

DU MPhil Phd in Zoology

Topic:- ZOO MPHIL

1) One of the first human genes suspected of exhibiting antagonistic pleiotropy between developmental stages and cell cycle regulation is

[Question ID = 3572]

1. P53
[Option ID = 14285]
2. GLI
[Option ID = 14286]
3. WNT
[Option ID = 14287]
4. MYC
[Option ID = 14288]

2) If a Bar eyed *Drosophila* female mated to white eyed male, what type of phenotype is expected in F1 generation males?

[Question ID = 3573]

1. White eyed
[Option ID = 14289]
2. Bar eyed
[Option ID = 14290]
3. Normal red eyed
[Option ID = 14291]
4. White apricot eye
[Option ID = 14292]

3) In the worm, *Caenorhabditis elegans*, dosage compensation is achieved by

[Question ID = 3574]

1. Reducing the activity of genes by half on both of the X chromosomes of the female
[Option ID = 14293]
2. Upregulating the activity of genes on both the X chromosomes of the female
[Option ID = 14294]
3. Upregulating the activity of genes on one of the X chromosomes of the male
[Option ID = 14295]
4. Inactivation of one of the X chromosomes of the female
[Option ID = 14296]

4) Dosage compensation in *Caenorhabditis elegans* on the X chromosomes of hermaphrodite involves redistribution of chromatin-modifying activities, leading to

[Question ID = 3575]

1. Depletion of histone methyltransferases SET-1 and SET-4
[Option ID = 14297]
2. Depletion of H4K16ac and an enrichment of H4K20me1
[Option ID = 14298]
3. Depletion of H4K20me1 and enrichment of H4K16ac
[Option ID = 14299]
4. Enrichment of both H4K16ac and H4K20me1
[Option ID = 14300]

5) Maximum size of DNA insertion is possible with which class of DNA cloning vector [Question ID = 3576]

1. Phagemid [Option ID = 14301]
2. BAC [Option ID = 14302]
3. P1 phage [Option ID = 14303]
4. YAC [Option ID = 14304]

6) RNase H can recognize and cleave [Question ID = 3577]

1. DNA from DNA/RNA hybrid [Option ID = 14305]
2. RNA from DNA/RNA hybrid [Option ID = 14306]
3. Double stranded RNA [Option ID = 14307]
4. Single stranded RNA [Option ID = 14308]

7) In blue white colony selection, alpha complementation to produce functional beta galactosidase occurs at [Question ID = 3578]

1. Gene level [Option ID = 14309]
2. Peptide level [Option ID = 14310]
3. RNA level [Option ID = 14311]
4. Promoter level [Option ID = 14312]

8) Which type of mammalian skeletal twitch muscle fibres would exhibit slow Myosin ATPase activity? [Question ID = 3579]

1. Type I and Type IIa [Option ID = 14313]
2. Type I only [Option ID = 14314]
3. Type I and Type IIb [Option ID = 14315]
4. Type IIa and Type IIb [Option ID = 14316]

9) A transducer in sensory perception is a receptor cell that [Question ID = 3580]

1. Gets activated by stimuli [Option ID = 14317]
2. Absorbs the stimulus energy [Option ID = 14318]
3. Generates an action potential [Option ID = 14319]
4. Changes the stimulus energy into energy of nerve impulse [Option ID = 14320]

10) The principal opposing force that restrains fluid loss from the capillary is[Question ID = 3581]

1. Filtration pressure [Option ID = 14321]
2. Colloidal osmotic pressure [Option ID = 14322]
3. Blood pressure [Option ID = 14323]
4. Hydrostatic arterial pressure [Option ID = 14324]

11) Which of the following conditions would have the greatest effect on peripheral resistance?[Question ID = 3582]

1. Doubling the length of vessel [Option ID = 14325]
2. Doubling the diameter of the vessel [Option ID = 14326]
3. Doubling the viscosity of the blood [Option ID = 14327]
4. Doubling the turbulence of the blood [Option ID = 14328]

12) If the reactant and product are taken at 1M concentration and the G° for a reaction is -25 kJ/mole, then the reaction would[Question ID = 3583]

1. Occur towards product formation [Option ID = 14329]
2. Occur towards reactant formation [Option ID = 14330]
3. Not occur in any direction as the reactant and products are already in equal concentration [Option ID = 14331]
4. Occur in any direction depending upon the absolute temperature of the reaction [Option ID = 14332]

13) In nucleoside triphosphates, the high energy resides in[Question ID = 3584]

1. All the triphosphate linkages [Option ID = 14333]
2. The alpha phosphate which is linked with phospho-ester linkage [Option ID = 14334]
3. The beta and gamma phosphates which are both linked to phospho-anhydride linkages [Option ID = 14335]
4. Only the gamma phosphate that is linked to phospho-anhydride linkage [Option ID = 14336]

14) Following are some statements for Iron-Sulphur World hypothesis:

A. The last universal common ancestor would have been created around ancient volcanic hydrothermal vents in ocean

B. The crevices in the volcanic rocks would have alkaline water

C. The energy to trap carbons is generated when electron flows through Iron-Sulphur clusters at the crevices

D. The proton gradients generated during electron transport chain in mitochondria are derived from ancient Iron-sulphur clusters found in the electron carrier protein complexes Which of the following combination is correct for ancient energy trapping system?

[Question ID = 3585]

1. A, B and C only
[Option ID = 14337]
2. B, C and D only
[Option ID = 14338]
3. A, C and D only
[Option ID = 14339]
4. A, B, C and D
[Option ID = 14340]

15) Polymerization catalysed by all DNA or RNA dependent DNA/RNA polymerase can in principle proceed both in $5' \rightarrow 3'$ or $3' \rightarrow 5'$ directions. However, in nature the polymerization occurs only in one direction that is $5' \rightarrow 3'$ direction. This is because[Question ID = 3586]

1. The polymerization in $3' \rightarrow 5'$ direction is energetically more expensive [Option ID = 14341]
2. It would be futile to have the polymerization to occur in both the directions [Option ID = 14342]
3. If error occurs and the wrong nucleotides are removed by proofreading, the polymerization in $3' \rightarrow 5'$ cannot proceed as the energy is carried at the growing end of polynucleotide chain [Option ID = 14343]
4. The polymerization which is driven by pyrophosphate hydrolysis can take place only if the polymerization is occurring in $5' \rightarrow 3'$ direction [Option ID = 14344]

16) Phosphorylation of enzymes is known to modulate the activity of enzymes in metabolic pathways because[Question ID = 3587]

1. Phosphorylation increases molecular weight of the proteins that leads to modulation of activity of enzyme [Option ID = 14345]
2. Phosphate interacts with the substrate which causes modulation of the enzyme activity [Option ID = 14346]
3. Phosphate during reaction is hydrolysed to give energy which increases rate of reaction [Option ID = 14347]
4. The charge on phosphate induces a structural change in the protein that modulates activity of the enzyme [Option ID = 14348]

17) Consider a situation in which embryo has region A and B that differentiate into different tissue types. If region B cells are grafted on to region A, they still develop as B cells. These cells are called:[Question ID = 3588]

1. Determined [Option ID = 14349]
2. Not determined [Option ID = 14350]
3. Specified [Option ID = 14351]
4. Apoptotic [Option ID = 14352]

18) Epimorphosis is regeneration through[Question ID = 3589]

1. Repatterning of existing cells, as occurs in Hydra [Option ID = 14353]
2. The reinitiation of division in existing cells, followed by patterning, as occurs in Hydra [Option ID = 14354]
3. The reinitiation of division in existing cells, followed by patterning, as occurs in amphibians such as newts [Option ID = 14355]
4. Repatterning of existing cells, as occurs in amphibians [Option ID = 14356]

19) In *Drosophila* embryo, mutation in maternal gene torso can cause loss of

[Question ID = 3590]

1. Acron and telson
[Option ID = 14357]
2. Abdominal segments
[Option ID = 14358]
3. Head region
[Option ID = 14359]

4. Thoracic region

[Option ID = 14360]

20) Why were frogs and sea urchins typically used to study development in classical anatomy and embryology? A. The animals were easy to breed in captivity. B. The eggs could be easily obtained as they developed outside the mother. C. In case of frogs, sufficiently large and robust eggs provided easy experimental manipulation. D. Due to transparency of their embryos, cell divisions and tissue movements could be followed visually. Choose the combination of correct answers from the options given below:[Question ID = 3591]

1. A and B only [Option ID = 14361]
2. B and C only [Option ID = 14362]
3. C and D only [Option ID = 14363]
4. A, C and D only [Option ID = 14364]

21) A combination of several molecules and their appropriate localisation is required for a normal establishment of organiser region. Select the CORRECT combination of molecules and their location required for formation of organiser region in Xenopus.[Question ID = 3592]

1. Dorsal side - Active (GBP, wnt11, GSK3, Dsh); Inactive (B-catenin) [Option ID = 14365]
2. Dorsal side - Active (GBP, wnt11, Dsh, B-catenin); Inactive (GSK3) [Option ID = 14366]
3. Dorsal side - Active (GSK3); Inactive (GBP, wnt11, Dsh, B-catenin, noggin) [Option ID = 14367]
4. Ventral side - Active (GBP, wnt11, Dsh, B-catenin); Inactive (GSK3) [Option ID = 14368]

22) Neutral alleles are those where allele differences are NOT correlated with differences in[Question ID = 3593]

1. Fitness [Option ID = 14369]
2. Genotype [Option ID = 14370]
3. Phenotype [Option ID = 14371]
4. Evolution [Option ID = 14372]

23) The point of intersection of resource availability curve and population growth curve is called as:[Question ID = 3594]

1. Tipping point [Option ID = 14373]
2. Breaking point [Option ID = 14374]
3. Malthusian catastrophe [Option ID = 14375]
4. Equilibrium point [Option ID = 14376]

24) The three-domain system of classification of living organisms was proposed by[Question ID = 3595]

1. Ernst Haeckel [Option ID = 14377]
2. Carl Woese [Option ID = 14378]
3. E.C. Colwell [Option ID = 14379]
4. Robert Whittaker [Option ID = 14380]

25) Among the steps of maturation of a pre- B-cell to a plasma cell, the only one step that does not require antigen is[Question ID = 3596]

1. Affinity maturation [Option ID = 14381]
2. Development of memory [Option ID = 14382]
3. Clonal selection [Option ID = 14383]
4. Recombination of the V, D, J gene loci [Option ID = 14384]

26) How many heavy chains of immunoglobulin are likely to be produced in an organism, if there are 250 V segments, 25 D segments, and 4 J segments?[Question ID = 3597]

1. 6250 [Option ID = 14385]
2. 25,000 [Option ID = 14386]
3. >> 6250 and <25,000 [Option ID = 14387]
4. >>>25,000 [Option ID = 14388]

27) Match the important players of antigen processing and presentation in Column I with Column II.

List I	List II
A. LMP2	I. Lysosome
B. HLA DM	II. TAP
C. Invariant Chain	III. Removes CLIP
D. Acidic vesicular compartment	IV. Part of proteasome
E. Peptide transporter	V. Locks MHC class II molecules

Choose the correct answer from the options given below:

[Question ID = 3598]

1. A - I, B - II, C - III, D - IV, E - V [Option ID = 14389]
2. A - IV, B - III, C - V, D - I, E - II [Option ID = 14390]
3. A - IV, B - II, C - III, D - V, E - I [Option ID = 14391]
4. A - IV, B - V, C - III, D - I, E - II [Option ID = 14392]

28) Following statements explain some of the properties of vaccines:

- A. Attenuated vaccines are more likely to induce cell-mediated immunity than killed vaccines.
- B. Transplacental transfer of maternal IgG antibodies against measles confers short-term immunity to the foetus.
- C. An RNA vaccine only induces response to a single epitope.
- D. Macromolecules generally contains a large number of potential epitopes.
- E. One disadvantage of DNA vaccines is that they do not generate significant immunologic memory.

Which one of the following combinations has all CORRECT statements?

[Question ID = 3599]

1. A, B and D only
[Option ID = 14393]
2. A, B and C only
[Option ID = 14394]
3. B, C and D only
[Option ID = 14395]
4. A, D and E only

[Option ID = 14396]

29) The dynamics of which cytoskeletal element changes in a moving amoeba?[Question ID = 3600]

1. Microtubules [Option ID = 14397]
2. Microfilaments [Option ID = 14398]
3. Intermediate filaments [Option ID = 14399]
4. MreB [Option ID = 14400]

30) The four postulates of the Chemiosmotic hypothesis accounted for:[Question ID = 3601]

1. The four complexes of the electron transport chain (ETC) [Option ID = 14401]
2. Cardiolipin [Option ID = 14402]
3. ETC, F1-F0 ATPase, cardiolipin and pmf generators [Option ID = 14403]
4. ETC, F1-F0 ATPase, cardiolipin and anion exchangers [Option ID = 14404]

31) In vertebrate photoreceptors, the sequence in the signaling cascade after activation of rhodopsin by light is:[Question ID = 3602]

1. Transducin, PLC, DAG + IP₃, Na⁺ channel [Option ID = 14405]
2. Transducin, PLC, PIP₂, DAG + IP₃, Dark current channel [Option ID = 14406]
3. Transducin, PDE, 5'-GMP, Na⁺ channel [Option ID = 14407]
4. Transducin, PDE, cGMP, 5'-GMP, Dark current channel [Option ID = 14408]

32) Water molecules form a water spiral through minor groove of DNA double helix. B-DNA at 85% relative humidity has certain number of water molecule interacting its base pairs. When the relative humidity is reduced from 85% to 70%, it causes transition in DNA conformation. Which of the following statement is CORRECT?[Question ID = 3603]

1. It causes B to A transition with base pairs perpendicular to the axis. [Option ID = 14409]
2. It causes B to Z transition with base pairs perpendicular to the axis. [Option ID = 14410]
3. It causes B to A transition with base pairs tilted to the axis. [Option ID = 14411]
4. It causes B to Z transition with base pairs tilted to the axis. [Option ID = 14412]

33) If cytosines have to H-bond with G:C base pairs in a double stranded DNA to form a triple helical DNA through Hoogsteen base pairing, mild acidic pH is required, because[Question ID = 3604]

1. N7 at G has to be protonated [Option ID = 14413]
2. N3 at cytosines has to be protonated [Option ID = 14414]
3. H-bond is mediated through acidic protons [Option ID = 14415]
4. Both N7 at G and N3 at C have to be protonated [Option ID = 14416]

34) Hybridization of nucleic acids follow a complex second order kinetics, where the concentrations of the single stranded nucleic acids, their length, base composition, and the salt concentration in the hybridization medium are important. However, in conventional Southern blot hybridization, one strand is immobilized on a membrane and the probe, usually of uniform small in size, is added far in excess concentration. This is done to[Question ID = 3605]

1. Change the second order kinetics to pseudo second order reaction and to make hybridization independent of length of the probe DNA [Option ID = 14417]
2. Change the second order kinetics to bimolecular second order reaction [Option ID = 14418]
3. Make hybridization independent of length of DNA only [Option ID = 14419]
4. Change the second order kinetics to apparent first order reaction and to make hybridization independent of length of the probe DNA [Option ID = 14420]

35) Which of the following processes capture the key difference between metapopulation versus single-population approach to study population dynamics?[Question ID = 3606]

1. Births and Deaths [Option ID = 14421]
2. Life history variation [Option ID = 14422]
3. Immigration and Emigration [Option ID = 14423]
4. Environmental and demographic stochasticity [Option ID = 14424]

36) The two species of barnacles, *Balanus* and *Chthamalus*, live in intertidal zone and distribute free-swimming larvae over all exposed rocks. Which of the statements mentioned below CORRECTLY explains their co-existence in the given habitat?

[Question ID = 3607]

1. They co-exist in the same niche

[Option ID = 14425]

2. Either *Balanus* or *Chthamalus* must eventually become locally extinct as one is a predator of the other

[Option ID = 14426]

3. *Balanus* being faster growing and crowds out *Chthamalus* from lower tidal zone, while *Chthamalus* endures the drier conditions and populate upper tidal zone

[Option ID = 14427]

4. There is no way to determine which will survive since it is a random field event

[Option ID = 14428]

37) Neurons that get excited in an individual by sight of another individual performing a task has been experienced by the focal individual are called[Question ID = 3608]

1. Vision neurons [Option ID = 14429]
2. Motor neurons [Option ID = 14430]
3. Sensory neurons [Option ID = 14431]
4. Mirror neurons [Option ID = 14432]

38) Which of the following statements is INCORRECT with respect to Luciferase?

[Question ID = 3609]

1. Luciferase gene expresses constitutively without a promoter

[Option ID = 14433]

2. Gene isolated from firefly enzyme luciferase can be incorporated into animals cells and help them glow

[Option ID = 14434]

3. Luciferase can be used a tool to trace the behaviour of genes in animals

[Option ID = 14435]

4. *In vitro* luciferase based reporter assays may lead to drug discovery

[Option ID = 14436]

39) Which of the following is NOT a property of the neurotransmitter molecule?[Question ID = 3610]

1. It must be synthesized and stored in pre-synaptic neuron and must be released by the presynaptic axon potential. [Option ID = 14437]
2. It must not be synthesized and stored in other tissues and organs of the body. [Option ID = 14438]
3. The molecule when experimentally applied, must produce a response in the post-synaptic cell that mimics the response produced by the release of neurotransmitter. [Option ID = 14439]
4. The molecule must be having a life-span larger than that of a hormone. [Option ID = 14440]

40) The induction of an unfamiliar new genetically dissimilar male mouse in the group of female mice causes abortion of pregnancy. This effect is known as[Question ID = 3611]

1. McClintock effect [Option ID = 14441]
2. Whitten effect [Option ID = 14442]
3. Lee-Boot effect [Option ID = 14443]
4. Bruce effect [Option ID = 14444]

41) The bacterium *Escherichia coli* has a single circular DNA as its genome that has 4×10^6 bp. How many moles of DNA are present in each *E. coli* cell?

[Question ID = 3612]

1. 1 mole
[Option ID = 14445]
2. 0.25×10^{-6} moles
[Option ID = 14446]
3. 6.023×10^{23} moles
[Option ID = 14447]
4. 1.66×10^{-24} moles
[Option ID = 14448]

42) The bacterium *Escherichia coli* has one copy of the circular DNA that has 4×10^6 base pairs. How many moles of DNA and how many moles of nucleotides, respectively are present in a single *E. coli* cell?

[Question ID = 3613]

1. 1.66 yocto moles and 13.28 atto moles, respectively
[Option ID = 14449]
2. 1 mole and 4 micro moles, respectively
[Option ID = 14450]
3. 6.023 yocto moles, and 13.28 zepto moles, respectively
[Option ID = 14451]
4. 1.66 zepto moles and 4 atto moles, respectively
[Option ID = 14452]

43) When a monochromatic light passes through a solution, the intensity of transmitted light[Question ID = 3614]

1. Decreases linearly with increasing concentration of solute [Option ID = 14453]
2. Increases linearly with increasing concentration of solute [Option ID = 14454]
3. Decreases exponentially with increasing concentration of solute [Option ID = 14455]
4. Increases exponentially with increasing concentration of solute [Option ID = 14456]

44) During an isopycnic centrifugation when the density of liquid equals to the density of sedimenting particle, the particle will[Question ID = 3615]

1. Not move at all [Option ID = 14457]
2. Continue moving towards the bottom of the centrifuge tube [Option ID = 14458]
3. Start moving towards top of the centrifuge tube [Option ID = 14459]
4. Move randomly in the tube [Option ID = 14460]

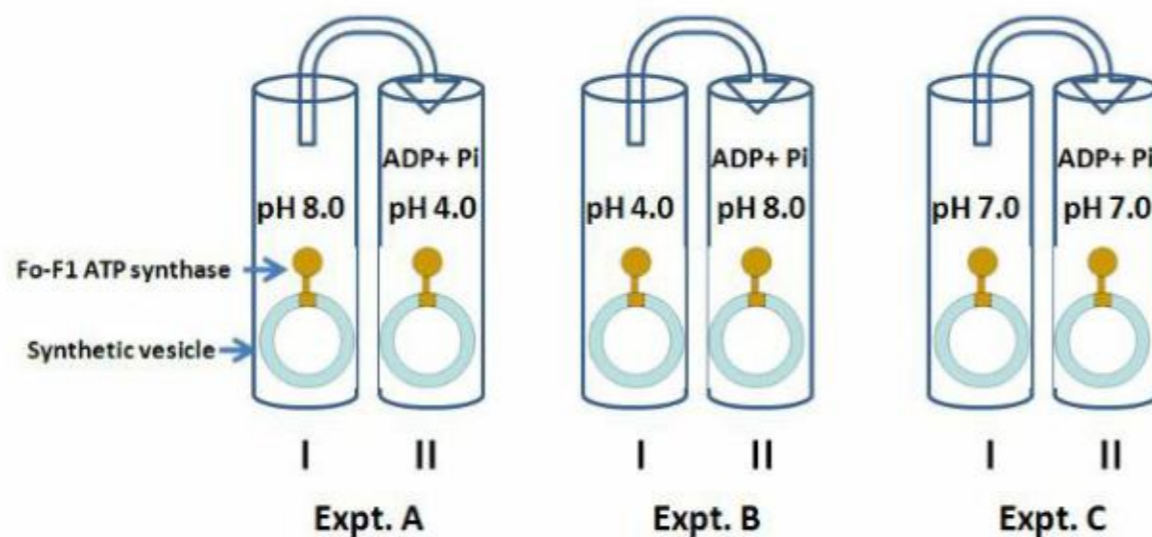
45) Separation of eukaryotic mRNA by polyU-sepharose is an example of[Question ID = 3616]

1. Affinity chromatography [Option ID = 14461]
2. Ion-exchange chromatography [Option ID = 14462]
3. Partition chromatography [Option ID = 14463]
4. Chromatofocussing [Option ID = 14464]

46)

Following experiments (Expt. A, B, and C) were conducted where synthetic vesicles containing Fo-F1 ATP synthase were prepared and incubated overnight in tube labeled as I

Subsequently, the vesicles from the tube I were transferred to the tube II which also contained ADP and Pi (inorganic phosphates).



Which of the following statements is TRUE for the above experiments?

[Question ID = 3617]

1. As a consequence of generation of proton gradients, ATP will be synthesized in both the Expt. A and B.

[Option ID = 14465]

2. ATP shall be synthesized only in the experiment B, because the proton has to flow out of the vesicles through the Fo-F1 particle for ATP synthesis.

[Option ID = 14466]

3. ATP shall be synthesized in Expt. C as well because Fo-F1 ATP synthase has the inherent property to catalyze synthesis of ATP from ADP and Pi.

[Option ID = 14467]

4. Since in mitochondria the components of electron transport chain are also required for ATP synthesis, in none of the experiments ATP shall be synthesized.

[Option ID = 14468]

47) A purified protein was analyzed by SDS PAGE after treating with beta-mercaptoethanol and SDS. It resolved into two bands of 25 and 50 kDa of equal intensity. However, when the protein was separated using Gel-filtration column of Sephadex G-100, it resolved only as a single protein with a molecular weight of 150 kDa. The CORRECT possible explanations for the results of above experiment is:[Question ID = 3618]

1. The protein got degraded while resolving in SDS PAGE. [Option ID = 14469]
2. The protein had contaminants that were bound when separated through Sephadex G-100. [Option ID = 14470]
3. The protein is a tetrameric protein having two subunits each of 50 and 25 kDa held together by disulfide bonds. [Option ID = 14471]
4. The protein is a tetrameric protein having two subunits each of 50 and 25 kDa held together by amide bonds. [Option ID = 14472]

48) *Escherichia coli* cells were grown for many generations in $^{15}\text{NH}_4\text{Cl}$ as sole nitrogen source. Subsequently, these cells were grown exactly for four generations in medium containing $^{14}\text{NH}_4\text{Cl}$. The DNA from these cells were isolated and separated. If $^{15}\text{N}/^{15}\text{N}$ represents the two strands of DNA where both strands have heavy nitrogen; $^{15}\text{N}/^{14}\text{N}$ as intermediate DNA; and $^{14}\text{N}/^{14}\text{N}$ as DNA containing light nitrogen, the ratios for heavy: intermediate: light DNA, respectively would be

[Question ID = 3619]

1. 1: 0: 7

[Option ID = 14473]

2. 1: 1: 6

[Option ID = 14474]

3. 0: 1: 7

[Option ID = 14475]

4. 0: 8: 0

[Option ID = 14476]

49) Which of the following is NOT a categorical variable?[Question ID = 3620]

1. Gender [Option ID = 14477]
2. Marriage status [Option ID = 14478]
3. Occupation [Option ID = 14479]
4. Age [Option ID = 14480]

50) Cadherins are cell adhesion molecules which adhere to other cells by homophilic interactions only in the presence of high concentration of extracellular Ca^{2+} . Lymphocytes normally do not express cadherins. E-cadherins were expressed in lymphocytes and equal number of these cells was cultured in medium containing high concentration of Ca^{2+} . What would you observe under the microscope?[Question ID = 3621]

1. Single cells [Option ID = 14481]
2. Clumps of lymphocytes mixed with single cells [Option ID = 14482]
3. Large aggregates of lymphocytes [Option ID = 14483]
4. A sheet of lymphocytes [Option ID = 14484]