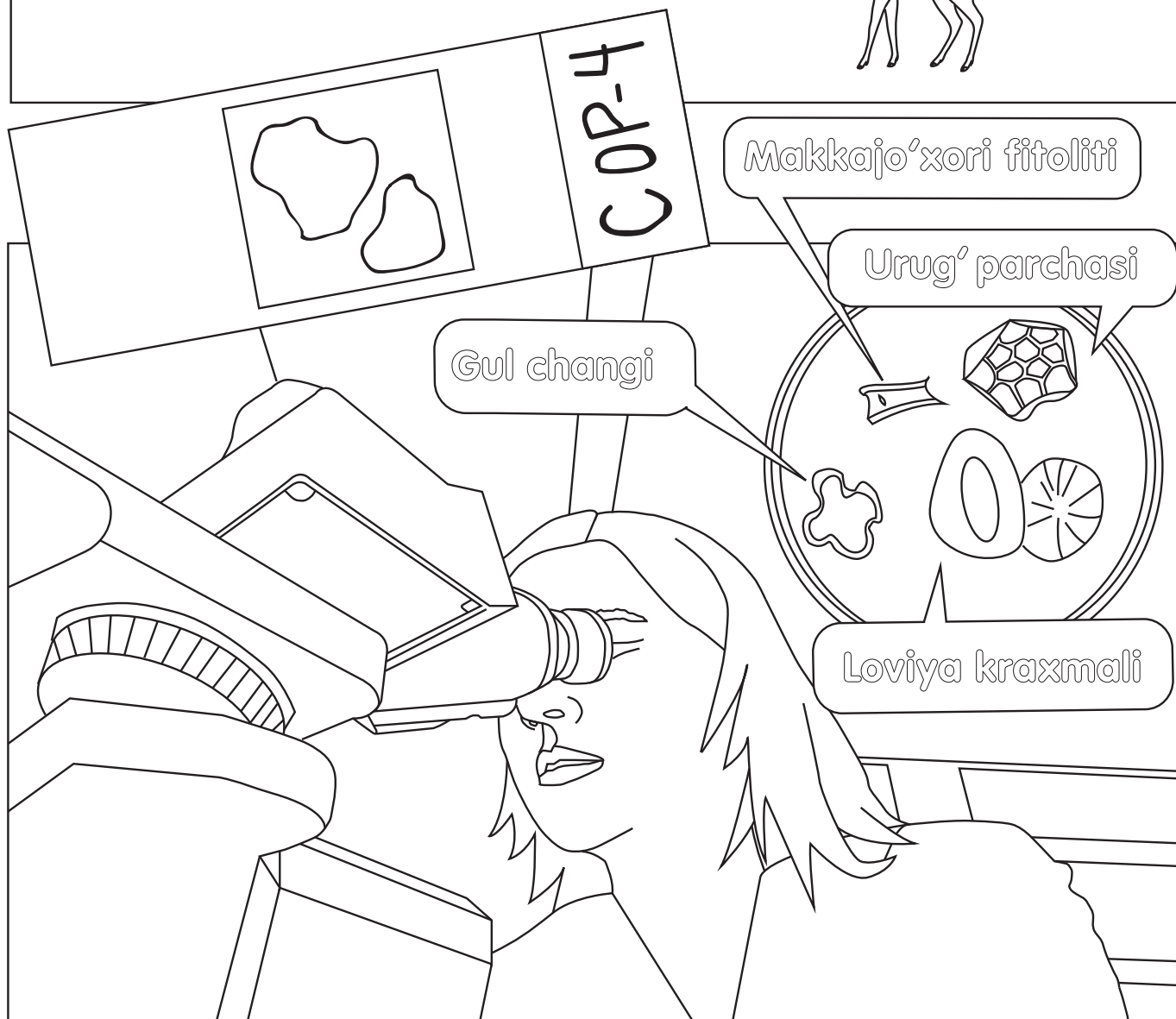


Radiouglerod sanalash hozirdan to 40 000 yilgacha bo'lgan davrdagi o'simlik va hayvonlarning yoshini aniqlashda ishlatiladigan usuldir.

# QADIMGII OVQATLANISH ODATI

Olimlar qadimgi idish va inson tishlaridagi ovqat zarrachalar topish uchun mikroskoplardan foydalanishadi. Kichik zarrachalari tahlili Mezoamerikada 2000 yil oldin yashagan qadimgi maya xalqi ovqatlanishi haqida ma'lumot berishi mumkin.

Kopan, Gonduras  
Klassik maya davri,  
ermizning 300-yillari



Gul changi

Makkajo'xori fitoliti

Urug' parchasi

Loviya kraxmali

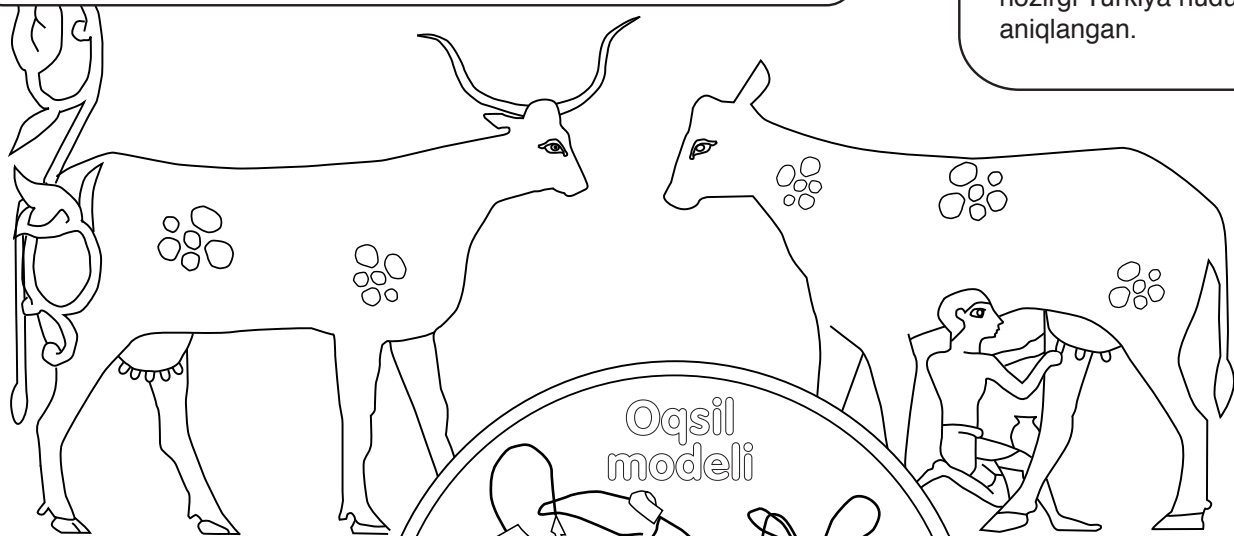
COP-4

## XONAKILASHTIRISH

10 000 yil davomida odamlar o'simlik va hayvonlarni ularning ma'lum bir xususiyatlariga ko'ra yetishtirib keldilar. Qoramol ozuqa sifatida eng birinchi xonakilashtirilgan hayvon bo'lib, qadimgi odamlar ulardan go'shti, suti, terisi va qo'sh qo'shish uchun foydalanishgan.

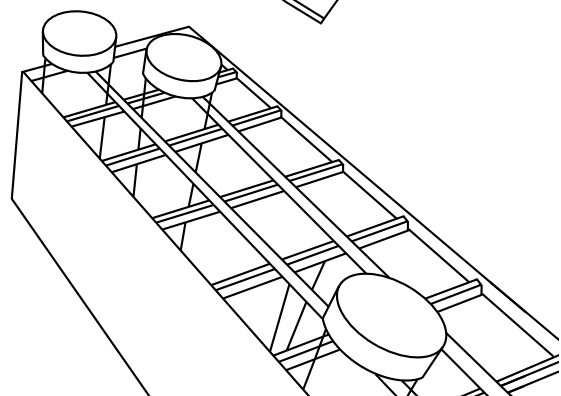
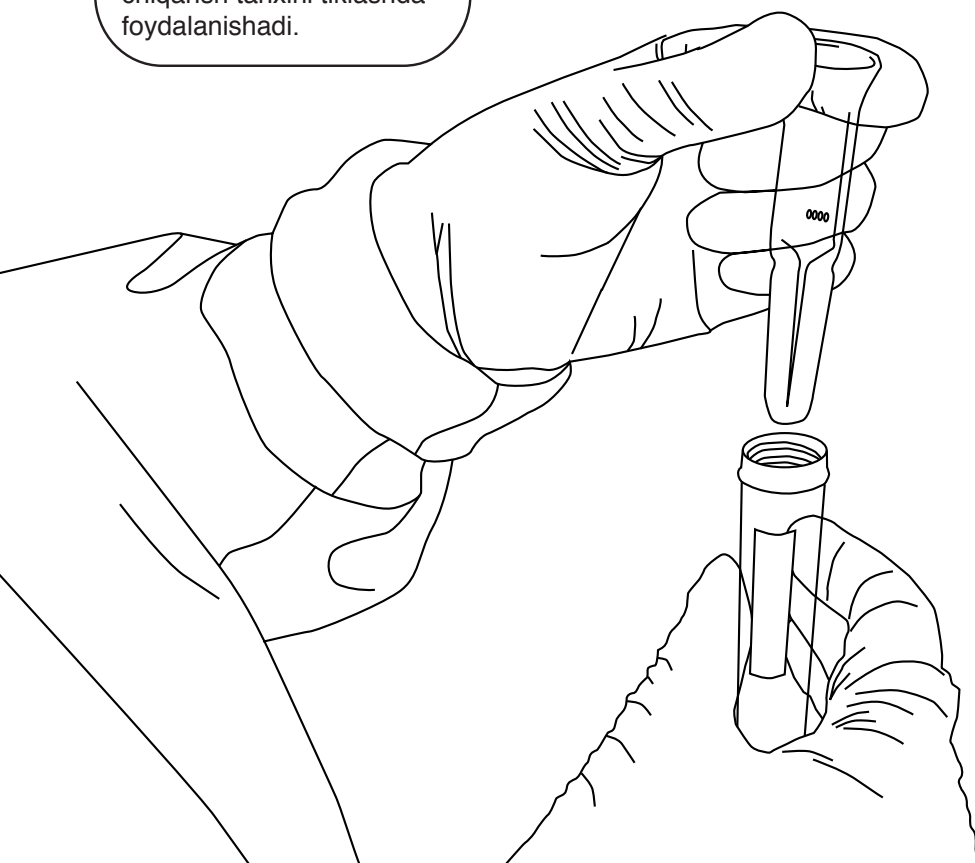
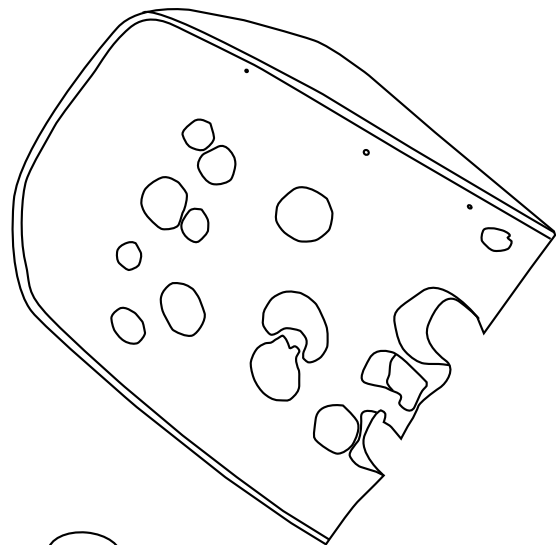
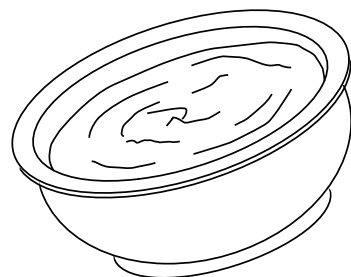
## BILARMIDINGIZ?

Qoramol hozirda qirilib ketga yovvoyi buqadan xonakilashtirilgan. Eng qadimgi xonakilashtirilgan qoramol Onado'li yarimoroli, hozirgi Turkiya hududida aniqlangan.



## Sut mahsulotlari tarixi

Sut sog'ishning qachon boshlanganligi aniq emas, biroq arxeologlar mass-spektrometriya texnologiyasidan qadimgi tishlarda sut oqsillarini aniqlashda va eng birinchi sut mahsulotlari ishlab chiqarish tarixini tiklashda foydalanishadi.



## Mo'g'uliston

Maysalar bilan qoplangan Mo'g'uliston dashtlarida bir qancha turdagi hayvonlar, shu jumladan, ot, qoramol, qo'tos, qo'y, echki, shimol bug'usi va tuyalar yashaydi. Ko'chmanchi qabilalar ularning barchasidan sut mahsulotlari ishlab chiqarishda foydalanadi.

Ot

Qo'y

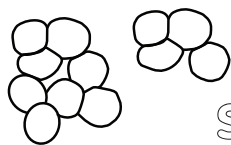
Echki

Shimol  
bug'usi

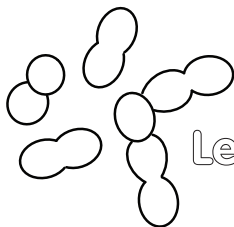
Sigir

## SUT MAHSULOTLARI

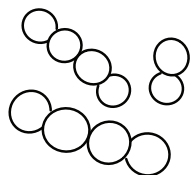
Sut mahsulotlari Mo'g'uliston kundalik hayotida juda muhim o'rin tutadi. Arxeologik manbalarning guvohlik berishicha, bu an'ana kamida 3 500 yildan beri davom etib kelyapti.



Stafilokokk



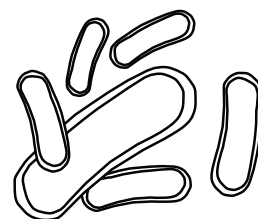
Leykonostok



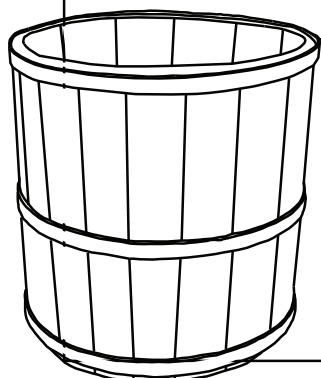
Laktokokklar

## Sut mikroflorasi

Mikroblar-asosan, bakteriya va achitqilar, bir nechta turdagi sut mahsulotlari, masalan, yogurt, sariyog', pishloq, shuningdek, qurut va qimiz tayyorlashda muhim rol o'ynaydi.

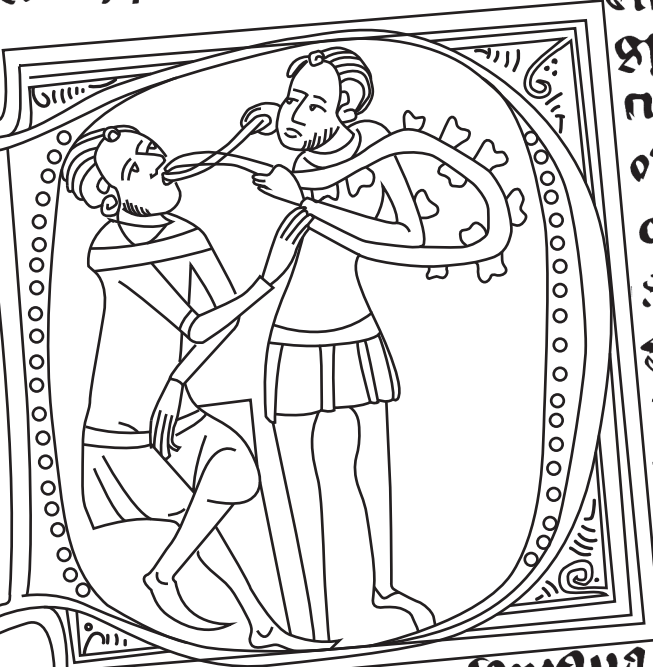


Laktobakteriyalar



# QADIMGI KASALLIKLAR

Suyak, tishlar va tish toshlari qadimgi odamlarning sog'lig'i haqidagi qimmatli ma'lumotlarni o'zida saqlaydi. Masalan, tish toshida saqlanib qolgan DNK va oqsillar milk kasalligi va kariyes tarixini o'rganishda olimlarga yordam beradi.



## Omne Bonum

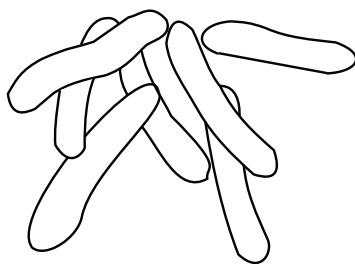
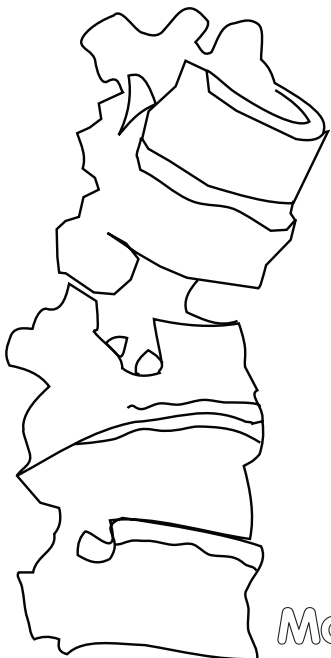
Omne Bonum – XIV asrga oid lotin tilidagi qomusnoma (ensiklopediya) bo'lib, Britaniya kutubxonasida saqlanadi, kitob Yevropa o'rta asr hayoti haqida hikoya qiladi. Qomusnomada tishni davolash va tibbiy yordam ko'rsatish haqida ma'lumotlar bor, bu esa bizga o'rta asr kishilarining salomatlik holati va kasalliklarini yaxshiroq izohlashga yordam beradi.



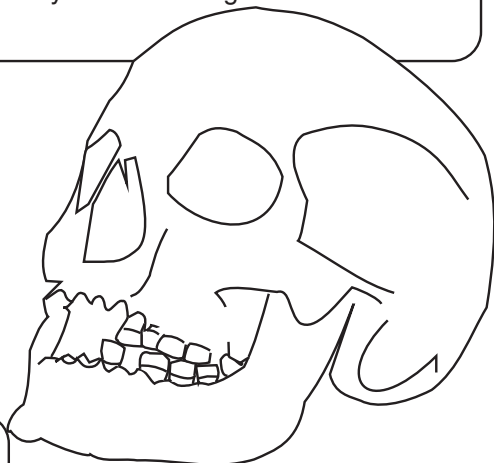
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## SIL (TUBERKULYOZ) VA MOXOV

Sil va moxov kasalligi bir biriga yaqin bakteriyalar tomonidan qo'zg'atiladi, bular: tuberkulyoz mikobakteriyasi (lot. *Mycobacterium tuberculosis*) va moxov mikobakteriyasi (lot. *Mycobacterium leprae*). Ikkala bakteriya ham suyaklarni zararlashi mumkin, skeletda qolgan bakteriya DNK qoldiqlari ushbu qadimiy kasalliklarning tarixini o'rganishda yordam beradi.

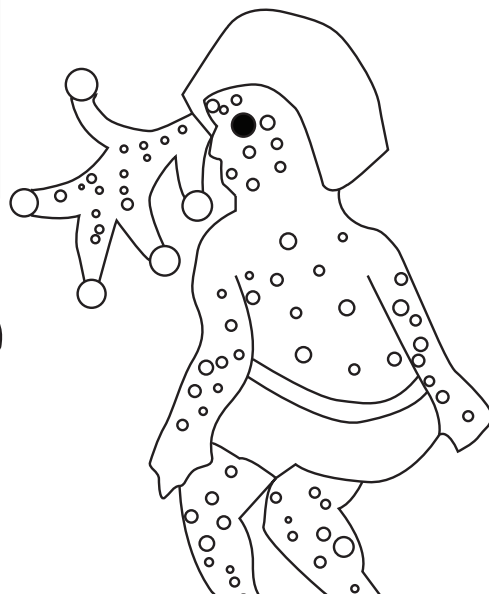


Moxov mikobakteriyasi

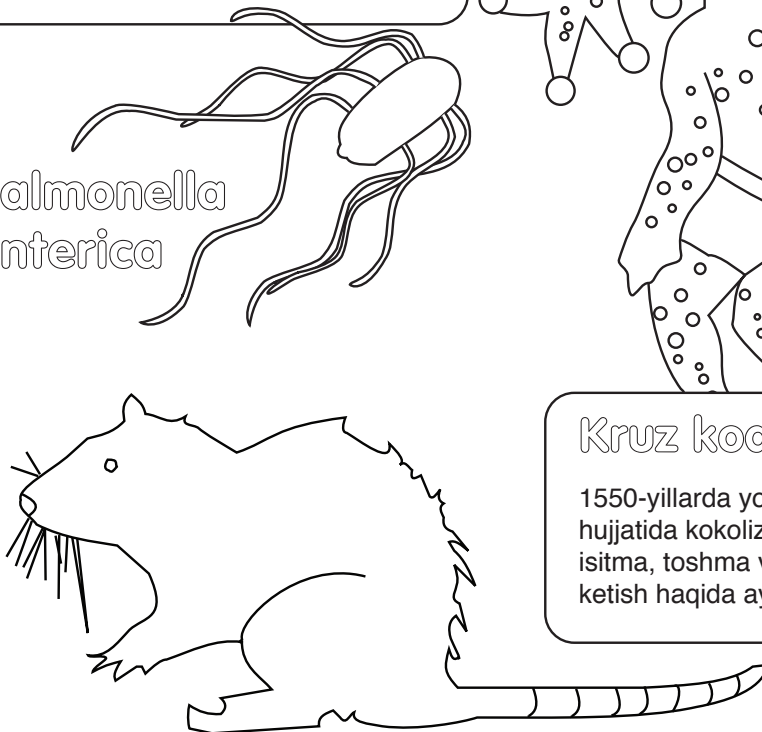


## KOKOLIZTLI EPIDEMIYASI

Asteklar tomonidan kokoliztli (astekchasiga "parazit", "kasallik") deb nomlangan noma'lum kasallik epidemiyasi 1545–1550-yillarda Meksika aholisining 60–90 % ining qirilib ketishiga sabab bo'ladi. Yaqinda kasallik qurbonlaridan birining tishida qorin tifi kasalligi qo'zg'atuvchisi – Salmonellalar avlodiga kiruvchi bakteriya (lot. *Salmonella enterica*) DNK si aniqlandi.



*Salmonella enterica*



## Shifokor Shnabel

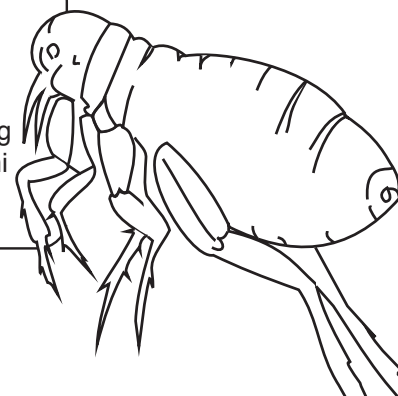
XVII asrda o'lat yuqtirgan bemorlarni davolovchi shifokorlar "yomon havo" dan himoyalash uchun qush tumshug'ini eslatuvchi niqob taqib yurishgan.

## Kruz kodeksi

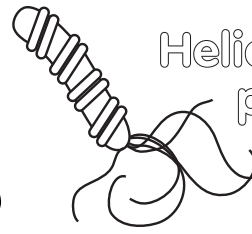
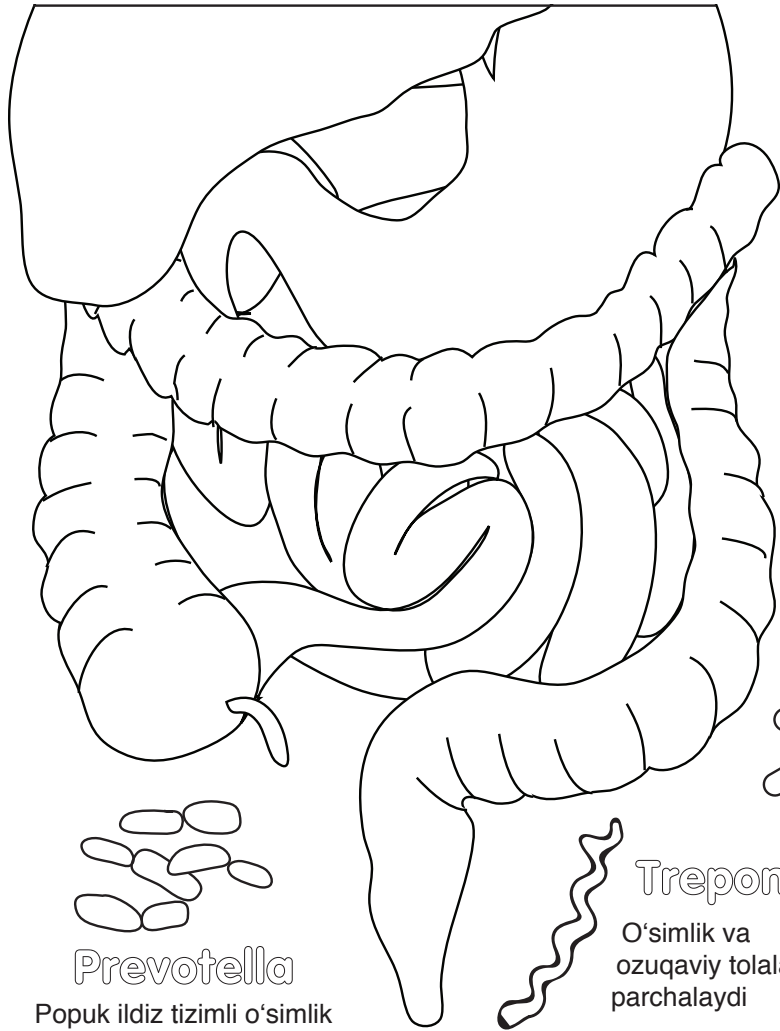
1550-yillarda yozilgan astek hujjatida kokoliztli belgilari – isitma, toshma va kuchli qon ketish haqida aytiladi.

## O'LAT

O'lat kasalligini kalamushlarda yashovchi zararlangan burgadan o'tadigan *Yersinia pestis* bakteriyasi qo'zg'atadi. O'lat Yevropaning yarim aholisining o'limiga sabab bo'lgan Qora o'lim pandemiyasini (1346–1353-yillarda) keltirib chiqargan edi.







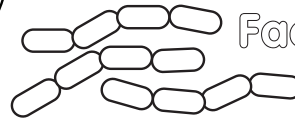
**Helicobacter pylori**

Spiralsimon bakteriya bo'lib, oshqozonda yashaydi va oshqozon yarasi hamda ba'zi turdagi saratonni keltirib chiqarishi mumkin.



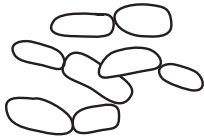
**Bifidobakteriyalar**

Emizikli chaqaloqqa sutni hazm qilishda yordam beradi



**Faecalibacterium**

Ichak hujayralari uchun ozuqa ishlab chiqaradi



**Prevotella**

Popuk ildiz tizimli o'simlik mahsulotlarini hazm qilishda yordam beradi

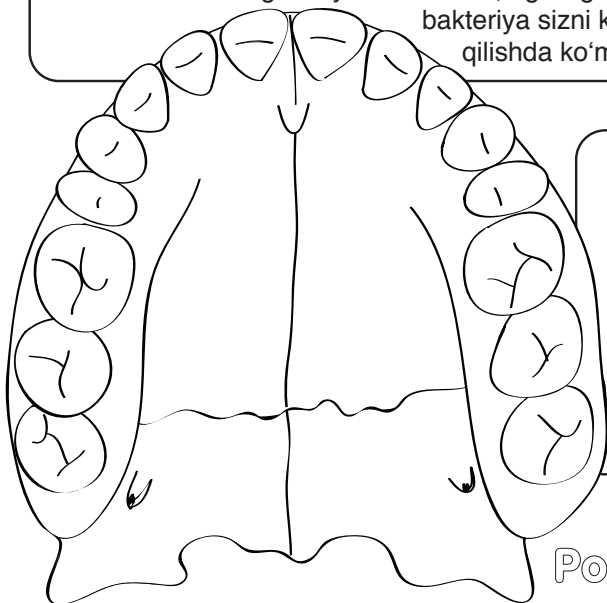


**Treponema**

O'simlik va ozuqaviy tolalarni parchalaydi

## AJDODLAR MIKROBIOMI

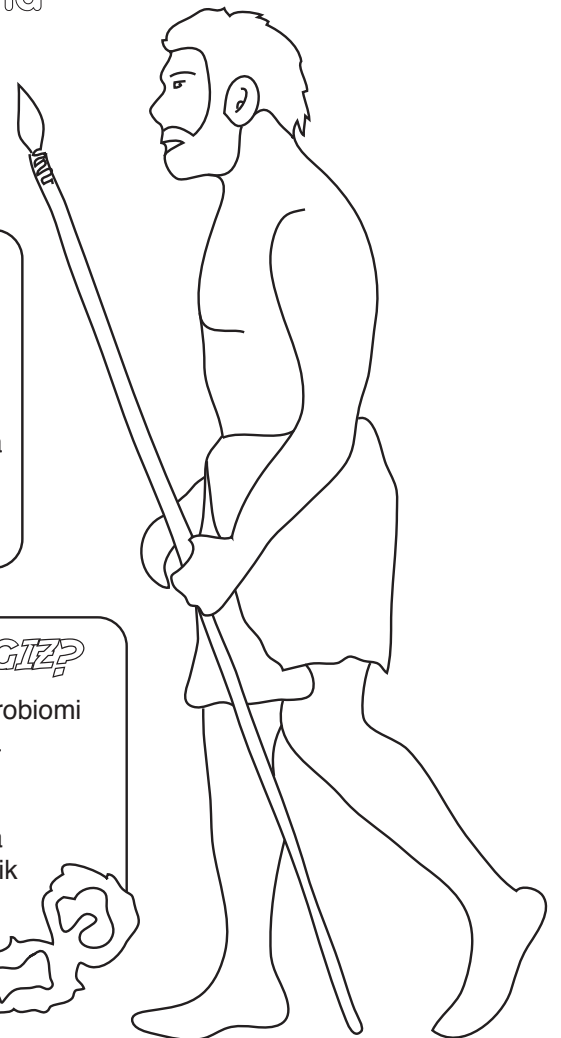
Sizning tanangizda trillionlab bakteriya hujayralari joylashadi va bu barchasi sizning mikrobiomingiz deyiladi. Ichaklarda yashovchi bakteriyalar sizga ovqatingizni hazm qilish va immun tizimingiz mustahkam bo'lishida yordam beradi. Teringizda yashovchi bakteriya sizni toza turishingizda yordam bersa, og'zingizda yashovchi bakteriya sizni kasalliklardan himoya qilishda ko'maklashadi.



### BILARMIDINGIZ?

Olimlar ajdodlar mikrobiomi tarkibini o'rganish va kasalliklar sababini yaxshiroq tushunish uchun tish toshlar va qadimgi inson organik chiqindilarini tadqiq qilishadi.

**Porphyromonas**



## TERMACHILAR

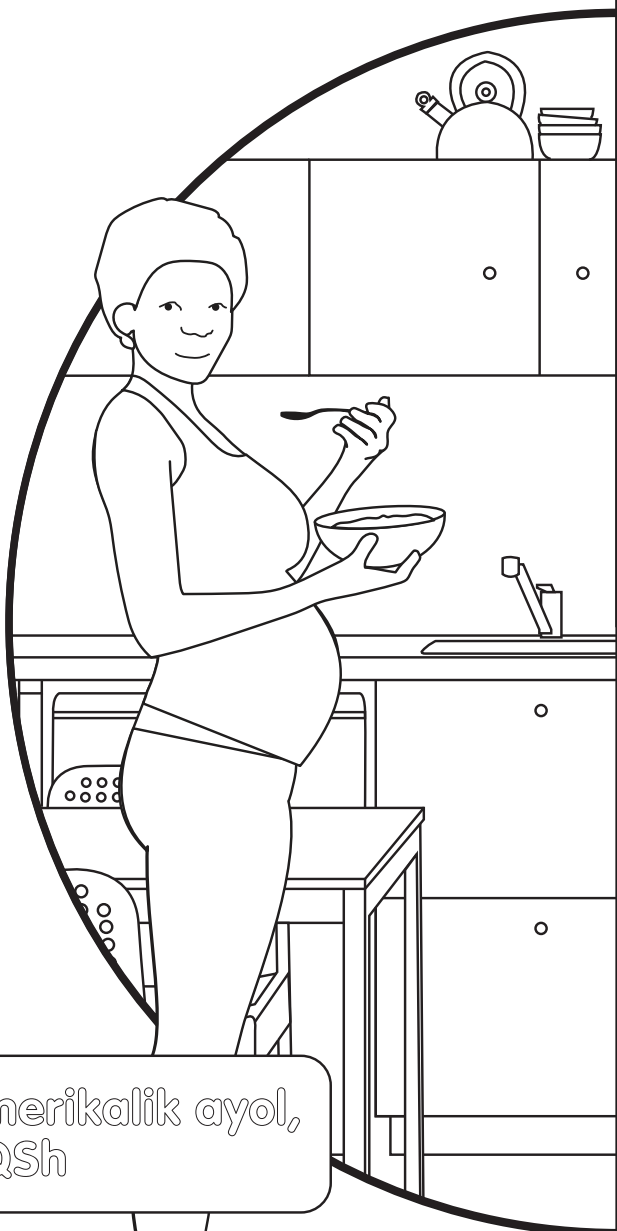
Termachilar, ya'ni ovchi-termachilar nomi bilan tanilgan kishilar guruhi, asosan, yovvoyi o'simlik mahsulotlari va yovvoyi hayvonlarning go'shtlarini iste'mol qilishgan, ularning taomnomasi mavsumiy o'zgarib turgan.

Taxminan 10 000 yilcha oldin, dehqonchilik boshlanishidan avval yer yuzidagi barcha odamlar ovchilik va termachilik bilan kun kechirishgan.

Zamonaviy ovchi-termachilar hozirda sanoatlashgan jamiyatlarning aholisiga qaraganda murakkabroq mikrobiomga ega.



Hadza ayoli va uning bolasi, Tanzaniya



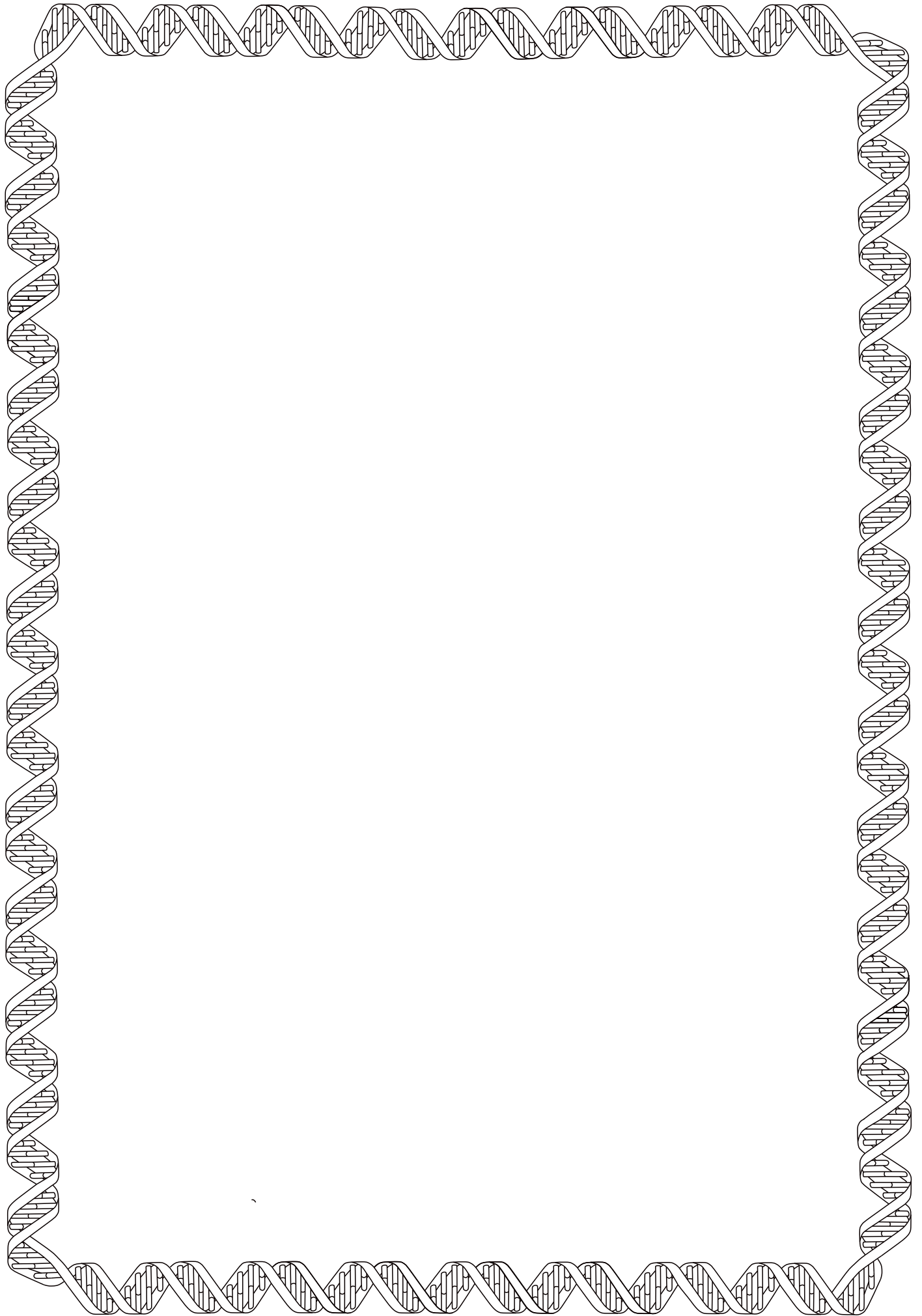
Amerikalik ayol, AQSh

## SANOATLASHGAN JAMIYAT

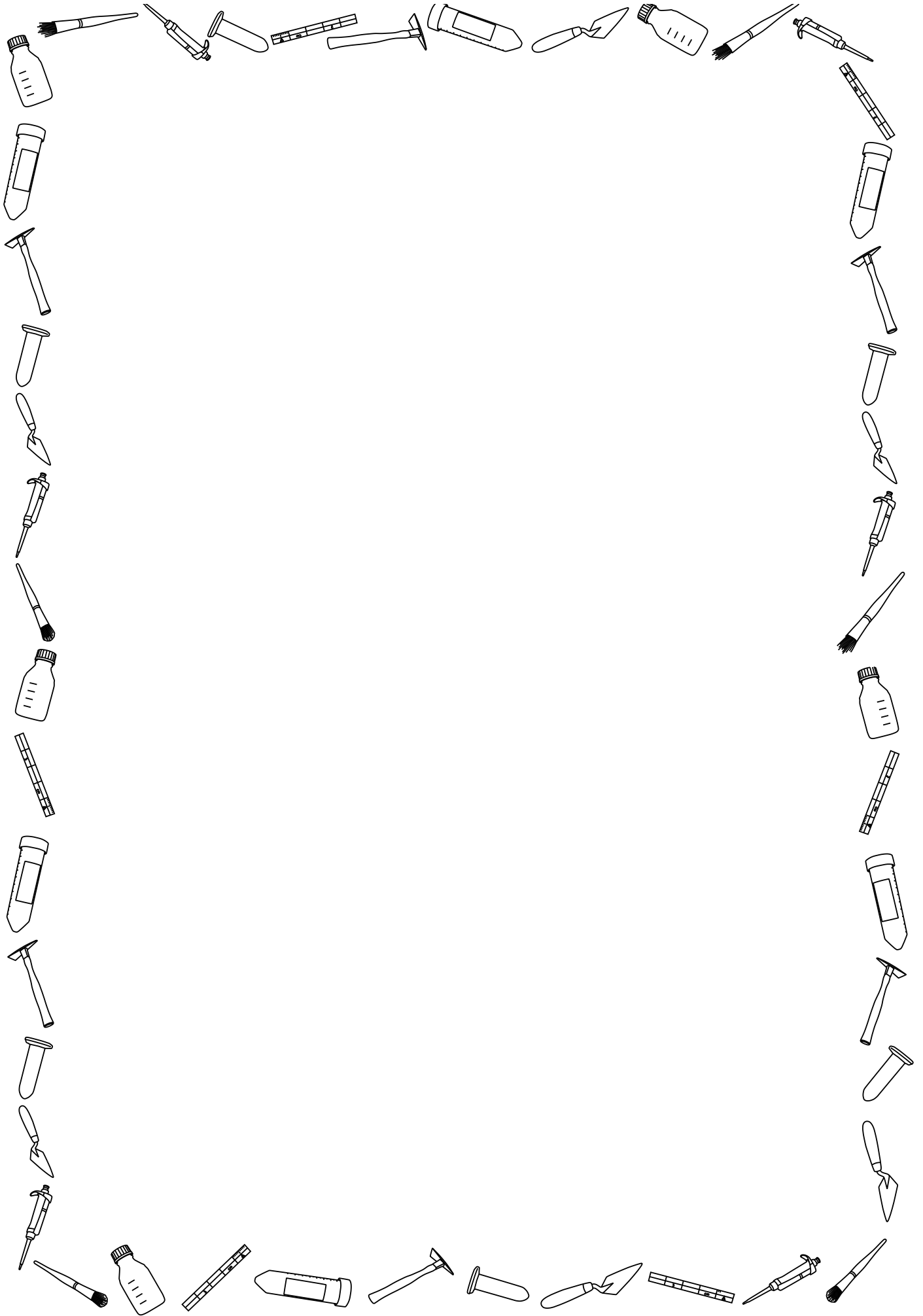
Sanoatlashgan jamiyatlarda, asosan, dehqonchilik mahsulotlari iste'mol qilinadi, qishloq xo'jaligida juda oz sonli insonlarga band bo'ladi.

Mexanizatsiya, himoyalash va saqlash sanoatlashgan oziq-ovqat zanjirining asosiy jihati bo'lib, oziq-ovqat iste'mol qilinguniga qadar uzoq yo'lni bosib o'tadi.

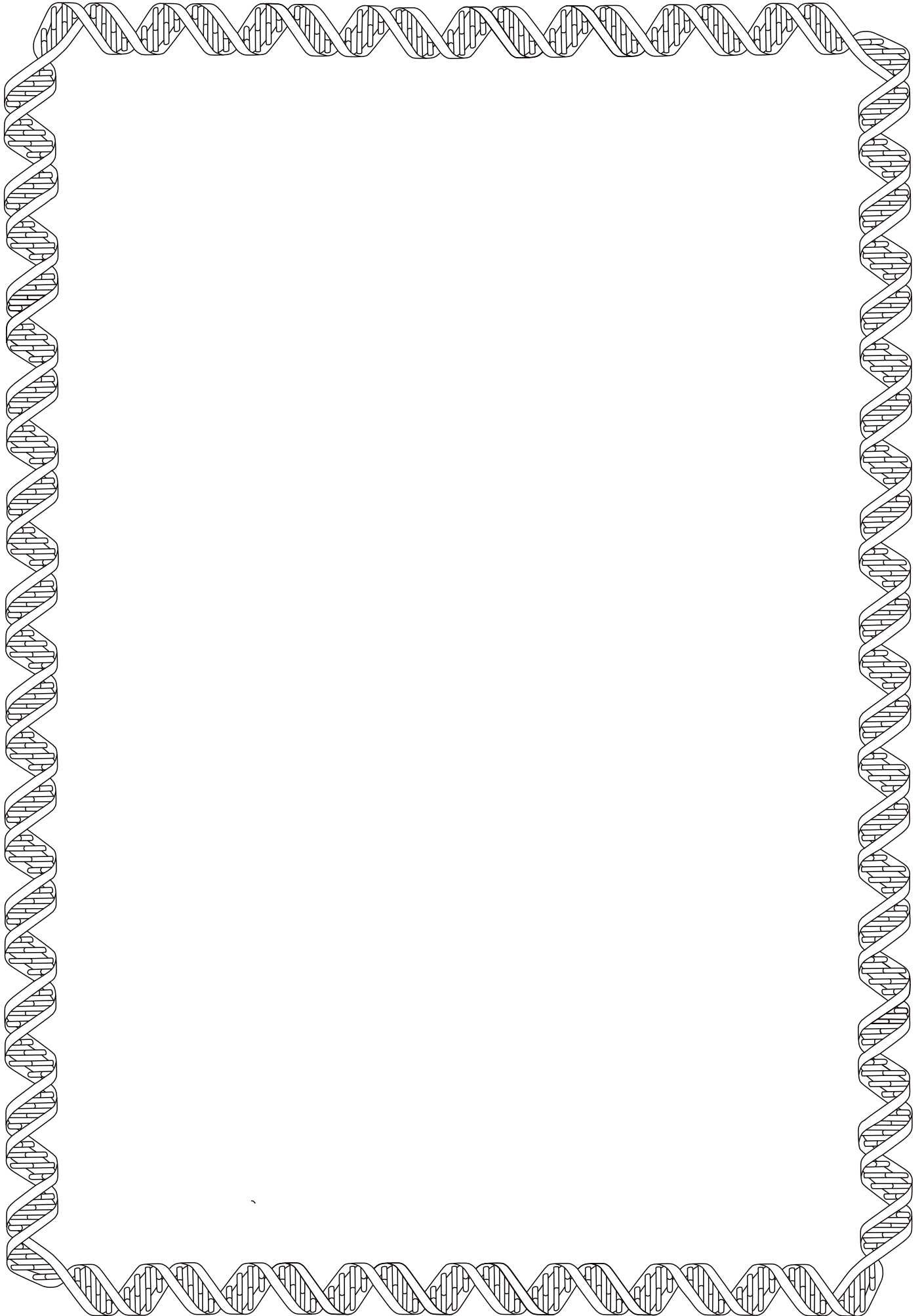
Bugun sanoatlashga jamiyat odamlarida ichak mikrobiomlari xilma xilligi biroz kamaygan, bu esa ularda ba'zi surunkali yallig'lanishlar xavfini ortishiga olib kelishi mumkin.









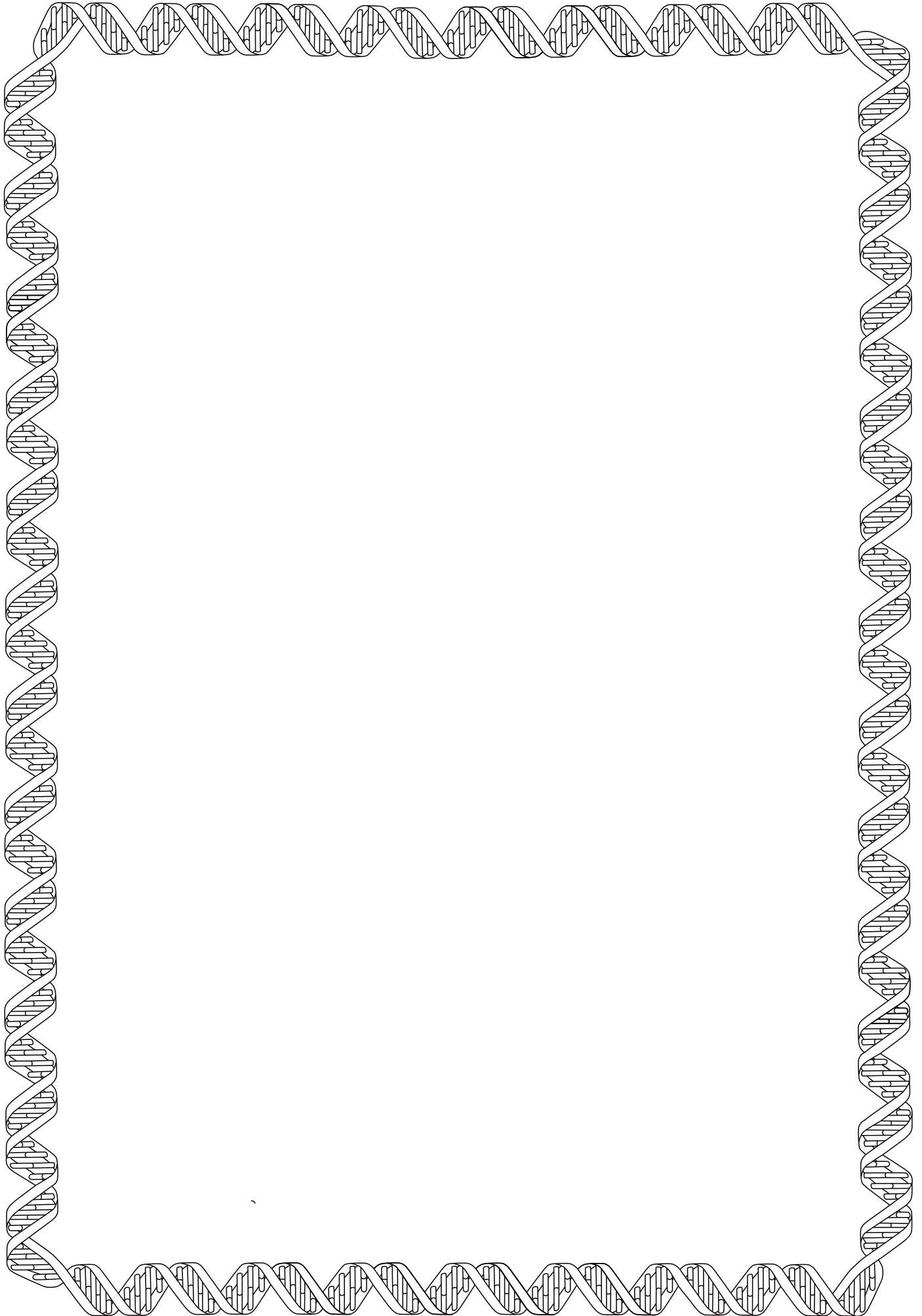






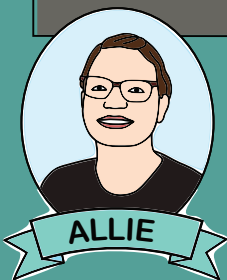








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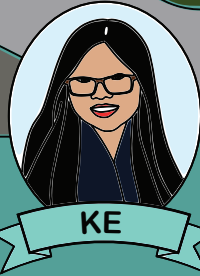
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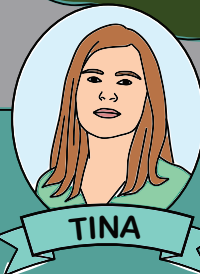
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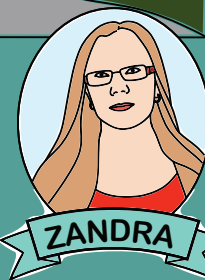
JESSIE



KE



TINA



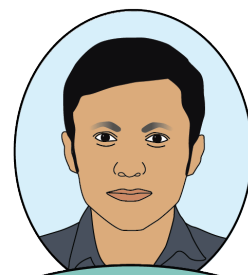
ZANDRA

# ARXEOLOGIYA OLAMIGA sayohat Bo'yash kitobi

Qarang, arxeologlar va boshqa olimlar insoniyat o'tmishi haqidagi muammolarni yechishda birgalikda qanday ishlamoqda! **Biz kimligimizni va insoniyat paydo bo'lgandan to o'rta asr o'lat tarqalishigacha nimani tadqiq qilishimizni** tushunish uchun bizga qo'shiling! **Qadimgi ko'chishlar** va **radiouglerod sanalash** haqida bilib oling! Olimlar qanday qilib juda kichik o'simlik qoldig'i zarrachalaridan **qadimgi ovqatlanish odatlarini** o'rganyotganini ko'rasiz. **Xonakilashtirish** haqida qiziqarli ma'lumotlar va **sut mahsulotlari** ortidagi ilmni topasiz! **Qadimgi kasalliklar** va **epidemiylarni** tadqiq etib, **ajdodlar mikrobiomini** kashf etasiz.

Maks Plank Insoniyat tarixi fanlari instituti olimlari tomonidan tayyorlandi.

O'zbek tiliga **Niyoz Rashidov** tomonidan tarjima qilindi.



NIYOZ