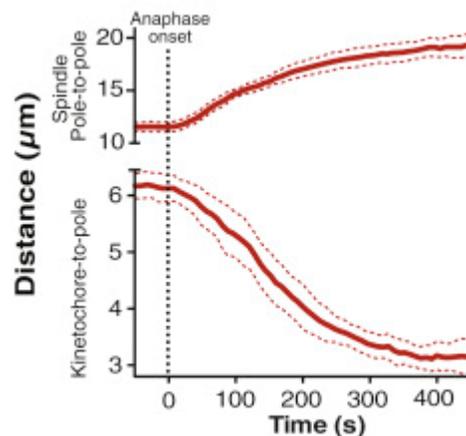


APPENDIX A. EXAMPLES OF STUDENT-AUTHORED QUESTIONS ON PEERWISE & COMMENTS FROM PEERS

Here are two examples of student-authored MCQs and comments from peers on PeerWise. We are grateful to our students for generating these materials, their identities are removed to avoid potential conflicts of interests and ethical issues.

Question 4581939

Kuan-Chung Su, Zachary Barry & et al. (2016). Analysis of Anaphase Chromosome Dynamics in Human Cells [JPEG]. A Regulatory Switch Alters Chromosome Motions at the Metaphase-to-Anaphase Transition. https://ars.els-cdn.com/content/image/1-s2.0-S2211124716314668-gr1_lrg.jpg



The above image shows the displacement between the kinetochore and spindle pole and the displacement between opposite spindle poles of HeLa cells during the anaphase stage of mitosis.

Which of the following statements is false?

OPTION	ALTERNATIVE ANSWERS	FIRST ANSWERS	CONFIRMED ANSWERS
A	The increase of displacement between opposite spindle poles, is contributed by the polymerization of overlapping polar microtubules.	1 (6.67%)	0
B	The increase of displacement between opposite spindle poles, is contributed by a driving force from dynein motor proteins that are associated with the spindle poles on aster microtubules.	4 (26.67%)	0
C	The decrease of distance between the kinetochores and spindle pole is primarily due to the rapid depolymerization of kinetochore microtubules from the plus end.	4 (26.67%)	0
D	The decrease of distance between the kinetochores and spindle pole is contributed by the sliding of bridging microtubules that pushes kinetochore fibers poleward.	6 (40.00%)	0

Explanation (written by the question's author, and become available when a participant attempted it)

The following explanation has been provided relating to this question:

A. (True)

For Anaphase B, not only do plus end-directed motor proteins (primarily kinesin motor proteins) push the spindle poles apart by creating a sliding force between overlapping polar microtubules, overlapping polar microtubules do grow longer through polymerization.

B. (False)

For Anaphase B, while it is true that dynein motor proteins (minus end-directed motor proteins) assist with the increasing distance between spindle poles, the dynein motor proteins should be attached to the cell cortex. Only then can the motor proteins pull the spindle poles further apart.

C. (True)

For Anaphase A, the primary force that segregates sister chromatids is the rapid depolymerization of kinetochore microtubules. As such, this is the primary reason the distance between the spindle pole and the kinetochore decreases.

D. (True)

For Anaphase A, recent research suggests that the sliding of bridging microtubules is one of the mechanisms for chromosome movement in human cells (Kruno Vukušić et al., 2017). For more information, one can find the details here: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5637169/>

Topics (tagging the question to a particular topic)

The following topics have been indicated as being relevant to this question:

Topic 1

Here are four comments for this question (Three top-level comments and one reply)

Written: 5:33pm, 13 Aug	Author has: 97 points and 7 badges
Hi, It is just my opinion. In idea C, the primary force is the driving force of motor proteins that pull chromosome to the poles, the rapid depolymerization of kinetochore microtubules allows motor protein to move. Thank you for your good question. :))	<input type="radio"/> <input type="radio"/> <input checked="" type="radio"/> <input type="radio"/>
Written: 9:39pm, 13 Aug	Reply written by question author
Hi, thank you for your comment. I wasn't aware of that information. Glad that you were able to brought my attention to something I've missed out during the lecture. Thank you! (by: ...)	
Written: 6:46pm, 14 Aug	Author has: 1355 points and 11 badges
Good question with easy to understand and concise explanations, you managed to trick me with option D since i missed the word bridging microtubules. If i am not wrong though, you need to have five different options according to the document on the peerwise assignment, but there's only four options here, so not sure if there will be a problem. ...	<input type="radio"/> <input type="radio"/> <input checked="" type="radio"/> <input type="radio"/>
Written: 12:27pm, 15 Aug	Author has: 799 points and 10 badges
Good question! Got caught in the wording of option B as I did not think of the cell cortex versus spindle microtubule angle. ...	<input type="radio"/> <input type="radio"/> <input checked="" type="radio"/> <input type="radio"/>

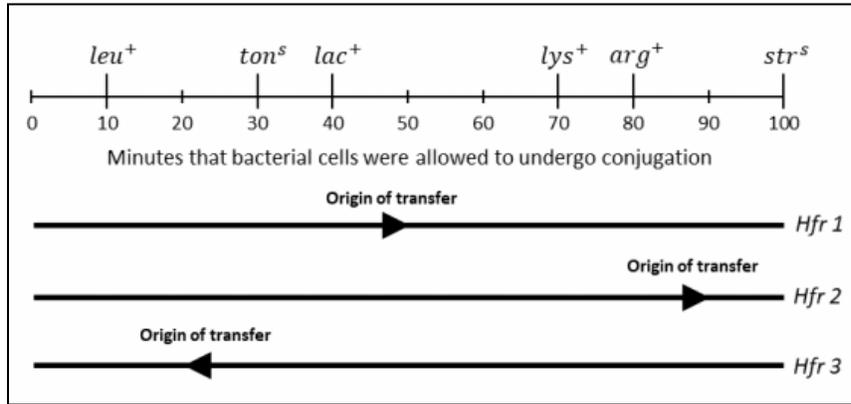
Question 4591238

This question has been answered by 20 people and has an average rating of 4.46 (based on 13 ratings)

Below are two *E. coli* strains with their genotypes shown:

Hfr cells: *leu⁺ ton^s lac⁺ lys⁺ arg⁺ str^s*

F⁻ cell: *leu⁻ ton^r lac⁻ lys⁻ arg⁻ str^r*



The above image shows the genetic map and direction of transfer of each Hfr donor that were used in the interrupted conjugation experiment between Hfr donors and F⁻ recipients.

Which of the following is **FALSE**?

Notes:

leu⁺, lys⁺, arg⁺ = ability to synthesise leucine, lysine, arginine;

leu⁻, lys⁻, arg⁻ = inability to synthesise leucine, lysine, arginine;

ton^s = sensitive to infection by bacterial virus T1;

ton^r = resistant to infection by bacterial virus T1;

lac⁺ = ability to metabolise lactose for growth;

lac⁻ = inability to metabolise lactose for growth;

str^s = sensitive to antibiotic streptomycin;

str^r = resistant to antibiotic streptomycin;

OPTION	ALTERNATIVE ANSWERS	FIRST ANSWERS	CONFIRMED ANSWERS
A	From the sample obtained after 40 minutes of conjugation between Hfr 1 donors and F ⁻ recipients, colonies can be seen forming in an agar nutrient plate consisting of streptomycin and lactose as the only source of carbohydrate.	 2 (10.00%)	 0 (0.00%)
B	From the sample obtained after 30 minutes of conjugation between Hfr 2 donors and F ⁻ recipients, colonies can be seen forming in an agar nutrient plate consisting of streptomycin, but lacking lysine and arginine amino acids.	 1 (5.00%)	 0 (0.00%)
C	From the sample obtained after 40 minutes of conjugation between Hfr 3 donors and F ⁻ recipients, more colonies can be seen forming in an agar nutrient plate consisting of streptomycin and bacterial virus T1, compared to the agar nutrient plate of the same conditions containing the sample obtained after 30 minutes of conjugation between Hfr 2 donors and F ⁻ recipients.	 10 (50.00%)	 3 (75.00%)
D	From the sample obtained after 30 minutes of conjugation between Hfr 1 donors and F ⁻ recipients, more colonies can be seen forming in an agar nutrient plate consisting of streptomycin and lactose as the only source of carbohydrate, compared to the agar nutrient plate of the same conditions containing the sample obtained after 30 minutes of conjugation between Hfr 3 donors and F ⁻ recipients.	 5 (25.00%)	 1 (25.00%)
E	From the sample obtained after 70 minutes of conjugation between Hfr 3 donors and F ⁻ recipients, colonies can be seen forming in an agar nutrient plate consisting of streptomycin, having lactose as the only source of carbohydrate, as well as lacking lysine and arginine amino acids.	 2 (10.00%)	 0 (0.00%)

Explanation

The following explanation has been provided relating to this question:

A. (True)

Following the direction of transfer of Hfr 1, we can find that after 40 minutes, there's a possibility that the lac⁺ gene has been transferred to the F⁻ cell and replaced the lac⁻ gene. Thus, after killing all the donor cells with streptomycin, some transconjugants can still form colonies on the agar plates as they are able to metabolise lactose for growth.

B. (True)

Following the direction of transfer of Hfr 2, we can find that after 30 minutes, there's a possibility that both the lys⁺ and arg⁺ genes have been transferred to the F⁻ cell and replaced the lys⁻ and arg⁻ genes. Thus, after killing all the donor cells with streptomycin, some transconjugants can still form colonies on the agar plates as they are able to self-synthesise lysine and arginine.

C. (False)

The correct statement should be:

"From the sample obtained after 40 minutes of conjugation between Hfr 3 donors and F⁻ recipients, lesser colonies can be seen forming in an agar nutrient plate consisting of streptomycin and bacterial virus T1, compared to the agar nutrient plate of the same conditions containing the sample obtained after 30 minutes of conjugation between Hfr 2 donors and F⁻ recipients."

This is because following the direction of Hfr 3, we can find that after 40 minutes, there's a possibility that the tons gene has been transferred to the F⁻ cell and replaced the tonr gene. As such, these transconjugants are sensitive to infection by bacterial virus T1, and are killed off; On the other hand, following the direction of Hfr 2, we can find that after 30 minutes, there's no possibility that the tons gene could be transferred to the F⁻ cell and replace the tonr gene. Thus, these transconjugants are still resistant to infection by bacterial virus T1, and won't be killed off. Comparing both petri dishes, there would be lesser colonies in the sample obtained from the conjugation of Hfr 3.

D. (True)

Comparing both of the situations, we would find that the lac⁺ gene is closer to the origin of transfer of Hfr 1 than to the origin of transfer of Hfr 3. The closer the gene is to the origin of transfer, the more efficient the gene is transferred. Thus, more transconjugants obtained from the conjugation of Hfr 1 donors have the lac⁺ gene compared to the transconjugants obtained from the conjugation of Hfr 3 donors, leading to more colonies.

E. (True)

Following the direction of transfer of Hfr 3, we can find that after 70 minutes, there's a possibility that the lac⁺, lys⁺ and arg⁺ genes have been transferred to the F- cell and replaced their corresponding genes. Thus, after killing all the donor cells with streptomycin, some transconjugants can still form colonies on the agar plates as they are able to metabolise lactose for growth, and self-synthesise lysine and arginine.

Topics

The following topics have been indicated as being relevant to this question:
topic 2

Comments

There are six comments for this question (six top-level comments and 0 replies)

There are 6 comments for this question (6 top-level comments and 0 replies)

Written: 8:57am, 27 Aug	Author has: 2493 points and 18 badges
★★★★	
for c is it false because the ton(s) allele will replace the ton(r) allele in the F- cell? or do they have mechanisms that prevent detrimental alleles from undergoing recombination?	★ ○ × ○
Reply to this comment	
Written: 2:13pm, 24 Aug	Author has: 553 points and 8 badges
Very in-depth question that tests a student's knowledge about direction of gene transfer from donor to recipient cell during conjugation. Question well explained with definitions of each and every type of allele, and the explanation for each statement is also clear and concise.	★ ○ × ○
Reply to this comment	
Written: 2:38pm, 25 Aug	Author has: 1201 points and 13 badges
ohno i accidentally cmed my answer when i got it wrong ohno AHAH but good question! and it really made me work it out and got me jumbled! really liked the in depth explanation tool	★ ○ × ○
Reply to this comment	
Written: 2:58pm, 27 Aug	Author has: 1316 points and 11 badges
loads of effort put into crafting the question and explanations, thank you!	★ ○ × ○
Reply to this comment	
Written: 5:13pm, 30 Aug	Author has: 466 points and 9 badges
Excellent question with good context and detailed explanations! It helped to reinforce the idea of direction of gene transfer and the different factors that can affect colony growth. It's great that there were comparisons between the colony growths caused by the different Hfr strains.	★ ○ × ○
Reply to this comment	
Written: 1:52pm, 31 Aug	Author has: 2129 points and 17 badges
nice, very in-depth, I spent quite a lot of time on it	★ ○ × ○
Reply to this comment	

<< Prev | 1-6 | Next >>
(Displaying 1 - 6 of 6)

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[Edit this question](#)