

6-MARUZA

Mavzu: Mikroorganizmlarning
o'zaro munosabati

The two most important terms used to study classification is “Taxonomy” and “Systematic”.

Taxonomy (Greek, taxis = arranged; nomos = law) is the classification of living organisms into groups. It deals with

- ☐ Making and maintaining collection of microorganisms
- ☐ Differentiating species
- ☐ Identification (Keys) and diagnosis of species and genera
- ☐ Naming and describing species and genera

Principles of taxonomy is an interesting tool, need to understand concept and meaning between Taxonomy, Systematic and International code of nomenclature. Taxonomy in this sense includes a range of different areas from description and naming of new taxa (nomenclature), classification and construction of identification system for particular groups of organisms.

Systematic (Greek, systema = a whole made of several parts) includes traditional taxonomy with the addition of theoretical and practical aspects of evolution, genetics and speciation. The study of the evolutionary relationship between organisms is usually referred to as phylogenetics.

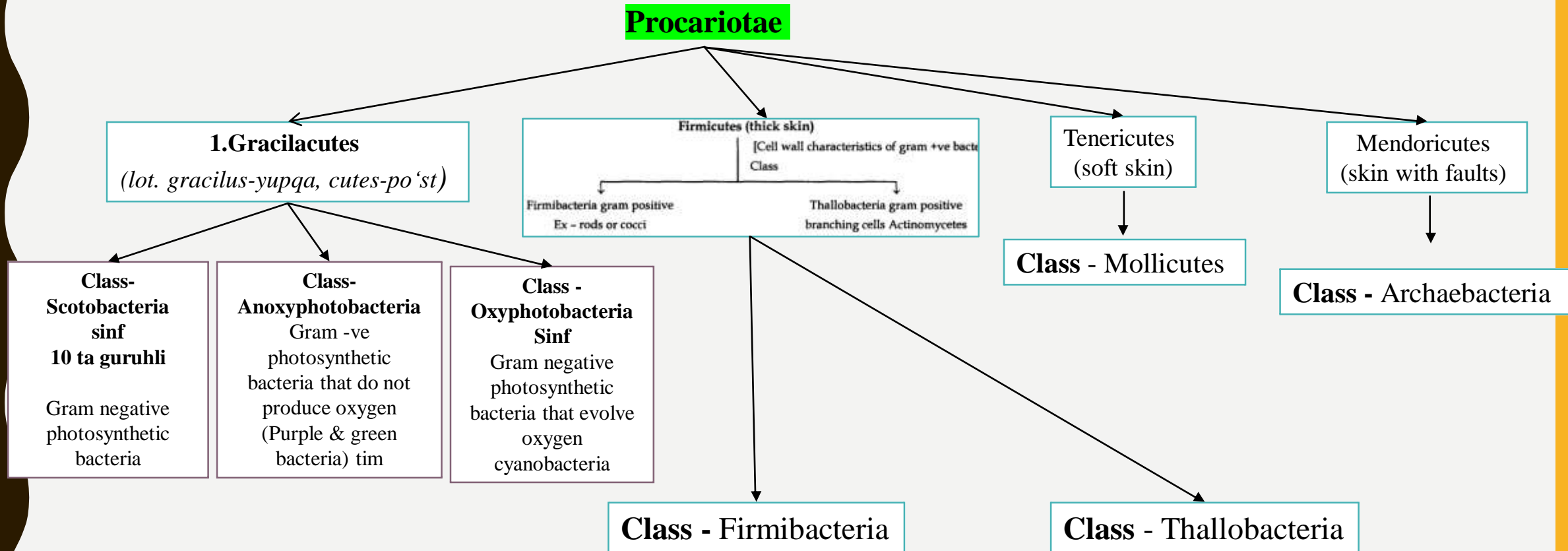
Systematics deals with

- ☐ Development of the classification of organisms
- ☐ Species comparison and grouping into higher categories
- ☐ Organisms are arranged in definite, hierarchical order
- ☐ The order of the system is based on hypotheses of common descent

Bergey's Manual of Systematic Bacteriology [First Edition 1984] After all the information gathered with the detailed account of many microbiologists on classification, the first edition of Bergey's Manual of Systematic Bacteriology was published in the 1984.

It contains both **eubacteria and Archaea bacteria**. The manual divides the kingdom **Prokaryotae into following four divisions primarily based on the nature of cell wall**. These four divisions are as follows:

D.X.Bergi (1984-y.) ma'lumoti bo'yicha **Procariotae** dunyosi 4 ta bo'linga ajratiladi:



Division Gracilicutes Gram-negative cell wall. Non-endospore-forming. Includes photosynthetic and nonphotosynthetic types; can exhibit swimming or gliding motility; includes rods, cocci, and curved forms.

**Bu bo'lim o'z navbatida 3 ta sinfga
ajratiladi.**

Scotobacteria

Anoxyphotobacteria

Oxyphotobacteria



Nonphotosynthetic gram-negative bacteria.

1. Gracilacutes
(*lot. gracilus-yupqa, cutes-po 'st*)

Scotobacteria

Order-Spirochaetales

Spiral cells that swim by flexion; found in water and in the bodies of vertebrates; genera include *Borrelia*, *Treponema*, and *Leptospira*, all parasites of humans and other animals.

Order - Pseudomonadales

Rigid-walled cells of variable shape, in some species forming chains; photosynthetic pigment present in certain species; cells usually motile by means of a single flagellum. Species found in soil, in fresh water and in salt water. Examples of genera: *Vibrio* (*cholerabacteria*), *Pseudomonas*, *Nitrosomonas*, *Thiobacillus*

Order-Rickettsiales

Obligate intracellular parasites; generally short rods. Multiply by binary transverse fission; often cause disease in humans and are transmitted by arthropods.

1. Gracilacutes

(*lot. gracilus-yupqa, cutes-po 'st*)



Anoxygenic photobacteria

Gram-negative bacteria that carry out the type of photosynthesis **that does not release oxygen.**

The major groupings within this class and some constituent genera are the purple sulfur bacteria, which use sulfide or elemental sulfur as electron donors (*Chromatium*); purple nonsulfur bacteria, which often use organic compounds as electron donors (*Rhodobacter*); green sulfur bacteria (*Chlorobium*); and filamentous green bacteria (*Chloroflexus*).

1. Gracilacutes

(*lot. gracilus-yupqa, cutes-po'st*)



Oxyphotobacteria

Class Oxyphotobacteria Gram-negative bacteria that carry out oxygen-evolving photosynthesis. Includes the cyanobacteria and the order Prochlorales; gliding or nonmotile forms. Most cyanobacteria are photoautotrophs and can fix dinitrogen gas. Often form long cell filaments.

Firmicutes - (gram +), hujayra devori qalin

Firmicutes (thick skin)

Nonphotosynthetic gram-positive bacteria.

Class - Firmibacteria



Nonbranching gram-positive bacteria. Includes rods and cocci forms. Some genera form endospores.

Class - Thallobacteria



Order - Actinomycetales



Rigid-walled cells that may grow out in a branching system, resembling mold colonies. Includes Mycobacterium tuberculosis (tuberculosis bacterium), Streptomyces

Gram-positive bacteria with branched or irregular walls. Some form spores on hyphae.

Irregular pleiomorphic cell shapes due to the absence of a rigid cell wall. Lack peptidoglycans.

Tenericutes
(soft skin)

Tenericutes – mustahkam hujayra devoriga ega emas

Class - Mollicutes

Flexible-walled cells in the order Mycoplasmatales; nonmotile, highly variable in shape at different life stages. Includes *Mycoplasma* and forms once known as pleuropneumonia-like organisms (PPLO).

Cell wall, when present, lacks peptidoglycan. Rods or cocci.

Mendoricutes
(skin with faults)

Mendosicutes – nuqsonli hujayra devori
bo'lgan (qadimgi arxebakteriyalar)

Class - Archaeobacteria

Possess cell walls and lipids with unusual compositions that differ from all other bacteria.

Lipids usually are isoprenol derivatives linked to glycerol backbone through ether linkage. Ribosomes are different in protein composition and sensitivity to antibiotics than other bacterial ribosomes.

Peptidoglycan, **if present, does not contain muramic acid**. Non-spore-forming. Most are anaerobic.

None contain chlorophyll. Many are motile by flagella. Can stain gram-positive or gramnegative but have a different cell-wall appearance than do other bacteria

Mikroorganizmlarga 1980-yil 1-yanvardan boshlab Xalqaro bakteriya nomenklaturasi kodeksi qoidalariga muvofiq nom beriladigan bo'ldi.

Mikroorganizmlarning yaqin belgilariga qarab tavsiflovchi:

Tur (specics)

Avlod (genus)

Qabila(tribe)

Oila (family)

Tartib (order)

Sinf (class)

Bo'lim (division)

The full taxonomical position of the *Typhoid bacillus* is as follows:

Division - Protophyta

Class - Schizomycetes

Order - Eubacteriales

Family - Enterobacteriaceae

Tribe - Salmonellae

Genus - Salmonella

Species - Salmonella Typh

Tur deb: fenotip jihatdan o'xshash, bitta genotipga ega bo'lgan individlar yig'indisiga aytiladi.

Ular kichik tur va variantlarga bo'linadilar.

TABLE 3.1. Taxonomic ranks or levels in ascending order

<i>Rank or level</i>	<i>Example</i>
Species	<i>E. coli</i>
Genus	<i>Escherichia</i>
Family	Enterobacteriaceae
Order	Enterobacteriales
Class	γ -Proteobacteria
Phylum	Proteobacteria
Domain	Bacteria

Amerika olimi, D.X.Bergi (1984-y.) ma'lumoti bo'yicha Procariotae dunyosi 4 ta bo'limga ajratiladi:

1. Gracilicutes – (gram -), hujayra devori yupqa.
2. Firmicutes - (gram +), hujayra devori qalin
3. Tenericutes – mustahkam hujayra devoriga ega emas
4. Mendosicutes – nuqsonli hujayra devori bo'lgan (qadimgi arxebakteriyalar)

Rus olimi, N.A Krasilnikov klassifikatsiyasi(1949-yil)ga ko'ra
barcha mikroorganizmlarni 2 guruhga ajratgan

1. Schizophyceae - xlorofil xosil qiluvchilar
2. Schizomyceae – xlorofilsizlar

Schizomyceae – xlorofilsizlar 4 ta sinfga bo'linadi

1. Actinomycetes – aktinomitsetlar
2. Eubacteriae – chin bakteriyalar
3. Myxobacteriae – miksobakteriyalar
4. Spirochaetae – spiroxetalar

O'z navbatida bular ham keyin oila, turkum, ,turlarga bo'linadi

1-bo'lim. Gracilicutes (lot. *gracilius* — yupqa, *cutes* — po'st)

Bu bo'lim vakillariga: hujayra devori grammanfiy tuzilishga ega bo'lgan kokklar, tayoqchasimon prokariotlar kiradi.

Ular endospora hosil qilmaydi, bo'linib ko'payadi, vakillari fototrof, nofototroflar, aeroblar, anaeroblar, obligat parazitlardir.

Scotobacteria

Sinf 10 ta guruhi mavjud:

- 1 - spiroxetalar;
- 2 - aerob spiral va vibrionsimon, grammanfiy bakteriyalar;
- 3 - aerob grammanfiy kokklar va tayoqchalar;
- 4 - fakultativ anaerob, grammanfiy tayoqchalar;
- 5 - anaerob, grammanfiy, bukilgan va spiral tayoqchalar;
- 6 - grammanfiy, xemototrof bakteriyalar;
- 7 - sirpanuvchi bakteriyalar;
- 8 - xlamidabakteriyalar;
- 9 - poyali bakteriyalar;
- 10 - rikketsiyalar va xlamidalar **kabi guruhlarga bo'linadi.**

1 - spiroxetalar;

Ko'ndalangiga bo'linib ko'payadi, harakatchan, spora hosil qilmaydi. Spiroxetalaming ba'zilar saprofit holida hayot kechiradi. Ko'pchiligi odam va hayvonlarda yuqumli kasalliklarni keltirib chiqaradi.

2 - aerob spiral va vibrionsimon, grammanfiy bakteriyalar;

Aerob spiral va vibrionsimon, grammanfiy bakteriyalar Spirillaceae oilasini tashkil etadi. Hujayralari tayoqcha shaklida bo'lib, spiralsimon buralgan. Hujayrasining ikkita uchida to'p xivchinlar joylashgan, ular chuchuk suvlarda va tuproqda ko'proq yashaydilar.

3 - aerob grammanfiy kokklar va tayoqchalar;

Bu guruh vakillari 7 ta oilaga mansub bo'lib, shundan 3 tasi tuproqning hosildorligini oshirishda amaliy ahamiyatga ega. Psevdomonadalar tabiatda juda keng tarqalgan, ba'zi vakillari nitratlarni erkin azotgacha qaytara oladilar.

Azotobacteriaceae oilasi vakillari tayoqchasimon, kokksimon hujayralarga ega bo'lib, harakatchan, spora hosil qilmaydi, erkin azotni o'zlashtira oladi.

Rhizobiaceae oilasi vakillari tayoqcha ko'rinishida, spora hosil qilmaydi, boshqodoshlar ildizida tuganak xosil qiladi, o'simliklar bilan simbioz holda yashab, erkin azotni o'zlashtiradi.

Shu oilani **Agrobacterium avlodi** bar xil o'simlik ildizlarida shish hosil qiladi va vakillari fitopatogen bakteriyalarga kiradi

Methylococcaceae oilasi ikki avlodni Methylococcus va Methylomonasni o'z ichiga oladi. Bu avlod vakillari kokk va tayoqcha shaklida bo'lib, ular uchun energiya manbayi bo'lib metan va metanol xizmat qiladi

Acetobacteriaceae oilasi Acetobacter va Gluconobacter avlodlaridan tashkil topgan bo'lib, bu avlod vakillari etil spirtini sirka kislotalagacha oksidlaydi,

4 - fakultativ anaerob, grammanfiy tayoqchalar;

Fakultativ anaerob, grammanfiy tayoqchalar bu guruh vakillari Enterobacteriaceae va Vibrionaceae oilalariga mansub bo'lib, odam va hayvonlarda yuqumli kasalliklarni qo'zg'atadi. Bular *Esheria*, *Potobacterium*, *Salmonella*, *Shigella*, *Ervinia*, *Vibrion* va boshqa avlodlami o'z ichiga oladi. Ba'zi vakillari odam va hayvonlarda kasallik qo'zg'atsa, ba'zilar tuproqda, suvda yoki epifit holida uchraydi.

5 - anaerob, grammanfiy, bukilgan va spiral tayoqchalar;

vakillari to'g'ri, bukilgan va spiral tayoqchalardan iborat bo'lib, Bacteroidaceae oilasiga mansub, odam va hayvonlarning oshqozon-ichak yo'llarida uchrab, ba'zan oshqozon-ichak yo'llarida kasallik qo'zg'atishi mumkin, Sut emizuvchilarning oshqozon-ichak yo'llarida Selenomonas avlodiga mansub bakteriyalar uchraydi. Ularning shakllari yarim oysimon, harakatchan, uglevodlarni sirka, propion kislota, sut kislota, CO₂ gacha bijg'itadilar.

6 - grammanfiy, xemolitotrof bakteriyalar;

Grammanfiy, xemolitotrof bakteriyalar **ikki oila** va **15 ta avlod**dan iborat.

Nitrobacteriaceae oilasi vakillari tayoqchasimon, ellipssimon, sharsimon, spiralsimon ko'rinishlarda bo'lib, spora hosil qilmaydi. Harakatchan va harakatsiz vakillariga ega.

Xemolitotrof vakillari obligat holda uchraydi. Ular energiyani ammiak yoki nitratlaming oksidlanishidan oladi. Tuproqda, suv havzalarida, dengiz va okean suvlarida ko'proq tarqalgan. Nitrosospira, Nitrosococcus, Nitrosolobus, Nitrospira, Nitrococcus kabi vakillari ammiakni nitritgacha oksidlaydi.

Siderocapsaceae oilasi vakillari kapsula bilan qoplangan bo'lib, tayoqcha, sharsimon, ellipssimon hujayralardan iborat. Bu oila vakillari temir oksidini to'plash xususiyatiga ega. Ular oksidlarni kapsula ustida, kapsuladan tashqarida yoki kapsulani o'zida to'playdilar. Bu oila vakillari xemoroorganotroflar hisoblanib, kislorodli muhitni yoqtiradi va temir moddalari bor suvlarda ko'proq tarqalgan.

7 - sirpanuvchi bakteriyalar;

Myxobacteriales va Cytophagales tarkibga kiruvchi bakteriyalar sirpanuvchi bakteriyalar nomlanadi. Myxobacteriales tarkibiga meva tana hosil qiluvchi bir hujayrali miksobakteriyalar kiradi. Silindrsimon hujayralari uchi egilgan, tashqi tomondan shilimshiq kapsula bilan o'ralgan bo'lib, bo'linib ko'payadi. Miksobakteriyalarning hujayra devori elastik bo'lib, bakteriya hujayrasining egilishiga va harakatlanishiga yordam beradi. Vegetativ hujayralari bo'linib ko'payadi, sirpanib harakatlanadi, rangsiz yoki rangli meva tanalar hosil qiladi.

8 - xlamidabakteriyalar;

Xlamidabakteriyalar hujayrasining usti qobiq bilan o'ralgan, ular 7 avlodga bo'linadi. *Sphaerotilus* avlodi bir hujayrali, tayoqchasimon, grammanfiy organizmlar bo'lib, qutblaridaxivchinlarim avjud. Usti shilimshiq moddalardan iborat qobiq bilan o'ralgan.

Xlamidobakteriyalarning iplari bir necha millimetrlarga yetishi mumkin, hujayralar qin ichida bo'inib ko'payadi, hosil bo'lgan harakatchan qiz hujayralar qin ichidan sirpanib chiqib ketadi yoki qinning parchalanishidan chiqishi mumkin. Bu avlod vakillari chuchuk va ifloslangan suvlarda uchraydi. *Leptothrix* avlodi vakillari to'g'ri tayoqchalar shaklida bo'lib, zanjir hosil qilib, qobiq bilan o'ralgan holda uchraydi. Qobiqlari temir yoki marganes oksidlarining gidratlari bilan to'yingan yoki qoplangan holda uchraydi. Kislородli muhitni yoqtiradi, gram manfiy, yuqoridagi avlodlardan tashqari *Streptothrix*, *Crenothrix*, *Clonothrix* avlodlari ham mavjud.

9 - poyali bakteriyalar;

Poyali bakteriyalar 17 ta avlodga birlashgan. Hyphomicrobium avlodi vakillari ikki uchi o'tkirlashgan tayoqchasimon, ovalsimon, tuxumsimon yoki loviyasimon ko'rinishlarga ega. Ular bar xil uzunlikdagi o'simtalar hosil qiladi. Ko'payishi ipsimon o'simtalar uchida joylashgan, kurtaklar yordamida amalga oshadi, kurtaklari yelilgandan so'ng harakatchan bo'lib qoladi va gifadan ajraHb, substratga yoki boshqa bir hujayraga yopishadi. Xemoorganotrof bo'lib, o'sishi uchun CO₂ kerak bo'ladi. Ko'pgina poyali bakteriyalar laktat, formiat, asetat va boshqa birikmalarni o'zlashtirish xususiyatiga ega.

10 - rikketsiyalar va xlamidalar

Rikketsiyalar va xlamidalar - bu guruh mikroorganizmlari Rickettsiales va Chlamydiales deb nomlangan tartiblarni o'z ichiga oladi.

Rickettsiales tartibi uch oilani birlashtiradi; *Rickettsiaceae*, *Bartonellaceae*, *Anaplasmataceae*. Ular birqancha nopatogen, ammo hujayra ichidagina ko'payadigan parazit vakillarni o'z ichiga oladi. Vakillari tayoqchasimon, sharsimon yoki ipsimon shaklga ega bo'lib, har xil rikketsioz deb ataladigan yuqumli kasalliklarga sababchi bo'ladi. Rikketsiyalar ham tayoqchasimon, sharsimon va ipsimon bo'lib, spora hosil qilmaydi, harakatsiz.

6-MA'RUZA

MAVZU: MIKROORGANIZMLARNING O'ZARO VA BOSHQA ORGANIZMLAR BILAN O'ZARO MUNOSABATI

Reja:

1. Simbioz
2. Sinergizm
3. Antogonizm
4. Parazitizm.
5. Simbiotik munosabatda yashovchi mikroorganizmlar.
6. Tuproqda azot hosil bo'lishida mikroorganizmlar ta'siri.
7. Atmosfera azotining biologik fiksasiyasi
8. Azotofiksatorlar sianobakteriyalar

Simbioz

Bir xil muhitda ikki xil mikrobyoki ikki xil organizm birgalikda hamkorlikda yashaydi.

Masalan: lishayniklar – bu yerda zamburug'lar bilan suv o'simliklari birgalikda hayot kechiradi, yoki dukkaklilar oilasiga kiruvchi o'simliklar bilan *Rhizobium* avlodigadagi tuganak bakteriyalarning birgalikda yashashi.

Metabioz

Ikkita organizm birga yonma-yon yashab yashash davrida biri ishlab chiqqan *mahsulotidan ikkitasi bahramand bo'ladi*, ya'ni sharoit yaratib beradi.

Masalan: saprofit mikroblar oqsillarni parchalab leptonga va aminokislotalarga ajralib undan nitrifikasiyalovchi mikroorganizmlar nitrat kislota va uning olib boradi. Ammonifikasiyada N_3S chiqib u fototrof mikroorganizmlar o'zlashtirishadi.

Sinergizm

Ikki va ko‘plab organizmlar birgalikda yashab foyda ko‘radi.

Masalan: ammonifikatorlar bilan nitrofikatorlar fototrof bakteriyalarning birgalikda yashashi.

Antogonizm

Bir turdagi mikroby rivojlangan joyda ikkinchi turdagi mikroby rivojlana olmasa, ya'ni u ishlab chiqqan mahsuloti ta'sir kilib halokatga olib keladi. Bunday hodisani zamburug'lar bilan bakteriyalar o'rtasida ko'rish mumkin.