**virusebi**

**umTavresi parazitebi**

virusebi parazitebia, magram isini ujredebidan ar Sesdgebian. isini arian genetikuri informaciis bitebi (nukleis mJava) dapaketebuli proteinis SefuTvaSi. rodesac isini debem genetikuri informaciis Tavis pakets maspinZel ujredSi., is warmarTavs ujredis metabolur meqanizacias meti virusebis warmoebisaTvis. ise, rom virusebi warmoeba gaziarebuli procesia.virusi awodebs informacias; maspinZeli ujredi awodebs metabolur meqanizacias. zogierT SemTxvevebSi ujredis metaboluri qmediTobis mxolod patara nawili iwyebs virusebis warmoebas da paspinZeli ujredi TiTqmis xeluxlebelia. sxva SemTxvevebSi yvela mspinZeli ujredis funqciebi icvleba da ujredi kvdeba.

virusebs SeuZliaT ujredian organizmebze Seteva. konkretuli virusebi mWidrod dakavSirebuli organizmebis parazitebis mcire jgufia . magram arsebobs virusebis mravali saxeobebi. yvela prokariotebi, eukariotuli organizmebi, mcenareebi da cxovelebi m.S. adamianebi mgrZnobadebi arian virusebis Setevis mimarT. maSinac ki, rodesac kargad vgrZnobT Tavs, Cven vifaravT uamrav virusebs mSvid mdgomareobaSi.

ujreduli mikroorganizmebis mocileba siTxidan SesaZlebelia filtrSi gatarebiT. asi wlis ganmavlobaSi gamoiyeneboda faifuris filtrebi. mkvlevarebi varaudobdnen, rom aseTi filtracia yvela siTxes gaukeTebda sterilizacias. Tumca 1892 wels axalgazrda rusma mecnierma dmitri ivanovskim ganacxada, rom filtracia ar asterilebda Tambaqos mcenareTa eqstraqtebs.. daavadebuli mcenareebidan siTxes, romelic gadioda filtrSi jer kidev SeeZlo gamoewvia mozaikuri daavadeba. Tavisi mikroskopis gamoyenebiT mas SeeZlo daenaxa zogierTi mikrobuli ujredebi siTxeSi da mas ar SeeZloa mikroorganizmebis kultivireba standartuli meTodebiT. Tavis angariSSi peterburRis mecnierebaTa akademiaSi man ganacxada, rom aRmoaCina infeqciuri agentis axali saxeoba, romelic ufro mcire iyo vidre baqteria. magram man gamoxata wuxili maszed, rom filtri iyo defeqtiani.

eqvsi wlis Semdeg cnobilma holandilma mikrobiologma martines v. baijerinkma daakvirda da mas eWvi ar epareboda Tavis meTodebze. man ganacxada, rom Tambaqos mozaikuri daavadebis infeqciuri agenti sakmaod patara organizmia filtris forebSi gasaZvrenad, man es organizmi daasaxela – “filterabeluri organizmi” (virus – laTinuria – Sxami, Slami). berjerinkma iwinaswarmetyvela, rom, sxva filterabeluriiqneba aRmoCenili. zogi iwvevs mcanareTa daavadebebs. sxvebi iwveven cxovelTa daavadebebs. TandaTonobiT filterabeluri ganmarteba moscilda da darCa – virusebi.

1935 wels vendel m. stenlim aSS-s bioqimikosma moaxdina Tambaqos mozaikuri virusis gawmenda da kristalizeba. misma aRmoCenam ganacvifra samecniero sazogadoeba da xalxi. infeqciuri daavadebis gamowveva bilogiuri unaria. kristalizacia dakavSirebulia gawmendil qimikatebTan. mxolod eleqtronuli mikroskopis SemuSavebiT virusebi sabolood iyo identificirebuli, rogorc gansazRvruli formis obieqtebi. magram, cocxalia virusebi? beijerinkma ivarauda, rom SesaZlebelia, rom isini “TviT-mxardamWeri molekulebia?

**virusebi cocxalia?**

imis gadawyvetilebis miReba cocxalia Tu ara – problema ar aris. cocxal arsebebs aqvT rigi Tvisebebi, isini awarmoeben metabolizms. isini organizebulia, rogorc ujredebi. isini Seicaven fermentebs, nukleis mJavebs, naxSirwyals da lipidebs. yvelafers rac es Tvisebebi gaaCnia – cocxalia. magram ra aris is rac yvelaze metia? virusebi mravldeba. isini Seicaven erTi da igive makromolekulebs rac aRmoCenilia ujredebian organizmebSi. isini viTardebian da eTvisebian cvalebad garemos. am mxriv isini sxva arsebebis msgavsia. magram virusebi ujredebi ar arian da maT ar gaaCniaT raime sakuTari mniSvnelovani metabolizmi. **virionas** gawmendili preparati (dauzianebeli ara tiraJirebuli virusis nawilakebi) ar aCvenebs sicocxlis aSkara niSnebs.

umetesi bilogi sTvlis virusebs cocxal organizmebad, Tumca martivebad. isini gvanan sxva cocxal arsebebs mravalmxrivad da albaT maTgan ganviTardnen. jer kidev zogierTi biologi amtkicebs, rom mxolod ujrediani organizmebi cocxalia. amis miuxedavad Cven SeiZleba vifiqroT, rom isini cocxali organizmebia da unda SeviswavloT isini. am saswavlo wignSi Cven ganvixilavT virusebs, rogorc mikroorganizmebis jgufs. modiT exla ganvixiloT Tu rogor axdenen mikrobiologebi mravali virusebis klasifikacias.

 **virusebis klasifikacia**

virusebi klasificirebulia (1) maspinZelis diapazonis, (2) zomis, (3) struqturis, da (4) cxovrebis ciklis Sesabamisad

**maspinZlis diapazoni**

virusebis pirveladi klasifikacia dafuZnebulia **maspinZlis diapazonze** (organizmebis speqtri Setevas axdens konkretul virusze). arsebobs cxovelTa virusebi, mcenareTa virusebi,, eikariotuli mikroorganizmebis virusebi, baqteriuli virusebi. baqteriuli virusebis saxelwodebaa **baqteriofagebi** an ubralod fagebi (fagi berZnul sityvidanaa “Wama”), radganac Cveulebriv isini axdenen baqteriuli ujredebis **lizirebas**.

Cveulebriv virusi axdens Setevas mxolod erT saxeobebze da xandaxan saxeobebis garkveul wevrebze. zogi virusebi Setevas axdenen ujredebis konkretul tipebze mcenareSi an cxovelSi.

rogor ganisazRvreba diapazoni saTanado receptorebis arsebobiT ujredis zedapirze. virusis yoveli tipi mimagrebulia receftoris konkretul tipze ise, rom virusis yoveli tips SeuZlia Seteva moaxdinos mxolod im ujredebze, romlebsac aqvT receftori.

**sidide**

simcire da struqturuli simartive virusebis mniSvnelovani Tvisebebia. zogi maTgani imdenad pataraa rogorc 25 nm. sxvebis sidide ki 300 nm. maTi diapazoni warmoadgens patara baqteriuli ujredis erT-meaTedan erT mesamemde aRwevs. virusebs umetesad ar gaaCniaT ujredovani struqturebi m.S. citoplazma, ribosomebi da birTvi an nukleoidi. umetesi umetesad nukleinuri mJavis nawilia, Sexveuli proteinul safarSi. virusebi genetikurad martivia. erTerTi udidesi virusTagani, T4 Seicavs 77 genebs. umciresi virusebi iseTi, rogoricaa QQß da MS2 Seicaven mxolod 3 gens, orive mZlavri paTogenia.

**struqtura**

virionis bazisuri struqtura aris nukleinis mJavis Suaguli, Semovlebuli proteinis safariT dasaxelebiT – **kapsidi.** amasTan erTad patara fermentuli molekulebia, damatebiTi struqturuli proteinebi da Semovlebuli membrana, romelsac uwodeben – **konverti.** sxva proteinebi xSirad qmnian struqturas, dasaxelebiT **– spaikebi -**  romlebic konvertidan Zvrebian. virusebi, romlebsac ar aqvT konverti uwodeben – **titveli virusebi.**

**nukleinis mJava,** yvela ujredovani organizmebi inaxaven Tavis genetikur informacias “dnk”-s orjaWvian formiT. genis gamoxatvis ganmavlobaSi isini iweren/transkribireben Tavis genetikur informacias “rna”-Si, magram “rna”-Si ar inaxaven. amis sawinaaRmdegod sxvadasxva virusebi inaxaven Tavis genetikur informacias nukleinis mJavis yvela formiT – “dna”-Si, “rna” –Si. magram yvela virusi iyenebs mxolod erT formas. virusebi, romlebic iyeneben ssDNA-s konvertirdebian orjaWvian formaSi., mxolod rodesac Semodis misi paspinZeli. virusebi, romlebic inaxaven informacias RNA-s mokle sqemaSi informaciis nakadi DNA-dan gadadis RNA-Si.

zogierTi am virusebidan iyeneben ssRNA-s, rac uSualod translirdeba maspinZel ribosomebis mier. aseT RNA-s ewodeba “flas strend” da faqtobrivad RNA-s mesenjeria. sxva virusebi inaxaven damatebiT.

**virusuli kapsidebi**

kapsidi, romelic Semoxveulia virusis nukleis mJavis Suagulze qvedanayofebidanaa Sedgenili, romlebsac uwodeben **kapsomerebs.**, romlebic Sedgenilia erT an met proteinisagan. kapsidebi Semodian sami bazisuri formiT: spiraluri, mraval mxrivi, da rTuli. konkretuli forma damokidebulia imaze, Tu rogoraa ganlagebuli kapsomerebi da ramdennaeria. zogierTi virusuli kapsidebi Camoyalibebulia mxolod erT kapsomerisagan. sxvebi Camoyalibebulia bevrisagan.

**spiraluri virusebis kapsomerebi** Seeferebian ermaneTs Tokiani struqturis formiT. Tambaqos mozaikuri virusi spiraluri virusis magaliTia. **mreavalmxrivi virusebi** Cveulebriv ganlagebulia, Tanabari mxareebiT romlebic Seeferebian formiT da gvagonebs geodeziur gumbaTs. yvelaze gavrcelebuli mravalmxvrivi virusis struqturas gaaCnia 20 samkuTxa zedapiri, ikosahedraluria (20-mxrivi)

kompleqsuri virusebi warmoadgenen struqturis kombinacias spiraluri nawiliT, romelsac ewodeba – kudi, mimagrebuli mravalmxriv nawilze, dasaxelebiT – Tavi. bevri baqteriofagi kompleqsuria da umetess aqvs meti struqturebi, isini Seicaven kudis futliars, TefSs bulavkas da kudis boWkoebs. TefSi, bulavkebi da kudis boWkoebi exmareba virions mimagrebuli iyos maspinZel ujredze. kudis futliari monawileobs virusul DNA-s ineqcirebaSi maspinZel ujredSi.

**virusuli konvertebi.** membrana, romelic Semoxveulia konvertul virusebze aris maspinZel ujredis citoplazmuri membranis naWeri. citoplazmuri membranebis msgavsad saidanac saidanac isini warmoiSvnen virusuli konvertebi Seicaven fofolipidebs da proteinebs. virusuli konvertis fosfolipiduri porcia gamodis maspinZlidan, xolo proteinebi kodirebulia virusul genomSi. zogierTagani am proteinebidan glikoproteinebia. konvertSi SefuTuli virusebi mgrZnobadia –arapolarul sxnarebisadmi, rogoricaa qloroformi da eTeri, radganac es sxnarebi anadgureben virusis membranas da mis infeqcirebis unars. titveli virusebi SedarebiT resistenturia arapolarul sxnarebisadmi. praqtikaze imis gansazRvra aris virusi konverSi Tu ara xdeba testirebiT arapolarul sxnarze da eTerse Tu inaqtivirebulia. konvertSi SefuTuli virusebi inaqtivirebulia; titveli virusebi – ara.

**sicocxlis cikli**

yvela virusebs aqvT erTi da igive cxovrebis cikli, romelic radikalurad gansxvavebulia ujredovani organizmis ciklebidan maspinZeli ujredis gareT virusebi arseboben mxolod virionebis formiT, romelic ar meordeba. ganmeorebisaTvis virusma unda moaxdinos maspinZeli ujredis infecireba. am qmedebiT viriona etmasneba ujreds, am process qvia adsorbcia. Semdeg virusuli genomi Sedia maspinZel ujredSi, am process uwodeben **–SeWra.** SeWris dros virusebis zogierTi tipebi ixsneba da iSleba ise, rom nukleinis mJava Sedis maspinZel ujredSi. kapsidis da konvertis mocilebis process uwodeben – **gaxdas.** sxva SemTxvevebSi mTeli virioni Sedis maspinZel ujredSi da Semdeg iwyeba gaxda. gaxdis Semdeg virusuli nukleinis mJava mimarTavs ujreds virusuli komponentebis Sesaqmnelad.

**taqsonomia**

pirvelad virusebi saxeldebodnen maTi maspinZeli diapazonis an organuli sistemis romelzedac moaxdines zemoqmedeba Sesabamisad. 1960-Si virologebma gaacnobieres, rom zogierTma virusebma SeiZleba moaxdinon erTze meti organul sistemaze zemoqmedeba. virusis klasificireba, rogorc tvinis virusi an kanis virusi an iseTi, romelic axdens konkretuli organizmis infeqcirebas aRar aris adekvaturi.

saWiroa axali klasifikaciis sistema. komiteti, romelic Semdgom dasaxelda, rogorc “virusebis taqsonomiis saerTaSoriso komiteti” (ICTV) 1960 wels saerTaSoriso mikrobiologiis kongresze moskovSi ayalibebs am amocanas. sistema, romelic maT SesTavazes ar aris tradiciuli sqema, romelic gamoiyeneba ujredovan organizmebisaTvis. (ICTV)-s sqemas aqvs sami ierarqiuli done – ojaxi, genusi da saxeoba.

(ICTV)-s sistemis gamoyenebiT virusi, romelic iwvevs imunodeficits (AIDS) klasificirebulia, rogorc

ojaxis – Retroviridae

Genus – Lentivirus

saxeobebi: adamianebis imunodeficitis virusi (HIV)

ojaxuri dasaxelebebi xSirad konvertirebulia inglisurad. ise, rom Retroviridae – arian retrovirusebi. es praqtika gaurkvevels xdis gansxvavebas ojaxisa da genus-s Soris.

**baqteriofagebi**

baqteriofagebi aRmoCenili iyo 1915 wels. 1940-Si mikrobiologebis mcire jgufma ori amerikelis maqs delbrikis da salvador lurias xelmZRvanelobiT daiwyes svidi baqtriofagis gamokvleva (T1 dan T7-de), romlebic uteven Esterichia coli-s. maTi miRwevebi iyo novatoruli ori mizeziT. pirveli – maT gaiges rogor gazardon da daTvalon baqteriofagebi. meore – maT aRmoaCines Tu rogor meordebian baqteriofagebi (replikacia). am Sedegebma baqteriofagebTan daamtkica, rom es misRebia virusebis yvela sxva tipebTan am mizeziT Cven daviwyebT baqteriofagebis Semowmebas.

**fagis daTvla da fagis zrda**

meTodebi, gamoyenebuli daTvlisaTvis da baqteriebis (an sxva virusebis) SeswavlisaTvis dafuZnebulia maspi8nZeli ujredebis infeqcirebisa da ganadgurebis reJimze. fagebis CamoTvlisaTvis gamoiyeneba nadebis /Plaque/ Tvla. erT-safexuriani zrdis eqsperimentma gamoavlina Tu rogor xdeba replikacia.

firfitis Tvla. imis dasadgenad, Tu ramdeni baqteriofagi arsebobs nimuSSi Cven davamateT maspinZeli baqteriis kulturis wveTi virusis nimuSSi.. Semdeg gavavrceleT virus-baqteriuli sxnari (an davasxiT damdnar agarSi) agariT gamagrebul zedapirze petris WurWelSi. saTanado inkubaciis periodis Semdeg – ramodenime saaTidan erT dRemde – petris WurWlis zedapiri xdeba dafaruli uamravi baqteriuli ujredebis farTiT. am farTze mrgvali dekoratiuli firfitebia/nadebia (regionebi mxolod ramodenime da arcerTi baqteriiT) (nax.13.6). umetes SemTxvevaSi erTi nadebi anviTarebs erT fagisaTvis virions, romelic arsebobs suspenziaSi.

nadebi im epidemiis Sedegia, romelic daiwyo erTaderTi virionis mier. am virionma moaxdina erTaderi baqteriuli ujredis inficireba. am virionebma daaimficira garSemo ujredebi ufro meti virionis warmoebiT. epidemia gagrZelda sanam baqteriam ar Sewyvita zrda fagis Semdgomi ganviTarebis prevenciiT. am droisaTvis umetesi ujredebi regionSi, romlebic exveva infeqciis sawyis adgils aRmofxvrilia garkveuli Rrublovani firfitis/diskis warmoebiT.

im firfitebis raodenoba, romlebic viTardeba dafaze gvkarnaxobs Cven Tu ramdeni virusi arsebobs Cvens nimuSSi.

Tumca Cveulebriv saWiroa virusis nimuSis ganzaveba firfitaze dadebis win. Semdeg vTvliT im baqteriofagebis raodenobas, romlebic nimuSSia, igive gziT Cven davTvliT baqteriuli ujredebis Tvlis Sedegebs. am proceduris dasaxelebaa – **plaque count** (diskis Tvla)

**erTsafexuriani zrdis mrude**

nadebios daTvlis unari mikrobiologebs aZlevs saSualebas Caataron raodenobrivi eqsperimentebi fagebTan, maS Soris erTsafexuriani zrdis mrudis eqsperimenti. klasikuri eqperimenti gvkarnaxobs Cven bevr rames virusul replikaciaze. erTsafexuriani zrdis mrudis eqsperimenti iwyeba baqteriofaguli virionebis damatebiT mgrZnobad baqteriul ujredebSi. ramodenime wuTis Semdeg ( ris ganmavlobaSic virionebi etmasneba baqteriul ujredebs) sxnari zavdeba ormocdaaTjer. aseTi ganzaveba Tu amyarebs ufroo met kontaqts virionebsa da maspinZel ujredebs Soris – aradamajerebelia.. Semdgom, intervalebiT PFU-s raodenoba inficirebul kulturaSi ganisazRvreba aRebuli nadebis TvliT. PFU-s raodenobis CamoyalibebiT nimuSSi im periodTan, romlis ganmavlobaSic nimuSi aRebulia awarmoebs erT-safexuriani zrdis mrudes. (nax. 13.7)

fagis erTsafexuriani zrdis mrude ar hgavs ujredovani organizmebis mrudes, ujredovani organizmebis odenoba izrdeba mdgradad. amis sawinaaRmdegod PFU-s raodenoba infecirebul kulturaSi ar izrdeba saerTos raRac periodis ganmavlobaSi infeqciis Semdeg. es ara zrdis periodis terminia - **latenturi periodi.** Semdeg (Tu fagebi iwveven TavianTi maspinZlebis afeTqebas) modis **afeTqebis periodi**. PFU-s raodenoba momentalurad izrdeba ramodenime aseuljer. afeTqeba erTjeradia. Tumca latenturi periodis ganmavlobaSi PFU-s raodenoba ar yalibdeba, bevri ram xdeba. maspinZeli ujredi virusuli nukleinis mJavis mimarTulebiT awarmoebs yvela molekularul komponents, romlebic saWiroa axali virionebis sawarmoeblad. afeTqebis periodis win da mis gan mavlobaSi komponentebi grovdeba virionebSi, romlebic gamodian ujredidan, rodesac is feTqdeba. am procesSi ujredi iSleba. PFU-s raodenobis zrda afeTqebis periodSi uwodeben = **afeTqebis sidides.** is warmoadgens axali virionebis saSualo raodenobas, romlebic gamodian inficirebul ujredidan.

virionebis raodenobis TvliT inficirebul kulturaSi Cven vigebT mets virusul replikaciis Sesaxeb, virionebis dasaTvlelad, yoveli nimuSi aRebuli inficirebul kulturidan upirveles yovlisa damuSavdeba qloroformiT. qloroformi klavs ujredebs nimuSSi, m.S. inficirebulebSi. qloroformi ar avnebs xeluxlebel fagis virionebs (isini ar arin gaxveuli konvertSi). inficirebis Semdeg virionebis raodenoba utoldeba nuls, da ase rCeba afeTqebamde. es Sedegi gveubneba, rom inficirebis Semdeg virioni wyvitavs arsebobas, rogorc erTeuli. is iSleba. Cndeba axali virionebi afeTqebis periodamde. es periodi, rodesac aRar arsebobs xeluxlebeli virionebi – **eklipsuri periodia.**

aqedan gamomdinare erTsafexurian zrdis mrudis eqsperimentSi baqteriuli kulturis inficireba sinqronizebulia. eqsperimentis ganmavlobaSi nebismier dros yoveli ujredi inficirebis erTi da igive stadiaSia. ise, rom mTeli kulturis SemowmebiT Cven vigebT ra xdeba yovel individualur ujredSi. am eqsperimentidan vigebT rodis iSleba fagis virioni, Tu rodis grovdeba fagis virionebis STamomavloba da rogor iwarmoeba bevri virionebi erTi inficirebuli baqteriuli ujrediT.

**replikaciis gzebi**

farTo sqemiT fagebis replikaciis cikli erTi da igivea. arsebobs variaciebi, Tumca, rogoricaa Tu rogorc virusuli genomi Sedis maspinZlis ujredSi da rogor toveben mas momwifebuli virionebi. amasTan erTad sxvadasxva ganviTarebis gzebia. zogierTi fagebi Sedian **litikuri gziT** uSualod meti virionebis warmoebiT. sxva fagebs SeuZliaT Sevidnen **lizogenuri gziT**, romelsac mihyavs xangrZliv mSvid mdgomareobamde, romelsac uwodeben – **lizogenia.** fagebi, romlebic midian mxolod litikuri gziT – **virulenturebia;** fagebs, romlebic miedinebian nebismieri gziT uwodeben – **zomiers;**

**virulenturi fagebi.** tipiuri virulenturi baqteriofagis replikaciis ciklis safexurebi, rogoricaa T4 aRwerilia qvemoT da Sejamebulia nax. 13.8. T4 aris titveli kompleqsuri dsDNA baqteriofagi.

pirveliT4 etmasneba Tavisi kudiT receftoris specifiur monakveTs, lipopolisaqariduli molekulis Sua regioni maspinZlis Tavisi maspinZlis Escherichia coli gare membranaSi. fagis yoveli saxeoba axdens molekulis erTerTi specifiuri saxeobis adsorbirebas ujredis zedapirze. es SeiZleba iyos lipopoli saxaridi an gramnegatiuri baqteriis gare membranis proteinuli komponenti, gram-dadebiTi baqteriis teixoviuri mJava flagelumis an pilusis proteini. fagebi ar axdenen konkretuli struqturebis adsorbirebas. isini adsorbireben specifiur molekulebs. magaliTad, zogierTi fagebi axdenen mxolod proteinebis adsorbirebas F-pili=s boloSi. sxvebi axdenen mxolod im proteinebis adsorbirebas, romlebic ayalibeben F-pili=s masaSi.

Semdeg SeWris dros an inficirebis stadiaze T4 –s kudis futliari ubiZgebs Tavis dsDNA-s Sevides ujredSi (Tavi-4). amiT iwyeba eklifsuri periodi. xeluxlebeli virioni aRar arsebobs. fagis proteinuli komponenti, romelic aRar TamaSobs rols replikaciis periodSi rCeba mimagrebuli ujredis zedapirze. amgvarad, T4 –s gaxda xdeba misi Sesvlis dros maspinZel ujredSi.

latenturi periodis dros, romelic mosdevs inficirebas fagis DNA miemarTeba maspinZel ujredisaken virusuli komponentebis seinTezirebisaTvis, maT Soris virusuli DNA da proteinuli komponentebi. latenturi periodis bolos komponenturi nawilebi grovdeba axal virionebad, am process hqvia – **momwifeba.**

virulenturi fagis infeqciebi imdenad swrafia faguri virionebis warmadobiT, rom gansacvifrebelia, rom zogierTi baqteriuli ujredebi fagiT inficirebul ujredebSi rCeba cocxali, zogierTi ki maTgani yovelTvis. es arian mutanturi ujredebi, rezistentuli fagis Semotevaze. umetes SemTxvevebSi specifiuri monakveTi maT zedapirze icvleba ise rom fagis virionebs aRar SeuZliaT maT gadaeban. aseTi mutanturi ujredebi zogadad arseboben erTi as milionTan SemTxvevebSi

(10-8 ). Cveulebrivi baqteriuli kultura as milionze meti ujredebiT (108) yovel mililitrSi Seicavs ujredebs, romlebic acocxleben infeqcias.

**zomieri fagebi.** zomieri fagebis (lambda) sicocxlis cikli agreTve axdens **Eschericia coli-s** inficirebas, naCvenebia nax. 13.9. fagi T4 –s msgavsad, fagi lambda aris dsDNA-s kompleqsuri virioni.

lambdis da T4 –s mier inficirebis sawyisi stadiebi analogiuria. lambda virioni axdens Tavisi kudiT adsorbcias konkretul receptorul proteinze baqteriis gare membranaSi ( konkretulad porini, romelsac moaqvs maltoza gare membranis gaswvriv).

iqve iq ineqcirebas axdens Tavis wrfiv dsDNA-s maspinZel ujredSi. dsDNA-s aqvs erTiani daboloebebi, romlebic uerTdeba erTmaneTs maspinZlis SigniT wris formirebiT. Semdeg λ irCevs rogorc litikur agreTve lizogenur gzas. litikuri gza TiTqmis identuria im gzasTan, romelsac iRebs T4, is miemarTeba maspinZeli ujredis lizisamde da antavisuflebs bevr virions. da piriqiT lizogenuri gza gadadis mSvid/uZrav mdgomareobaSi. arcerTi faguri komponenti ar sinTezirdeba. maspinZeli ujredi ar ziandeba. mrgvali fagis genomi martivad ganmeorebiT uerTdeba maspinZeli ujredis qromosoms da integrirdeba Tavisi gansazRvruli adgilmdebareobiT. am integrirebul mdgomareobaSi fagi DNA-s uwodeben “profagi”. represori proteini kodirebuli profagis mier rCeba mSvid mdgomareobaSi. xdeba profagis replikacia da danawileba STamomavlobis ujredebze danarCeni baqteriuli qromosomis gaswvriv. aseT ujredebs uwodeben – **lizogenuri,** ragdanac maT aqvT lizirebis potenciali Tu represori ar aris aqtivirebuli.

lizogenur baqteriul ujreds SeuZlia gaizardos, daiyos da awarmoos lizogenuri STamomavloba TiTqmis ganusazRvrelad. faqtobrivad umetesi baqteriuli kulturebi atareben albaT erTs an mets profagebs. magram iSviaT SemTxvevebSi profagi tovebs baqteriul qromosoms da dgeba litikur gzaze.. sul male maspinZeli ujredi lizirebs da momwifebuli virionebi gamodian mediaSi.

gamosuli virionebi ar axdenen gavlenas sxva ujredebze lizogenur kulturaSi. igive represori proteini romelsac uWiravs profagi mSvid mdgomareobaSi awarmoebs lizogenur ujredebs, romlebic immunuria infeqciisadmi igive virusiT.

am imunurobis gamo temperaturis fagebi awarmoeben nadebs, rodesac moTavsebulebi arian aralizogenur Stamze. am nadebs aqvs gansxvavebuli garegnoba. imis magivrad, rom iyvnen naTelni, rogorc virulenturi fagebis nadebi – odnav bundovania. nadebi vizualurad Cans radganac bevri ujredi lizirebulia fagebis mier. nadebi bundovania, radganac zogierTi ujredi gaxda lizogenuri da gadarCenili. isini izrdebian nadebSi maTi gaRrublianebiT.

aqedan gamomdinare temperaturis fagebs SeuZliaT icocxlon ormagi sicocxliT. isini ver moqmedeben, rogorc virulenturi fagebi da anadgureben TavianT maspinZels. maT agreTve SeuZliaT TavianTi DNA-s integrireba maspinZlis qromosomSi da mSvidobianad arseboba. rodesac integrirdebian isini inarCuneben udides potencials. nebismier lizogenur kulturaSi ujredebi mudmivad lizirdeba da uSveben momwifebul fagis virionebs

**fagis mravalferovneba**

Cven ganvixileT ori baqteriofagi, λ da T4, struqturulad analogiuri. isini didebi arian (daaxl, 225 nm) kompleqsuri titveli fagebi, romlebic Seicaven dsDNA-s.. magram arsebobs sxva mravali saxeobis baqteriofagi, rogoricaa Qß, romlebic patareebia da Seadgens 24 nm. zogierTi fagi xveulia; sxvebi ki mravali mxareebiT/polihedraluri/. ramodenime fagi konvertSia SefuTuli. nukleinis mJavis yvela tipebia – dsDNA, ssDNA, dsRNA, ssRNA – romlebic fagebSia napovni. umetesi fagebis nukleinis mJava erTiani molekulaamagram zogierTi fagi Seicavs ramodenimes. magaliTad f6 Seicavs sam dsRNA sxvadasxva molekulebs.

aqedan gamomdinare fagebs aqvT Zalian patara gavlena Cvens sicocxleze. isini analogiuria struqturiT, sicocxlis cikliT da mcanareTa da cxovelTa virusebis mravalferovnebiT, magram advilad Sesaswavlia. fagebis kvlevam gamoavlina virusologiis yvela bazisuri principebi, romlebic warmoadgenen safuZvels cxovelTa da mcenareTa virusebis mosakvlevad.